



# Electronic Trading Platform Reference Manual

LIFFE CONNECT® Version 7.1. CBOT

Manual Version 1.4

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## Preface

This document provides a definition of the capabilities of the CBOT's electronic trading platform powered by LIFFE CONNECT<sup>®</sup>. It describes the functionality available to traders but is not designed to be a user guide. For specific operating instructions, refer to the reference documentation of your Independent Software Vendor (ISV) or internal client application graphical user interface (GUI). **NOTE: Client Applications may not provide the full functionality available from LIFFE CONNECT<sup>®</sup>. Check with your Independent Software Vendor (ISV) or internal Client Application administrator for functions supported by your Client Application.**

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# 1. Introduction

## 1.1 Functional Overview

LIFFE CONNECT<sup>®</sup> is an electronic trading environment originally developed to support LIFFE's London futures and options markets and now extended to support other exchanges around the world.

LIFFE CONNECT<sup>®</sup> supports a wide range of derivatives contracts and functionality including orders for defined strategy types, thus eliminating legging risk in the trading of these strategies.

Other examples of functionality include:

- Options delta neutral trading
- Dynamic price limits
- Options pricing models
- Ex-pit orders
- Preference market making.

Trading on LIFFE CONNECT<sup>®</sup> takes place by submitting an order into the system. LIFFE CONNECT<sup>®</sup> matches orders in its central order book to produce trades. A range of order types are available, supporting different trading strategies. Untraded orders can rest in the order book, where they can be revised (within certain limits) or withdrawn. Wholesale ("ex-pit") trades are also supported.

After a trade has been executed on LIFFE CONNECT<sup>®</sup> trade details are sent to the post-trade processing and clearing system that will be provided by the CBOT.

Trading anonymity is a key aspect of trading on LIFFE CONNECT<sup>®</sup>. Participants in the market will not be aware of whose orders they are viewing or trading against, either pre or post trade.

Clearing Members will only be able to view the orders and trades of a Non-Clearing Member for whom they provided clearing services via their Client Application or from post-trade information provide by the clearing organization.

LIFFE CONNECT<sup>®</sup> offers the operating exchange a suite of applications for the monitoring and control of the electronic market to ensure an orderly market is maintained at all times.

## 1.2 e-cbot Contacts

**e-cbot Market Operations (Functional Help Desk)**

Tel: 312-347-4600 Fax: 312-341-3408

Hours: Sunday at 5:00 p.m. through Friday at 5:00 p.m. (Chicago Time)

E-Mail: [Market\\_Operations@cbot.com](mailto:Market_Operations@cbot.com)

**e-cbot Functional Member Readiness**

Tel: 312-341-7922 ITM/e-cbot User ID Tel: 312-347-5241 Fax: 312-341-7994

Connections E-Mail: [fmr@cbot.com](mailto:fmr@cbot.com)

User ID E-Mail: [ecbotuserid@cbot.com](mailto:ecbotuserid@cbot.com)

**e-cbot Training**

Tel: 312-435-3781 Fax: 312-341-3027

Website: [www.cbot.com/ecbot](http://www.cbot.com/ecbot)

## 1.3 Additional Web Information

[cbot.com](http://cbot.com)

Electronic Trading

e-cbot Bulletins

Error Trade Policy

Listserver Signup

Product Algorithms

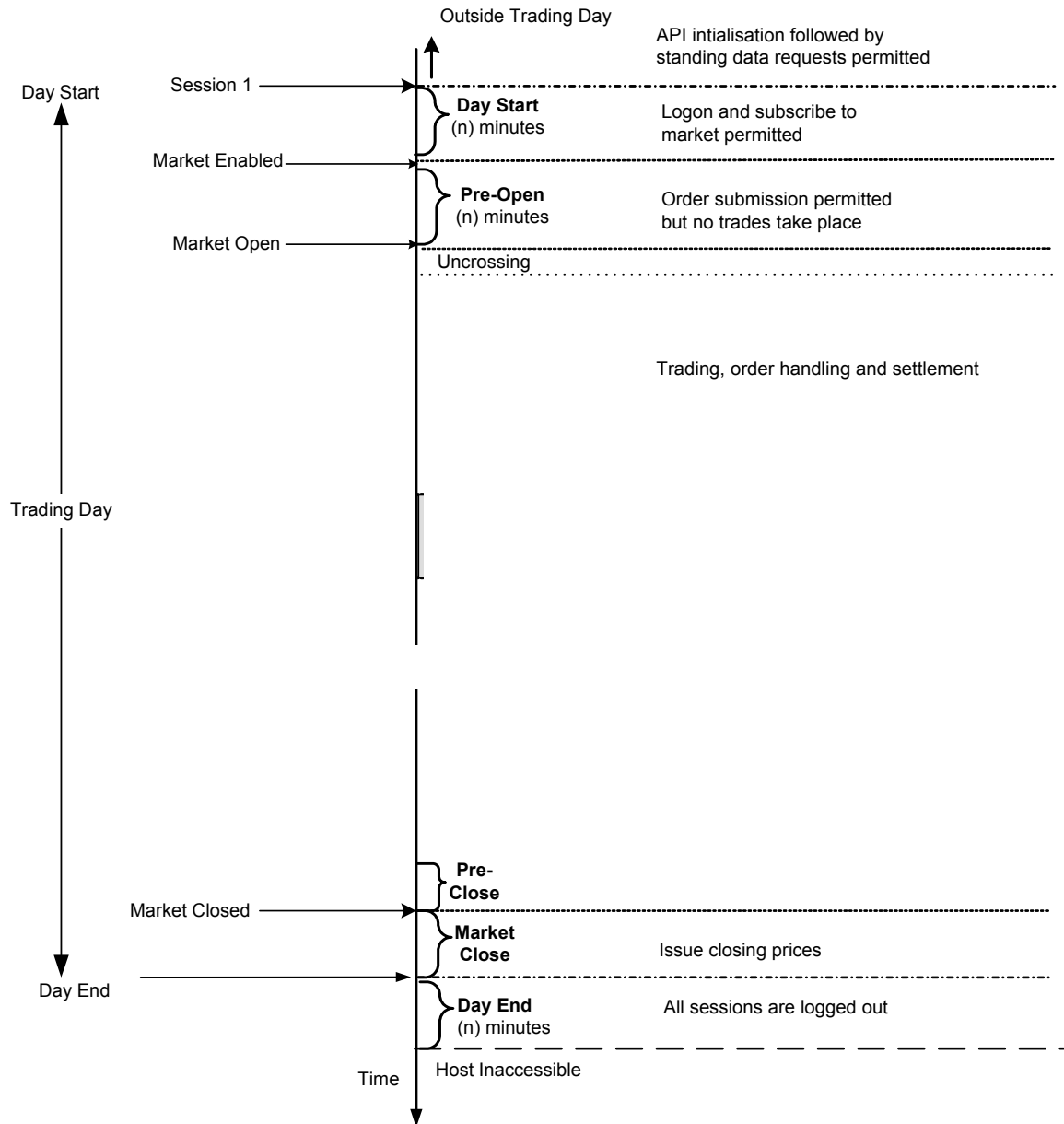
## 2. Trading

### 2.1 Periods of the Trading Day

The 'trading day' is separated into a number of distinct periods, known as market states and can be configured to automatically occur in the following order:

- Host Inaccessible
- Day Start
- Pre-Open
- Open
- Pre-Close
- Close
- Pre-Expire (set at month level)
- Expire (set at month level)
- Day End
- Host Inaccessible.

The following diagram illustrates a possible configuration of the trading day:



*Settlement and closing prices can be published at anytime between Pre-Open and Market Close.*

### 2.1.1.1 Day Start

The Day Start state is a specified period of (*n*) minutes duration at the beginning of the Trading Day. The time of Day Start is set globally for the Trading Host in standing data. The duration is a variable dependant upon the Pre-Open time configured for each market.

Prior to the start of the trading day, a Client Application can initialize the API. The Trading Host sends Market Mode messages to all Client Applications that have initialized to notify them of the start of the trading day.

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Once the day start message has been received, trader logon is enabled. Once logged on, a trader can then subscribe to (i.e. register an interest in) any products that are available for trading. LIFFE CONNECT® supports trading and view-only subscription rights. A trader must have subscription rights in order to subscribe to a particular market.

No orders can be submitted during Day Start as the order book will not be active. However Good Till Cancelled (GTC) orders that have been retained by the Trading Host from the previous trading day are returned to the market and can be revised or pulled.

### **2.1.1.2 Pre-Open**

At the start of Pre-Open, the Trading Host sends a market mode message to all the participants who have subscribed to a market indicating that Pre-Open has started.

During Pre-Open, the Client Application can use the functions provided by the API, including those used to submit, revise, pull orders and create strategies.

Traders may only enter the following order types into the market for both outright and strategies during this period:

- Market On Open (MOO) orders (see section 2.3.4.2).
- Limit orders (including Good Till Cancelled but excluding orders with IC, MV or CV permitted modifiers). See 2.3.3 Limit Orders and 2.3.2 Order Modifiers.

'Market On Open' orders are only valid during Pre-Open. Other order types may only be submitted once the Open period commences. Order matching will not take place during Pre-Open. This only occurs in the Open state.

As the Trading Host receives orders, changes to the best buy/sell prices and volumes, and to any other orders in the central order book, are transmitted to subscribed traders when they occur. In addition, indicative opening prices and volumes are calculated for each outright futures market and are transmitted to subscribed traders at regular intervals. These intervals can be configured on the Trading Host for each individual market. See 2.7.2 Indicative Opening Price.

During Pre-Open, price limits are supported for futures products in both the outright and strategy markets but not for option strikes and strategies.

### **2.1.1.3 Open**

This is the main trading state. The time of opening may be configured separately for each product, but all months within a product will open at the same time.

At the start of Open for each product, there may be backwardation or choice markets in some markets, in other words bids higher than or equal to offers. When this occurs the Trading Host runs an uncrossing algorithm to calculate the price at which the maximum volume will be traded and automatically executes those trades at the price calculated. Any orders that are executed using this approach will be traded at a price equal to or better than that at which they were entered. Market On Open orders (MOO) are processed immediately after uncrossing.

During the Open period, the Client Application may use any of the API functions including the following:

- Submission, revision and pulling of orders
- Receipt of settlement prices
- Ex-Pit orders
- Strategy creation and trading.

#### **2.1.1.4 Pre-Close**

Shortly before the close of trading in a product, the Trading Host sends a market mode message to all participants who have subscribed to a market indicating that Pre-Close has started. This message is issued two minutes before the end of the trading session for each product. This message is designed to warn members that the market is about to close.

During Pre-Close, the Client Application can use any of the functions provided by the API that are available during Open, including those used to submit, revise, pull orders and create strategies.

A Pre Close message is also distributed prior to the Expiry of a contract month

#### **2.1.1.5 Close**

Once the Close state has started, all trading ceases and no further orders are accepted until the next Pre-Open. At the beginning of the Market Close, all orders, with the exception of GTC orders, are automatically deleted. Traders can revise their GTC orders until the end of the Close state.

Closing prices are usually published during this period.

#### **2.1.1.6 Day End**

The Day End state follows Close. At Day End, all GTC orders are removed from the market and stored by the Trading Host until the next trading day.

At the end of the Day End period, the Trading Host will issue a 'Session End' message and automatically log out all market participants.

#### **2.1.1.7 Expiry**

At the end of the Pre-Expiry period, all trading in the expired month ceases and no further orders are accepted by the Trading Host. All orders, including GTC orders are automatically deleted and strategies which incorporate the expired month as a leg are suspended.

Expiry is similar to the Close state but it is set on an individual month level as opposed to product level.

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### **2.1.1.8 Inaccessible**

The Trading Host becomes Inaccessible following Day End and remains in this state until Day Start. During this time there is no access to LIFFE CONNECT<sup>®</sup> for any market participants.

### **2.1.1.9 Changes to the Trading Day**

The Exchange reserves the right to change the trading times within a specific trading day, for example on public holidays.

## **2.1.2 Market Attributes**

There are three market attributes that are available for Market Operations to use during most of the market states. The three attributes are:

- Price Limits
- Suspend
- Halt

Each of the attributes can be applied at the same time as the other attributes and they can interact with the markets states that occur between Day Start and Market Close (see 2.1 Periods of the Trading Day). Setting a market attribute will not prevent the transition between market states. When the Trading Host reaches its closed state, the market attributes are re-set to their default values.

### **2.1.2.1 Price Limits**

During any of the trading states, Market Operations can enable or disable price limits on a month or product basis. This prevents the Trading Host from carrying out any price limit checks on any order that is submitted into the market.

### **2.1.2.2 Suspend**

At any point during the trading day Market Operations can use the suspend attribute at the following levels:

- Product Group
- Product
- Expiry month
- Market

The result of using the suspend attribute is that all the orders in the suspended market are pulled including GTCs. No trading activity is permitted until the suspend attribute is removed.

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### 2.1.2.3 Trading Halt

The halt functionality gives Market Operations the ability to stop the order book in any of the trading states when circuit breakers are applied in the cash market. Circuit breakers will apply to: CBOT® Dow Jones Industrial Average<sup>SM</sup> futures & options, CBOT® mini-sized Dow<sup>SM</sup> futures & options, and CBOT® Dow Jones U.S. Total Market Index<sup>SM</sup> futures. If a product was halted when the market was in Pre-Open or Open, the Trading Host would enforce the following functional behavior.

- All existing orders will remain in the order book
- Orders can be pulled
- Order volume can be revised down.
- Strategies can be created
- Log on and log off is available
- Nominate replacement trader available
- Order transfer available.

The following functions will not be permitted by the Trading Host:

- No price revisions
- No submission of orders
- No submission of Ex-Pit trades
- No CMOs
- No RFQs
- No Revision of GTC date
- No Calculation of the IOP during Pre-Open.

The Halt attribute can only be applied at product (not month) level.

Before returning to the Open state a halted product will first pass through Pre-Open. This is designed to ensure that the order book has been re-established and the opening price accurately reflects where the market should be.

Once the market has entered the Close state or if there is a Trading Host failure, the halt attribute is turned off.

If the market is in the Open state when the halt is applied, implied prices and volumes are updated if parent orders are revised or pulled. If the market moves from Open to Pre-Open when it is halted, implied prices are cleared out where applicable (depending on the uncrossing policy) and IOPs are not generated.

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Price limits for both futures and options will still operate when a halt is applied even though the submission of new orders is not permitted.

**Note:** Options price limits do not apply during Pre-Open.

Market Operations will send a text message when a trading halt occurs (See 3.1.4 Text Message). Market Operations also sends an e-mail to a listserver group. Contact Market Operations if you would like to be added to the listserver group.

## **2.1.3 Trading Day Messages**

### **2.1.3.1 Market Modes**

Market mode changes may be notified for either a product, an expiry month or an individual outright or strategy market. If a market mode change is transmitted for a product, this indicates that all individual outright and strategy markets in that product have changed. If a market mode change is transmitted for an expiry month, this indicates that all individual outright markets in that expiry month, and all strategy markets with at least one leg in that expiry month, have changed. The Trading Host will send out the strategy market modes separately. Wherever possible, the Trading Host will transmit market mode changes for products or expiry months (depending on the level of subscription), rather than individual markets, in order to reduce the volume of transmitted messages.

## **2.2 Access via the LIFFE CONNECT<sup>®</sup> API**

Participation in the LIFFE CONNECT<sup>®</sup> market is dependent upon market access and data requests made via the LIFFE CONNECT<sup>®</sup> API.

### **2.2.1.1 Log On/Log Off**

#### **ITM Log On**

To access LIFFE CONNECT<sup>®</sup> it is necessary for a user to log on via an Individual Trader Mnemonic (ITM) and API call. This call establishes a session on the Trading Host for the Individual Trader Mnemonic in question. The Individual Trader Mnemonic is authenticated by the use of a cryptographic key and password (see 6.1.2 Responsible Person/Individual Trader Mnemonic/e-cbot User ID). The logon call returns the ITM's privilege level. Some ITMs may have a 'View' privilege, where they can request information only.

Specifically, ITMs with a 'View' privilege can use any API call with the exception of:

- Those related to trading and order handling.
- The call to Retrieve Orders.

Logon attempts are refused while the Trading session is closed or while Market Operations deny logon to specific ITMs (see 3.1.3 Lock-Out). An appropriate error status is returned for each case.

In order to protect the Trading Host from multiple failed logons, the Gateway will stop forwarding ITM logon requests to the Trading Host after a configurable number of failed logons (See 7.1.2 LIFFE

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CONNECT<sup>®</sup> Gateway). The Gateway will continue to stop failed logons for a configurable period of time. An appropriate error status is returned when the maximum logon attempts has been reached. This is counted on a per ITM session basis, so failed logons made by one ITM will not affect the ability of other ITMs to logon.

### **ITM Log Off**

This call closes the ITMs session on the Trading Host and pulls all orders except those which have been either successfully handed over to a replacement trader (see 2.3.1.6 Handover to Replacement Trader) or have been entered as GTCs.

### **User Log Off**

Depending on the implementation of the client application it is possible for users to log off of their local application while keeping the ITM logged in to LIFFE CONNECT<sup>®</sup>. In this scenario the users day orders would not be affected.

## **2.2.2 Market Data Functions**

### **2.2.2.1 Automated Market Reference**

Automated Market References (AMR) are used to uniquely identify each possible outright and strategy market. The Client Applications use API calls to request outright and strategy standing data information, which will detail the AMR values and consequent market definitions.

## **2.2.3 Market Information Functions**

### **2.2.3.1 Subscription**

Client applications must allow a user to subscribe to a market, using a Subscribe to Market call, before any market information can be forwarded to them.

Subscribers will then receive market mode changes for any individual market to which they have subscribed.

In addition, client applications can subscribe independently to any of the following optional streams of information within the above levels. The streams are:

- RFQ stream - To receive Request for Quote (RFQ) calls.
- Best Price stream - To receive Publish Market Information, Publish Implied Market Information and Publish Strategy Market Information calls.
- Market Depth stream - To receive a Market Depth update, followed by Order Book Update calls.
- Market Data stream - To receive Indicative Prices, Deltas, Volatilities and Interest Rate calls from the Market Data Interface.

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A user can submit orders or RFQs to any market and receive trade confirmations on any orders without subscribing to the market in question.

### **2.2.3.2 Market Update**

A Client Application, which subscribes to the Market Depth stream of information for a market, immediately receives the price, side of the market (buy or sell) and new residual volume of any change to explicitly quoted prices/volumes in the central order book. The change may be due to a new order submission, a withdrawal, an order revision or a trade. This enables Client Applications to continuously track market depth. The updates will be disseminated for all products from the time they enter Pre-Open until they close.

### **2.2.3.3 Market Depth**

The Client Application, using the API, may request market depth information from the Trading Host. The call requests all explicit prices, and related aggregate volumes, available for buy and sell orders of a specified expiry month, series or explicit strategy market.

**Note:** The use of this call is monitored and controlled to limit degradation of service that could result from its excessive use.

Client Applications can continuously track market depth by updating the initial market depth information with the Order Book and Market Update information provided on subscribing to a market. Therefore, depending on the design of a Client Application, a trader will be able to view market depth on any chosen market.

### **2.2.3.4 Retrieve Orders**

Using a Retrieve Orders call, a Client Application can retrieve current details of either:

- GTC orders in the Trading Host for e-cbot User IDs under an ITM, or
- Non-GTC orders for e-cbot User IDs under an ITM that were withdrawn at the point of a ITM level Client Application failure (on reconnection, during the same Trading Day).

A call parameter is set to determine which details are returned.

A user does not need to be subscribed to a market to retrieve orders in that market.

## **2.3 Orders**

### **2.3.1 Order Management**

#### **2.3.1.1 Submission**

Client Applications provided by ISVs or Member Developers submit orders to the LIFFE CONNECT® Trading Host via the API. The Trading Host maintains a central order book for the entire market and matches orders when appropriate.

### 2.3.1.2 Revision

The Revise Orders function allows a trader to amend volume, price and GTC expiry date for single and batch orders. If the volume of an order is increased or its price is changed, the order will lose its original time-stamp and be re-stamped with the current time. A reduction of volume will have no effect on the original timestamp. **No other order parameters (including clearing data) can be revised after submission; otherwise the order must be pulled.**

The originating user or their replacement ITM (see section 2.3.1.6) can revise orders even if he/she is not subscribed to the market in question.

Ex-pit orders cannot be revised after they have been submitted.

### 2.3.1.3 Pull

Once an order has been stored in the Trading Host's central order book, it can be withdrawn (pulled) using a Pull Orders call. The Client Application may withdraw orders specified by the unique Order ID or as a block consisting of:

- Individual orders for a given list of Order IDs (see 2.3.1.4 Batch).
- All orders in a given futures or options product.
- All put or call orders for a given options product.
- All orders in a given expiry month for a given futures or options product.
- All orders in a specific futures or options outright or strategy market.

The block pulls described above also pull the strategy orders affected. The originating trader can pull orders even when not subscribed to the market in question.

Ex-pit trade orders cannot be pulled after they have been submitted. However, a message will be transmitted to the submitting trader if an ex-pit order is rejected by the Exchange.

### 2.3.1.4 Batch

Batch Order functionality enables traders to perform batch order operations within a single order message in the same product, as follows:

- batch submission – up to 16 orders;
- batch revision – up to 64 orders; and
- batch withdrawal – up to 64 orders.

When using batch order functionality, traders are not permitted to submit orders or revisions which would result in other orders in the batch matching, i.e. it is not permitted to use batch orders as a mechanism for cross transactions.

When processing batch order revisions, the Trading Host will revise lower bids and higher offers first in order to avoid the possibility of a revision trading against a resting order which is pending revision.

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No account is taken of crossing resulting from the generation of implied orders within the batch. Such crossing is possible given that there is no restriction on the mix of orders for outright and strategy markets in the batch.

### 2.3.1.5 Nominate Replacement Trader

An Individual Trader Mnemonic (ITM) may nominate, using their Client Application, a replacement Individual Trader Mnemonic. See 6.1.2 Responsible Person/Individual Trader Mnemonic/e-cbot User ID. The replacement ITM must be a valid ITM within the same member firm as the nominating ITM.

**NOTE: Not all Client Applications support the replacement ITM function. Please check with your Independent Software Vendor (ISV) or internal client application administrator.**

### 2.3.1.6 Handover to Replacement ITM

Using their Client Application, an ITM may choose to handover all non-GTC orders from e-cbot User IDs under it to the nominated replacement. The nominating ITM and all e-cbot User IDs under that ITM will then be logged off. Any orders transferred in this manner will retain their original timestamp. GTC orders will remain in the system against the nominating trader's ITM. If any of those GTC's trade, an ITM will need to check the clearing system for confirmation of the trade. LIFFE CONNECT<sup>®</sup> does not provide a trade message when the ITM logs back on.

**Note:** The Trading Host will not retain a record of the original ITM who submitted the order. The nominated ITM must be logged on to LIFFE CONNECT<sup>®</sup> in order to receive the orders. If an ITM attempts to log-off and transfer their orders when a nominated replacement is not logged on, the Trading Host will issue a warning before allowing log-off to continue. An ITM is able to nominate a replacement ITM at any point during the trading day from Day Start through to Day End, but order transfer can only occur during Pre-Open and Open.

In the event of a failure of the Client Application at the ITM level, or of the network link from the ITM Client Application to the Trading Host, the Trading Host will automatically transfer any existing non-GTC orders to the nominated replacement ITM, if one exists and is logged on.

## 2.3.2 Order Modifiers

The following permitted modifiers are available on LIFFE CONNECT<sup>®</sup>:

### 2.3.2.1 Minimum Volume (MV)

Minimum Volume orders are only executed if there is at least the minimum volume available, at the stated price or better. If not, the whole order is cancelled. Any residual volume from a partially executed minimum volume order is retained in the central order book.

### 2.3.2.2 Complete Volume (CV)

Complete Volume orders are only executed if there is sufficient volume available, at the stated price or better, for them to execute fully. Otherwise the entire order is cancelled.

### 2.3.2.3 Immediate & Cancel (IC)

Immediate and Cancel orders are executed against any existing orders at the stated price or better, up to the volume of the IC order. Any residual volume from the IC order is cancelled.

### 2.3.2.4 Order Modifier Usage

The following table details the permitted order modifiers that can be specified with price and volume for limit and market orders:

ORDER TYPE		PRICE	VOLUME	MV	CV	IC
Limit	Normal	✓	✓	✓	✓	✓
	GTC	✓	✓	✓	X	X
Market	Normal	X	✓	✓	✓	X
	MOO	X	✓	X	X	X
CMO	Each component	✓*	✓	X	X	X

\*For a Limit component, price and volume; for a Market component just the volume can be submitted.

## 2.3.3 Limit Orders

In the event of a Trading Host failure or market closure, all limit orders will be automatically pulled from the central order book with the exception of GTCs which are stored by the Trading Host. In the event of a failure of the Client Application at the ITM level, or of the network link from the ITM Client Application to the Trading Host, the Trading Host will automatically cancel any existing non-GTC orders unless a nominated replacement ITM exists and is logged on.

### 2.3.3.1 Normal

Limit orders are executed at the price stated or better. Unless otherwise specified, any residual volume from an incomplete Limit order is retained in the central order book until it is withdrawn, traded or until the end of the trading day.

The price and volume of a Limit order must be specified.

### 2.3.3.2 Good Till Cancelled (GTC)

GTC orders remain in the central order book until:

- they trade
- they are withdrawn by the submitting trader,
- the expiry month expires, or

- the order expires.

GTC orders can be given an expiry date and are valid until the end of trading on that date. If no date or a date beyond the expiry date is specified, the order will be valid until the month or market expires.

GTC orders are available in all trading periods but not when the Trading Host is inaccessible (see 2.1.1.8 Inaccessible).

GTC orders retain their original timestamp when they are returned by the Trading Host for the next trading day.

All GTC orders in options delta neutral strategies are pulled by the Trading Host at the end of the trading day and are not returned for the following trading day.

The original timestamp is used to ensure that the Trading Host returns orders in the correct time sequence. This is important when calculating the priority of order for the trading algorithms (see 2.7.6 Trade Policies).

## 2.3.4 Market Orders

### 2.3.4.1 Normal

Market orders are executed at the best price available in the order book when the order is received until all available volume at that price has been traded. If not, the order executes at the next best price and so on, until all the order volume has been used. A market order will not trade outside the price limits (see 3.2. Price Controls). **Any residual volume from an incomplete market order is cancelled. Market orders are rejected if the market is not open.**

### 2.3.4.2 Market on Open (MOO)

Market On Open orders can only be submitted for futures products including strategies. MOO orders are only accepted during Pre-Open and are intended for execution at the opening market price. MOO orders will be executed by the Trading Host after the uncrossing of Limit orders in the market when the market opens (see 2.7.3 Uncrossing).

Initially, MOO orders will trade against other MOO orders, at the opening price calculated after the uncrossing. After this, any residual volume remaining in MOO orders will be converted automatically to Limit orders at the opening price, and may then be executed against suitable Limit orders that remain in the market. If residual volume still remains, it will be retained in the central order book until it is withdrawn or traded, as is the case for a normal Limit order.

During Pre-Open the originator can view the volume submitted to the market but not the price of Market On Open orders. The Trading Host does not disseminate this information to the market.

**Note:** If an opening price cannot be calculated for the market when it opens, all MOO orders will be pulled automatically. The opening price is only calculated if there are bid and offer Limit orders in the market. The opening price cannot be determined in the following conditions:

- a. only MOOs in the market,
- b. only MOOs and Limit bids (no offers) in the market,

- c. only MOOs and Limit offers (no bids) in the market.
- d. only either Limit bids or offers in the market but not both.

However, if there are only uncrossed bids and offers in the market, the MOO orders would execute and/or convert at the mid-price.

### 2.3.5 Contingent Multiple Order (CMO)

A Contingent Multiple Order is an order that contains two or more 'component' orders. Trading of any component is contingent on being able to fully trade all components within the CMO.

CMOs provide clients with the ability to trade in separate markets across two separate products, therefore allowing traders to submit inter-product spreads to LIFFE CONNECT<sup>®</sup>. They cannot be submitted during Pre-Open, as all order components must exist in open markets.

CMOs are bound by the following:

- Maximum of 8 component orders.
- All component orders must be for outright orders, i.e. no strategies.
- Only one futures component permitted if any component order is for an option.
- It is not possible to submit a CMO for products traded on separate Trading Hosts.

Each component of a CMO can be of Limit or Market type. Any modifiers that are added are ignored e.g. Complete Volume, Immediate & Cancel, because of the Fill or Kill nature of the order. The CMO can be submitted as a mixture of buy and sell orders. The permitted product pairs are pre-defined by the Exchange.

The trades are executed in the same order as the components within the submitted CMO. All output messages accumulated during trading of the CMO are transmitted once trading of all the components is complete.

A single Order ID is allocated to all of the components within a CMO.

**Note:** As each individual component order is processed in turn, and as none of the components reside in the order book, it is impossible for two orders from a CMO to exist in the same market at the same time. Therefore, a trader cannot perform Guaranteed Cross trades by submitting a CMO that contains two matching component orders. If a trader does attempt a cross trade within a CMO, then the component trades will only trade with other orders already residing in the order book, if at all.

A component of a submitted CMO may trade with orders residing in the order book that were submitted by the same trader, subject to the cross trading rules applied to standard LIFFE CONNECT<sup>®</sup> orders.

Should one or more of the component orders fail to trade, the whole CMO is rejected and an error message is returned to the trader indicating which component failed to trade.

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## **2.3.6 Order Entry Parameters**

### **2.3.6.1 CBOT Account Number**

The LIFFE CONNECT<sup>®</sup> User Specified field is a 14 character alphanumeric field that will be used for the CBOT account number. CBOT Account Numbers are limited to 10 characters.

The User Specified field will be configured to be mandatory. The Trading Host would then only check whether the field contained a value or not.

### **2.3.6.2 CBOT Give Up/Market Maker Identifier**

The LIFFE CONNECT<sup>®</sup> account code field is a one character alphanumeric field that will be used to identify CBOT Give Up and Market Maker orders.

The following account codes will be available for the CBOT:

- ( ) - blank
- A – Group Give Up
- G –Single Give Up
- M - Market Maker.

Orders can only be given up to one member firm per order. If there are multiple give-ups for an order, these will need to be processed by the back office post-trade. If an order is revised, a trader will be unable to amend the account code. Should the trader need to change an account code they would be required to pull the order and resubmit a new order with the amended code.

### **2.3.6.3 CBOT Single Give Up Member Firm and Trader ITM Allocation**

If a 'G' is entered in the LIFFE CONNECT<sup>®</sup> account code field the respective member firms mnemonic must be entered in the MemberAllocation field.

This information is passed by the Trading Host to an external clearing system via the LIFFE CONNECT<sup>®</sup> Trade Data Interface.

The Member firm field can be up to 4 characters and the Trader field is 3 characters.

The member and trader details will be validated on submission to ensure that:

- Member firm mnemonics are valid
- Trader mnemonics are valid
- The combination of member firm and trader mnemonics are valid.

#### 2.3.6.4 CBOT Customer Type Indicator (CTI)

The LIFFE CONNECT<sup>®</sup> Customer Trade Indicator field is available through the API to represent the type of customer on whose behalf the trade is taking place. It is a single numeric character.

All member firms are reminded that CFTC and Exchange regulations require the accurate submission of Customer Type Indicator (CTI) codes for each transaction. The CTI codes to be utilized for CBOT transactions are detailed below:

**CTI 1** – Applies to transactions initiated and executed by an individual member for his own account, for an account he controls, or for an account in which he has an ownership or financial interest. However, transactions initiated and executed by a member for the proprietary account of a member firm (as defined below) must be designated as CTI 2 transactions.

**CTI 2** – Applies to orders entered/trades executed for the proprietary accounts of a firm defined as follows: Category (1a), (1b), (2a), (2b), (2c) and (3) member firms as defined in Regulation 230.02, and their affiliates and designated passive investor entities as defined in Regulation 450.02 (D), as well as category (4) e-cbot only member firms.

**CTI 3 –e-cbot:** Applies to orders entered by a member or non-member terminal operator for the account of another individual member or for an account controlled by such other individual member.

**CTI 4** – Applies to all orders/transactions not included in CTI categories 1, 2, or 3. These typically are orders entered by or on behalf of non-member entities.

It is the duty of each member, user or terminal operator entering orders into e-cbot to input for each order the correct CTI code and account designation. The account designation must be an account number, account name or other identifying notation, which is tied to the specific account owner for whom the order is placed.

With respect to orders that are capable of being immediately entered into e-cbot, no record other than the e-cbot order entry is required. However, if a member, user or terminal operator receives an order which cannot be immediately entered into e-cbot, a written order that includes the order instructions, account designation, date and time of receipt must be prepared. The order must be entered into e-cbot when it becomes executable.

The CTI field will be configured to be mandatory and validated by the Trading Host.

The LIFFE platform does not provide edit checks for valid CTI/Origin combinations. Any trades with invalid combinations will be passed by clearing as a trade in error. Clearing member firms can correct these trades by submitting the required changes.

#### 2.3.6.5 CBOT Origin Code

The LIFFE CONNECT<sup>®</sup> posting code field will be used for the CBOT Origin Code.

The Origin Code field is a single numeric character and will be mandatory and validated by LIFFE CONNECT<sup>®</sup>. If a trader enters an invalid origin code then LIFFE CONNECT<sup>®</sup> will reject the order.

The Origin Code field will be used to identify the type of customer order in order for clearing to assign the correct clearing fee. The valid fields for the Origin Code will be:

CBOT ORIGIN TYPE	ORIGIN VALUE
Customer	1
Non-Customer	2

#### 2.3.6.6 Price

The Price field shows the price at which an order was submitted or traded. LIFFE CONNECT<sup>®</sup> calculates prices in ticks but displays them in either decimal or fractional format. Positive and negative price values are supported on LIFFE CONNECT<sup>®</sup>.

#### 2.3.6.7 Volume

The volume of the order is entered in lots and must be a positive value.

#### 2.3.6.8 Buy/Sell Indicator

This parameter indicates whether the order is to buy or sell. For a strategy order this is shown on each leg of the transaction.

#### 2.3.6.9 e-cbot User ID

The LIFFE CONNECT<sup>®</sup> Trader Card Reference field is a 16 character alphanumeric field that the CBOT will use for the e-cbot User ID.

The Trader Card Reference field will be configured to be mandatory. The Trading Host will check whether the field contains a value or not. See section 6.1.2 Responsible Person/Individual Trader Mnemonic/e-cbot User ID.

#### 2.3.6.10 Customer Reference

The Customer Reference is a 14 character alphanumeric field available when submitting orders to identify customer or client, if required.

#### 2.3.6.11 Expiry Date

This indicates the date a GTC order is cancelled.

#### 2.3.6.12 Open/Close

The OpenClosedIndicator field indicates whether the order is opening or closing a position. The open/close indicator will no longer be required for any contract. This field is not a mandatory field for futures or options products. The field will default to 'O' for open when anything other than the 'C' (closed) indicator has been submitted.

When submitting a strategy order, the open/close field is set at order level not at individual leg level.

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### 2.3.6.13 Price Type

This field indicates whether the order is a Limit or Market order.

### 2.3.6.14 Time Type

This field indicates whether the order is Immediate and Cancel, Good Till Cancelled, Complete Volume, Market On Open, standard (or a valid combination of these).

## 2.3.7 Trading Against Customer Orders and Crossing Orders

### 2.3.7.1 Trading Against Customer Orders

During an e-cbot trading session, a member or Registered User shall not knowingly cause to be entered or knowingly enter into a transaction in which he takes the opposite side of an order entered on behalf of a customer, for the member's or Registered User's own account or his employer's proprietary account unless the customer order has been entered immediately upon receipt and has first been exposed on the e-cbot platform for a minimum of 5 seconds for outright futures contracts and a minimum of 15 seconds for spreads and options contracts. Such transactions that are unknowingly consummated shall not be considered in violation of this regulation.

### 2.3.7.2 Crossing Orders

Independently initiated orders on opposite sides of the market for different beneficial account owners that are immediately executable against each other may be entered without delay provided that the orders did not involve pre-execution communications.

Opposite orders for different beneficial accounts that are simultaneously entered by a party with discretion over both accounts may be entered provided that one order is exposed on the e-cbot platform for a minimum of 5 seconds for outright futures contracts and a minimum of 15 seconds for spreads and options contracts.

An order allowing for price and/or time discretion, if not entered immediately upon receipt, may be knowingly entered opposite a second order entered by the same firm only if the second order has been entered immediately upon receipt and has been exposed on the e-cbot platform for a minimum of 5 seconds for outright futures contracts and a minimum of 15 seconds for spreads and options contracts.

### 2.3.7.3 Pre-Execution Communications Prohibited

- (i) Pre-execution communications are communications between two market participants for the purpose of discerning interest in the execution of a transaction prior to the entry of an order on the e-cbot platform.
- (ii) **Pre-execution communications and transactions arising from such communications are prohibited in all products during all hours** except as otherwise provided by Regulation 331.05 (Block Trade Transactions).

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Violations of the regulation shall be considered an act detrimental to the interest and welfare of the Association.

## **2.3.8 Ex-Pit Orders**

### **2.3.8.1 Introduction**

For designated products, traders can submit orders for wholesale or ex-pit business that has been pre-negotiated outside the market, using the Submit Ex-Pit Trade function.

There are three types of Ex-Pit orders:

- Block (large volume trades)
- Basis (financial futures versus cash market)
- Against Actuals (commodity futures versus cash market)

Orders for wholesale, or ex-pit, business are valid when the market is open.

The markets in which wholesale, or ex-pit, business is valid are set by the Exchange. Trade volumes may be subject to minimum levels, which depend on the type of business and the traded product. The markets and volumes are defined in the product specification and specified in the product parameters on the Trading Host.

Ex-pit trades can be submitted in a strategy market, as long as that strategy market exists and is not suspended.

The prices of trades in ex-pit orders will be verified by Market Operations after submission, to ensure that they are in line with exchange-traded business, but are not subject to automatic price controls.

Submitted ex-pit trades will not enter the central order book or be made available to the market for trading. Once submitted, ex-pit trades cannot be pulled, revised or handed over to another trader (ITM).

All Ex-pit trades are examined by Market Operations and, if acceptable, are approved for execution. Once executed, ex-pit trades' volumes are added to the published total traded volume for their respective markets. The trade price with the exception of Against Actuals (see section 2.3.8.7) is disseminated to the market.

Under normal circumstances, approval of ex-pit trades takes place within a time period specified by the relevant regulatory body for the type of business.

If a trader has submitted orders for ex-pit trades that have been accepted but not yet approved, and the trader logs out, or their Client Application fails, the ex-pit orders are not affected and will remain registered with the Trading Host, awaiting approval. The trader does not need to be logged in for approval of ex-pit business to take place.

A flag is used to identify the type of ex-pit trade when the price is reported to the market (with the exception of Against Actuals where the price is not reported).

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### 2.3.8.2 Method of Submission

Ex-Pit trades can be submitted as outright orders, or strategy orders.

Ex-Pit trades are submitted via the Client Application, but are not matched in the Trading Host with other order types.

A trader submitting an Ex-Pit order must specify:

- The market (product/month etc).
- Price
- Volume
- Type of Ex Pit Trade.

Other information can be entered which can be configured to be either optional or mandatory, as follows:

- Customer Reference
- e-cbot User ID (LIFFE Trader Card Reference field)
- CBOT Account Number (LIFFE User Specified field)
- CBOT Give Up/Market Maker (LIFFE Account Code field)
- Cash Price (can only be optional)
- ISIN Code (can only be optional)
- Customer Trade Identifier (CTI)
- Open/Closed indicator (can only be optional but defaults to Open)
- CBOT Origin Code (LIFFE Posting Code field).

When entering the Ex-Pit order a trader submits both the buy and sell sides of the order for validation by Market Operations.

### 2.3.8.3 Ex-Pit Strategy Orders

Strategy Orders may also be submitted as Ex-Pit trades and are subject to validation by Market Operations in the same way. In addition to the optional and mandatory fields entered for an outright trade, the trader must also specify the individual leg prices to be allocated for the strategy trade.

### 2.3.8.4 Validation

Validation of Ex-Pit trades is performed by Market Operations. The following are examples of rejection reasons:

- Contract not enabled
- Contract Month not enabled
- Last trading day expired.
- Less than minimum volume.

#### 2.3.8.5 Block

Block trades are defined as high volume trades in any outright or strategy market. Orders must contain both the buy and sell side orders and include the trade price and volume. For strategy block trades, in addition to the total strategy price and volume, the order must include all individual leg prices and volumes.

#### 2.3.8.6 Basis

Basis trades are defined as strategies for long-term bond markets that incorporate a futures leg and an underlying bond (or cash) leg. Orders must contain the trade volume and the price of both the futures leg and the cash leg, and must include the necessary reference fields to identify the order within the cash market.

#### 2.3.8.7 Against Actuals

Against Actuals are defined as strategies for commodities markets that incorporate a futures leg and an underlying commodity leg. Orders must contain both the buy and sell side orders and include the trade price and volume.

### 2.3.9 Order Type Per Market Mode

The following table details the order types that can be submitted during the periods of the trading day.

Order Type	Pre-Day Start (Host Available)	Day Start	Pre-Open	Open Session	Pre-Close	Close	Day End
Normal Limit	No	No	Yes	Yes	Yes	No	No
Market	No	No	No	Yes	Yes	No	No
Market On Open	No	No	Yes	No	No	No	No
GTC Limit	No	Yes <sup>2</sup>	Yes	Yes	Yes	Yes <sup>3</sup>	No
CMO	No	No	No	Yes	Yes	No	No
Against Actuals	No	No	No <sup>4</sup>	Yes	Yes	No	No
Block	No	No	No <sup>4</sup>	Yes	Yes	No	No
Basis	No	No	No <sup>4</sup>	Yes	Yes	No	No

<sup>1</sup> Volume can only be revised downwards.

<sup>2</sup> Submitted by the Trading Host only.

<sup>3</sup> Revised or pulled only.

<sup>4</sup> Configurable according to Trading Procedures.

### **2.3.10 Cabinet Trading**

The cabinet trade allows options traders to trade deep out-of-the-money options by trading the option at less than the value of the smallest price movement within the product.

Cabinet trading on LIFFE CONNECT<sup>®</sup> does not permit negotiation of the value of the cabinet trade and is fixed on a per product level by the clearing system. The price reported to the Trade Data Interface by the Trading Host will be zero and therefore a value will need to be assigned to this trade.

Cabinet orders and the subsequent trades are valid in all outright markets and LIFFE CONNECT<sup>®</sup> will only allow traders to submit Cabinet limit orders. The Trading Host will not allow cabinet orders to be offered since the lowest offer that can be made is the smallest price movement permitted for that product.

Delta neutral orders submitted as a GTC with a cabinet bid will not be returned by the Trading Host for the following day.

### **2.3.11 Request for Quote (RFQ)**

An RFQ notifies market participants subscribed to a product that a price is required for the market. The RFQ can specify the volume for which a price is required, alternatively if no volume is given, the Trading Host will allocate a default value which is configured on a per product basis. For all CBOT products at launch, the default volume value for RFQs has been set to 10.

RFQs may be submitted by a trader via their Client Application, or automatically generated by the Trading Host.

#### **2.3.11.1 Trader Generated**

The trader, using a Client Application, may submit a Request for Quote (RFQ) for any futures/options expiry month, series or strategy without having to subscribe to the market.

#### **2.3.11.2 Host Generated**

When a submitted Limit order does not trade completely and its residual volume rests in the order book, then the Trading Host may generate an automatic RFQ. This functionality is controlled by a volume limit: an RFQ will only be generated if the residual volume equals or exceeds this limit. The volume limit is defined in the standing data and is configurable on a per product basis. There is no restriction on the number of RFQs the Trading Host will generate. For all CBOT products at launch the residual volume for the host to generate an automatic RFQ has been set to 51.

#### **2.3.11.3 Time to Block RFQ's**

For any given market, submission of RFQs is not permitted for a short time after submission of an earlier RFQ, for an equivalent or greater volume, in the same market. The length of time before another equivalent RFQ may be submitted, is specified by the Exchange and may be different for each individual market. If an RFQ is submitted in this period, unless it has a greater volume an error

status will be returned. For all CBOT products at launch the time to block RFQs has been set to 60 seconds.

## 2.4 Strategies

LIFFE CONNECT<sup>®</sup> allows the creation of recognized strategies that are separate from the order books of the outright markets. Traders can submit orders and trade in these strategy markets. The following sections detail the creation process, list the strategies available and explain how strategies are priced.

### 2.4.1 Strategy Creation

Strategies between outright futures months or options strikes need to be created before they can be quoted in or traded. Once a strategy has been created it is assigned an AMR and keeps this until any of its underlying legs expires and then the strategy no longer exists.

A strategy will be visible to end users on the day of its creation, but will not be visible on the next day unless a GTC order is still present at the end of the previous day.

This means that although the strategy will exist in the Trading Host and will have an AMR, it will have to be recreated again before any quotes/trading is possible.

GTC orders in delta neutral strategies are not retained by the Trading Host and have to be recreated on a daily basis.

#### 2.4.1.1 GTC Strategies

Traders do not have to recreate the strategies for their GTC orders as they are automatically recreated by the Trading Host when the GTC orders are returned to the market.

#### 2.4.1.2 Creation by Traders

A trader must create a LIFFE CONNECT<sup>®</sup> recognized strategy in the long (Buy) position. For example, the futures Calendar Spread must be created in terms of buying the near month to sell the far month. If a trader attempts to specify the legs in a different order it will be rejected by the Trading Host.

A trader with a sell order would create the strategy from the buyers perspective and enter an offer.

## 2.4.2 Types of Strategies

### 2.4.2.1 Futures

Strategy	Code	Strategy Definition/Structure	Pricing
Calendar Spread	E	Buy (Sell) one contract in the near month, Sell (Buy) one contract in the far month	Subtract the price of the back month from that of the front month

Strategy	Code	Strategy Definition/Structure	Pricing
Butterfly	B	Buy (Sell) one contract in near Calendar month Sell (Buy) two contracts far month, Buy (Sell) one contract in a further dated expiry month. The gaps between the months do not have to be equal/ consecutive	The combined price of the two products being sold is subtracted from the combined price of the two contracts being bought
Condor	W	Buy (Sell) one contract month in the first month of the strategy, sell (Buy) one contract in each of the next two delivery months and Buy (Sell) one product in the fourth month. The gaps between the months do not have to be equal/consecutive	(Month1 – Month 2) – (Month3 – Month4)
Strip	M	The simultaneous purchase (sale) of one or more contracts in four or more quarterly delivery months within a single contract. Any quarterly delivery month can act as the first month of the Strip, as long as there are at least three following months available. Serial months in a product are ignored and cannot form part of a Strip Strategy. The number of lots in each leg can vary. Selling the Strip involves selling all months in the Strip, vice versa for buying	Calculated from a net change in price between the current trading sessions price and the previous day's Daily Settlement price. Where a new expiry month is listed, a zero net change in price is to be assumed for this month.
Pack	O	Packs consist of four consecutive quarterly months. The first month of the "White" Pack is always the first quarterly month. The number of lots in each leg must be the same. LIFFE CONNECT <sup>®</sup> currently recognizes five Packs: White Pack /Red Pack /Green Pack /Blue Pack/Gold Pack	Priced same as Strips above
Bundle	Y	Bundles are standardized Strips. The first month of a Bundle is always the front Quarterly month. The number of lots in each leg must be the same. LIFFE CONNECT <sup>®</sup> currently recognizes four Bundles: 2 – Year Bundle/3 – Year Bundle/4 – Year Bundle/5 – Year Bundle	Priced same as Strips above
Reduced Tick Calendar Spreads	Z	Buy (Sell) one contract in the near month, Sell (Buy) one contract in the far month Note: The minimum tick size movement will be smaller than that available in other strategies or outright markets.	Priced the same as Calendar Spread above.

LIFFE CONNECT<sup>®</sup> will facilitate the Implied trading of both “out” from strategies into outright and “in” from outright into strategies. However, only implied “out” prices and volumes will be reported across the API to connected front ends, with the front ends being relied upon to generate implied “in” prices locally (Butterfly and Calendar Spread). Implied out trading functionality can be implemented for Calendar Spread.

### 2.4.2.2 Options

The following table lists the recognized Options strategies that may be traded on LIFFE CONNECT<sup>®</sup>. The components of an option strategy (whether a buy or sell order) must always be created from the BUY perspective, as defined below:

LIFFE CONNECT <sup>®</sup> Strategy Code	Strategy	Strategy Definition/Structure  (Sequence in which the strategy order must always be entered, irrespective of whether it is a buy or a sell order)
A	Jelly Roll	Buy (sell) a reversal in one serial month and sell (buy) the reversal in another serial month to produce a synthetic spread between both months.  Sell (buy) call, buy (sell) put at same strike in near month, buy (sell) call, sell (buy) put at same strike in far month (strike price in far month need not equal strike price in near month).
B	Call Butterfly	Buy call, sell two calls at higher strikes, buy call at a higher strike (The strikes do not have to be consecutive and the gaps between them do not have to be equal)
	Put Butterfly	Buy put, sell two puts at higher strikes, buy put at a higher strike (The strikes do not have to be consecutive and the gaps between them do not have to be equal)
D	Call Spread*	Buy call, sell call (same month) at higher strike
	Put Spread*	Buy put, sell put (same month) at lower strike
E	Call Calendar Spread	Sell near month call, buy far month call (Same strikes across the two months)
	Put Calendar Spread	Sell near month put, buy far month put (Same strikes across the two months)
F	Call Diagonal Calendar Spread	Sell near month call, buy far month call at a different strike
	Put Diagonal Calendar Spread	Sell near month put, buy far month put at a different strike
G	Guts	Buy call, buy put at higher strike
H	2x1 Ratio Call Spread	Sell call, buy two calls at higher strike
	2x1 Ratio Put Spread	Sell put, buy two puts at lower strike

<b>LIFFE CONNECT® Strategy Code</b>	<b>Strategy</b>	<b>Strategy Definition/Structure</b> (Sequence in which the strategy order must always be entered, irrespective of whether it is a buy or a sell order)
I	Iron Butterfly	Buy the straddle, selling Strangle. This must be entered in the following sequence, which equates to the same: Sell put, buy put and call at higher strike, sell a call at an even higher strike (The strikes do not have to be consecutive and the gaps between them do not have to be equal)
J	Combo	Sell call, buy put at lower strike
K	Strangle	Buy put, buy call at higher strike
L	Call Ladder	Buy call, sell call at higher strike, sell call at even higher strike (The strikes do not have to be consecutive and the gaps between them do not have to be equal)
	Put Ladder	Sell put, sell put at higher strike, buy put at even higher strike (The strikes do not have to be consecutive and the gaps between them do not have to be equal)
M	Options Strips	Comprised of a minimum of 2 and a maximum of 8 outright strikes being either all call or all puts, and a mixture of calls and puts; or An example is to buy a call and put at one strike and buy a call and put at another strike. The premium is added together to form a strip.
N	Straddle Calendar Spread	Sell Straddle in near month, buy Straddle in far month at same strike (Sell near month put, sell near month call, buy far put, buy far call)
P	Diagonal Straddle	Sell Straddle in near month, buy Straddle in far month at different strike: Calendar Spread Sell near month put, sell near month call, buy far month put, buy far month call
S	Straddle*	Buy put, buy call at same strike
W	Condor	Buy put (call), sell put (call) at two even higher strikes, buy put (call) at yet higher strike. (The strikes do not have to be consecutive and the gaps between them do not have to be equal)
X	Box	Buy call and sell put, buy put and sell call at higher strike
r	Synthetic Underlying	This is a standard conversion/reversal strategy but without the Underlying leg. Reversal: Buy a call, sell a put at the same strike To trade a Conversion the order must be entered in the same sequence as above, but submitted to the market as a sell/offer order
w	Iron Condor	Buy (sell) the call spread and also buying (selling) the put spread with lower strikes. Sell (buy) put, buy (sell) put at higher strike, buy (sell) call at even higher strike, sell (buy) call at even higher strike (all series for the same expiry month).

<b>LIFFE CONNECT® Strategy Code</b>	<b>Strategy</b>	<b>Strategy Definition/Structure</b> (Sequence in which the strategy order must always be entered, irrespective of whether it is a buy or a sell order)
x	3 – Way: Buy a Call spread versus a Put	Buy a Call spread versus selling a put: Buy a call, sell a call at a higher strike, sell a put at any strike
y	3 – Way: Buy a Put spread versus a Call	Buy a Put spread versus selling a call: Buy a put, sell a put at a lower strike, sell a call at any strike.
z	3 – Way: Straddle versus a Call	Buy a Straddle versus selling a call: Buy a put and call at the same strike, as well as selling a call at any strike.
z	3 – Way: Straddle versus a Put	Buy a Straddle versus selling a put: Buy the straddle (i.e. Buy a put and call at the same strike), as well as selling a put at any strike.

\* LIFFE CONNECT® will facilitate the Implied trading of both “out” from strategies into outright and “in” from outright into strategies. However, only implied “out” prices and volumes will be reported across the API to connected front ends, with the front ends being relied upon to generate implied “in” prices locally. Implied out trading functionality can be implemented for Call/Put spreads and Straddles

### 2.4.2.3 Delta Neutral Strategies

<b>LIFFE CONNECT® Strategy Code</b>	<b>Strategy</b>	<b>Strategy Definition/Structure</b> (Sequence in which the strategy order must always be entered, irrespective of whether it is a buy or a sell order)
V	Call Volatility Trade	Buy call, sell Underlying to give zero net delta
V	Put Volatility Trade	Buy put, buy Underlying to give zero net delta
d	Call Spread versus Underlying	Buy call, sell call at higher strike, sell the Underlying
d	Put Spread versus Underlying	Buy put, sell put at lower strike, buy the Underlying
s	Straddle versus buying Underlying	Buy put, buy call at same strike, buy the Underlying
s	Straddle versus selling Underlying	Buy put, buy call at same strike, sell the Underlying
c	Call Spread versus sell Put versus Underlying	Buy a Call spread versus selling a put versus selling the Underlying: Buy a call, sell a call at a higher strike, sell a put at any strike, selling the Underlying.
p	Put Spread versus sell Call versus Underlying	Buy Put spread versus selling a call: Buy a put, sell a put at a lower strike, sell a call at any strike, buy the Underlying
a	Call Ladder versus buying Underlying	Buy call, sell call at higher strike, sell call at even higher strike, buy the Underlying

<b>LIFFE CONNECT® Strategy Code</b>	<b>Strategy</b>	<b>Strategy Definition/Structure</b> (Sequence in which the strategy order must always be entered, irrespective of whether it is a buy or a sell order)
A	Call Ladder versus selling Underlying	Buy call, sell call at higher strike, sell call at even higher strike, sell the Underlying
A	Put Ladder versus buying Underlying	Sell Put, sell Put at higher strike, buy put at even higher strike, buy the Underlying
A	Put Ladder versus selling Underlying	Sell put, sell put at higher strike, buy put at even higher strike, sell the Underlying
j	Combo versus buying Underlying	Sell call, buy a put at a lower strike, buy Underlying
e	Call Calendar Spread versus buying Underlying	Sell near month call, buy far month call (same strike across the two months), buy the Underlying.
e	Call Calendar Spread versus selling Underlying	Sell near month call, buy far month call (same strike across the two months), sell the Underlying
e	Put Calendar Spread versus buying Underlying	Sell near month call, buy far month put (same strikes across the two months), sell the Underlying
e	Put Calendar Spread versus selling Underlying	Sell near month put, buy far month put (same strikes across the two months), sell the Underlying
h	2 by 1 Ratio Call Spread versus buying Underlying	Sell call, buy two calls at higher strike, buy the Underlying
h	2 by 1 Ratio Call Spread versus selling Underlying	Sell call, buy two calls at higher strike, sell the Underlying
h	2 by 1 Ratio Put Spread versus buying Underlying	Sell put, buy two puts at lower strike, buy the Underlying
h	2 by 1 Ratio Put Spread versus selling Underlying	Sell put, buy two puts at lower strike, sell the Underlying
R	Reversal /Conversion (Synthetic)	Reversal: Buy call, sell put at same strike, sell Underlying  To trade a 'conversion' the order must be entered in the same sequence as above, but submitted to the market as a Sell/Offer order.

### 2.4.3 Pricing of Strategies

#### 2.4.3.1 Net Premium

The majority of strategies priced on the LIFFE CONNECT® system are calculated by “netting” the buy legs against those of the sell leg.

For Futures products the strategy is expressed in terms of the front (nearest to expiry) month first. For example for a calendar spread, buying Jun/Sep means buying Jun to sell Sep. Selling Jun/Sep means selling Jun to buy Sep.

See Appendix Examples: 8.1 Pricing of Strategies Net Premium

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## 2.4.4 Trading Strategies

When a strategy trade occurs, the counterparty to each trade receives full notification of the traded price of said strategy including the leg price allocations. The Trading Host also sends the following updates to the market as a whole to provide full visibility of trading activity at any time:

- Price Updates
- Volume Updates.

### 2.4.4.1 Price Updates

As in the outright market, when a strategy trades, updates are not only sent to the counterparties of the trade but also the market receives price updates via a Strategy Market Update message. As described in the Strategy Leg algorithm (see section 2.7.4), the price for each leg within the strategy is assigned by the Trading Host when the strategy trades.

Therefore, in addition to the traded strategy price update being distributed to the market, the traded price for each leg is distributed via another Strategy Market Update message. This message informs the market not only of the strategy leg price but also the strategy type it was generated from. For Delta Neutral trading, if the underlying product is listed on the Trading Host, the underlying leg will also be updated.

**Note:** For strategies which contain ratio legs, more than one price may be traded for a particular leg. Reporting of strategy leg prices are restricted to one price which will always be the worst price to ensure calculation of the strategy traded price from the leg prices will not generate a better price than actually executed.

### 2.4.4.2 Volume Updates

When a strategy trade occurs the counterparties are naturally notified of the volume executed, at each price, for both the strategy as a whole and each leg. As with the Price Updates the market is also informed of the traded volume details through both the Market Update and Strategy Market Update message:

- Last Traded Volume for strategy market
- Total Traded Volume, for current day, for strategy market
- Last Traded Volume for each leg (outright market) of the strategy
- Total Traded Volume for current day, for each leg (outright market) of the strategy.

## 2.5 Implieds

LIFFE CONNECT<sup>®</sup> offers an implied strategy trading facility for selected strategies (see 2.5.1 Implied Strategies).

There are two different ways of processing strategy orders at the Client Application level:

- 
- Implying 'In' orders, which build contingent strategy orders from existing outright orders;
  - Implying 'Out' orders, which build contingent outright orders from existing strategy and outright orders.

The prices of orders submitted in the relevant outright legs will be used by the Trading Host to generate implied-in prices. Where these implied-in prices represent the best price for a strategy, they may be traded subject to the trading priority.

An implied-out price will be generated in an outright leg from the interaction of an order in an explicit strategy market and an order in one of the relevant outright legs. Where the Trading Host generated implied-out price represents a better price than that available in the outright leg, that order may be traded subject to the trading priority provided the other leg of the explicit strategy can still be traded at the same time.

The interaction of an order in an explicit strategy market and an order in one of the relevant outright legs, generates an "implied out" price and volume in the other relevant outright leg. Where the "implied out" price is better than the price of other orders in the relevant outright leg, the "implied out" price and volume will be disseminated to Quote Vendors via the Market Data Interface (MDI). Where the "implied out" price is equal to the price of other orders in the relevant expiry month, the total volume of all orders at that price will be disseminated. This will mirror the dissemination of "implied out" prices and volumes on LIFFE CONNECT<sup>®</sup>.

Although the Trading Host will generate both implied-in and implied-out prices, only implied-out prices and only those which represent the current best market price will be distributed via the LIFFE CONNECT<sup>®</sup> API.

Display of implied prices will be dependent upon the type of Independent Software Vendor (ISV) or member firm developed client trading application used. Implied prices are not calculated during Pre-Open unless the Full Implied Uncrossing algorithm is used for options. (See 2.7.3.2 Full Implied Uncrossing for Options Products). No chaining occurs i.e. implieds are not derived from other implieds. Implied prices are used in the uncrossing algorithm but are not used in Indicative Opening Price (IOP) calculation during Pre-Open.

## 2.5.1 Implied Strategies

The Trading Host generates implied prices for the following futures and options strategies:

<b>IMPLIED STRATEGY SET AT PRODUCT LEVEL</b>	<b>CONFIGURED ON</b>	<b>CONFIGURED OFF</b>
<b>OPTIONS CALL SPREADS</b>	Implied in and out prices generated. Implied out prices published	No implied prices calculated or published
<b>OPTIONS PUT SPREADS</b>	Implied in and out prices generated. Implied out prices published	No implied prices calculated or published
<b>OPTIONS STRADDLES</b>	Implied in and out prices generated. Implied out prices published	No implied prices calculated or published
<b>FUTURES CALENDAR SPREADS</b>	Implied in and out prices generated. Implied out prices published	No implied prices calculated or published
<b>FUTURES BUTTERFLIES</b>	Implied in prices calculated but are not published	No implied prices calculated or published

See Appendix Examples: 8.2 Pricing of Implied Ins and Implied Outs

## 2.5.2 Rules of Implieds

### 2.5.2.1 Uncrossing “Crossed” Implied Outs

Implied in prices are calculated during the Pre-Open/Uncrossing period, and form part of the initial two-stage uncrossing algorithm.

Implied Out prices are not calculated or shown in the Pre-Open period and are only calculated and taken into account after Outright and Strategy markets are uncrossed.

In certain circumstances Implied Out prices generated immediately after the Uncrossing sequence has run will be crossed and will need to be dealt with (see example below).

**Position before Uncrossing**

<b>MONTH</b>	<b>BID</b>	<b>OFFER</b>
<b>Jun</b>	95.500 (10)	
<b>Jul</b>		
<b>Sep</b>		95.300 (10)
<b>Jun/Jul</b>		0.100 (10)
<b>Jul/Sep</b>		0.080 (10)

**Position after Initial Uncrossing**

<b>MONTH</b>	<b>BID</b>	<b>OFFER</b>
<b>Jun</b>	95.500 (10)	
<b>Jul</b>	95.400 (10) Implied Out	95.380 (10) Implied Out
<b>Sep</b>		95.300 (10)
<b>Jun/Jul</b>		0.100 (10)
<b>Jul/Sep</b>		0.080 (10)

The scenario in the above example shows that the Bid/Offer spread for July is still “crossed”.

In order to deal with this the Bid price is effectively “pulled” and re entered in order to allow it to receive the improvement and trade at 95.380.

It should be noted however that if another (outright) Bid of 95.400 were to have been present then this would have forced the market in July to trade at 95.400 and be 95.400 Bid left over. See 2.7.3 Uncrossing.

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## 2.6 Reduced Tick Spreads

LIFFE CONNECT® will allow Reduced Tick Spread calendar spreads in addition to normal calendar spreads within the same product.

For example, the outright months and strategy markets in one product will trade in 1/32, while the reduced tick spread market will trade in 1/4 of 1/32.

The Reduced Tick Calendar spread markets will function in much the same way as a normal Calendar Spread markets on the LIFFE CONNECT® platform. Traders subscribed to the physical commodity will receive notification of new Reduced Tick calendar spreads being created and, should they trade, they will also receive notification of the last traded price and volume. This will include the leg prices and volumes, all without having to explicitly subscribe to the new contract. Reduced Tick Spread markets will have a recognized strategy code of 'Z'.

### **Reduced tick spread products:**

- US Treasury Bond Futures
- 10 Year Treasury Note Futures
- 5 Year Treasury Note Futures
- 2 Year Treasury Note Futures
- 10 Year Interest Rate Swap Futures
- 5 Year Interest Rate Swap Futures

### **Reduced tick spreads will:**

- Send volume updates for trades to the outright legs
- Trade in the same denominator as the other strategies and outrights
- Reference to legs for the calculation of the strategy leg prices
- Use a different price format from that used in the other strategies and outright months

### **Reduced tick spreads will not:**

- Support implied in and out prices
- Update traded leg prices in the respective outright months
- Settle in a tick size less than the outright markets

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## 2.7 Algorithms

### 2.7.1 Introduction

LIFFE CONNECT<sup>®</sup> has a number of trading algorithms to support the functional behavior of the Trading Host. The algorithms available are as follows:

- Calculation of prices implied from outright and strategy markets
- The calculations of the indicative opening price during Pre-Open
- Uncrossing of futures and options products at market open
- The determination of trade price for each leg of a traded strategy
- The determination of trade volume for the underlying leg of volatility strategies
- Allocation of traded volume between multiple orders
- Allocation of traded volume between multiple orders, including Market Maker privileges.

### 2.7.2 Indicative Opening Price

The Indicative Opening price (IOP) periodically informs traders of the predicted opening trade price (and volume) during Pre-Open.

Indicative opening details are published via the API using a Market Update message with a flag set indicating that the prices and volumes are indicative.

The calculation is performed at intervals during Pre-Open rather than on receipt of every order.

For example, it may be configured to calculate the opening price every (30) seconds during Pre-Open and send a Market Update message (to notify traders that the price and/or volume has changed). Immediately prior to Open the frequency of calculation can be increased – for example at (10) minutes prior to Open, increase the calculation frequency to every (5) seconds.

The IOP algorithm is only designed to work with the two-stage uncrossing algorithm (see section 2.7.3.1) for futures products that have crossed markets. If the bids and offers are not crossed, no IOP is calculated or disseminated.

IOPs are only calculated for outright futures months. Strategy markets or implied prices are not included in the calculation. The dissemination of the IOP only occurs when the recalculated value changes from that previously issued.

The IOP calculation times and intervals can be configured on a per product basis. The frequency of publication of these will be set on a per contract basis but will be in the order of once every 30 seconds, improving to once every 5 seconds in the final 300 or 600 seconds prior to the open.

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### 2.7.3 Uncrossing

During Pre-Open, traders may only enter Market On Open orders (MOO) and Limit orders with GTC or standard time type and no minimum volume requirements.

As these orders cannot be traded during this period, there will be incidences of bids being higher than offers or offers lower than bids, a state commonly known as Backwardation or choice/crossed markets.

Immediately upon Market Open, LIFFE CONNECT<sup>®</sup> will apply an uncrossing algorithm to calculate the price at which the maximum volume will be traded. This will automatically take into account all orders that have resulted in incidences of backwardation and execute all of these at the prices calculated.

All orders which are executed under this approach will be traded at a price equal to or better than that which they were entered. Market On Open orders (MOO) are processed during the latter stages of uncrossing.

#### 2.7.3.1 Two Stage Uncrossing for Futures Products

##### The Uncrossing Trade Price

The uncrossing algorithm performs a series of passes, matching the best bid/s and best offer/s. Once all backwardated volume has been matched, there may be residual volume in the market. The uncrossing algorithm takes into account all orders in the market submitted during Pre-Open to determine the prices at which all uncrossed business is traded. This ensures that the uncrossed calculated price falls within the market remaining, after the market has been uncrossed.

Uncrossing trades can only take place if there are crossed bids and offers in the market. Once uncrossing trades have been identified, the uncrossing algorithm will calculate the "Uncrossing Trade Price" by applying one of the four following calculations. The calculation applied is determined by the residual volume left in the market:

1. There is no remaining bid or offer volume

Uncrossing Trade price = the average of the bid and offer price from the last trade.

2. There is remaining offer volume but no bid volume

Uncrossing Trade Price = offer price from last trade.

3. There is remaining bid volume but no offer volume

Uncrossing Trade Price = bid price from last trade.

There is remaining offer and bid volume.

To determine the Uncrossing Trade Price:

- Determine the Best Offer Price and the Bid Price from the Last Trade. Take the lowest of these. This is the 'High Price'.

- Determine the Best Bid Price and the Offer Price from the Last Trade. Take the highest of these. This is the 'Low Price'.

The Uncrossing Trade Price is the average of the 'High Price' and 'Low Price'.

**Note:** Products are traded only in full ticks, but where a half tick Uncrossing Trade Price is calculated, the price allocated to all uncrossed business will be rounded down where this price is positive, but rounded up where this price is negative. LIFFE CONNECT® rounds towards zero.

See Appendix Example: 8.3.1 Two Stage Uncrossing for Futures Products.

### 2.7.3.2 Full Implied Uncrossing for Options Products

When uncrossing option markets it is only possible to calculate the uncrossing trade price using Full Implied Uncrossing.

## 2.7.4 Strategy Leg Pricing

### 2.7.4.1 Overview

While LIFFE CONNECT® matches strategies at a single price; the resulting positions are always maintained in the corresponding outright series. This ensures that traders can use either the outright or strategy markets to open and close their positions. Therefore once a strategy trade has been identified, each leg must be allocated a price which is consistent both with the strategy traded and with the current price in the outright market. LIFFE CONNECT® uses the following algorithm to determine the price of each outright leg as follows:

- Assign reference price based on Bid / Ask and last trade information in the outright market
- Adjust leg prices to meet strategy price

## 2.7.5 Delta Neutral Strategies

LIFFE CONNECT® supports the functionality to perform delta neutral (volatility) trades i.e. to trade simultaneously an options product with either an Exchange listed or non-Exchange listed cash product. The following are examples of possible volatility trades:

- An individual equity option AND the underlying stock. Validation of the underlying stock price is not currently supported on LIFFE CONNECT®.
- An Exchange listed option (individual, index or strategy) AND the Exchange listed future.
- A LIFFE CONNECT® recognized options strategy AND the underlying stock.

This allows traders to hedge an option position using the related underlying. An example of this functionality is described for equity options below (the procedure is similar for futures).

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LIFFE CONNECT<sup>®</sup> will:

- Report the cash leg of an equity options volatility trade to the cash market in real time.
- Validate the cash leg price of the volatility order upon submission and trade to ensure that it is within an allowable spread of the current market mid-point.
- Map different options codes to the cash market codes for the same product.
- Where applicable, allow an Alternate Underlying contract, for example options on CBOT<sup>®</sup> Dow Jones Industrial Average<sup>SM</sup> against either the CBOT<sup>®</sup> DJIA and CBOT<sup>®</sup> mini-sized Dow Futures
- Account for different contract sizes between the option and its underlying to ensure a delta neutral position

### 2.7.5.1 Rules for the Underlying Futures Leg

Creation of volatility market

In addition to variable underlying values and contracts the delta neutral trading functionality also enables configuration of the underlying leg by months, price, and delta when the Delta neutral strategy is created.

Traders can choose the delta value for delta neutral orders submitted. The volume of the underlying leg is calculated by the Trading Host based on the submitted delta. The futures leg price and volume is reported to the market with a tag to denote it is a delta neutral trade. However unlike other strategy trades, the underlying leg will not update the total traded volume of that market.

### 2.7.6 Trade Policies

A number of different algorithms (“Trade Policies”) are available to allocate tradable volume in incoming orders where there are multiple orders in the order book which could complete the trade. In all these policies, orders providing a better price are traded first; only the allocation of volume to orders at the same price varies.

The trade policies available for LIFFE CONNECT<sup>®</sup> 7.1 are as follows:

- Price-Time
- Order Level Pro-Rata
- Order Level Pro-Rata Priority
- Order Level Pro-Rata Priority Order and Volume Cap
- Order Level Pro-Rata Priority Order and Minimum Volume
- Order Level Pro-Rata Priority Order, Volume Cap and Minimum Volume
- Preference Price-Time

- Preference Order Level Pro-Rata
- Preference Order Level Pro-Rata Priority

**Note:** Preferencing Trade policies are detailed in section 2.7.7 Preferencing.

### 2.7.6.1 Price-Time

In this simple algorithm, priority is given to orders at the best price (highest for a bid, lowest for an offer). If there are several orders at this best price, priority is given to the first order that entered the market. This order will receive all incoming business until it is filled.

#### Example 1: Price-Time Priority Matching

When an order is submitted, the Trading Host's actions are dependent on the type of order entered and whether or not there is an order already in the central order book against which the new order can match.

In this example, assume the central order book has a bid Limit order of 109-03 for 500 Bond Sep 03 futures from Trader A timestamped 12:00 which is followed by a bid of 109-03 for 500 lots from Trader B timestamped 12:01.

The sequence of events is:

1. Trader C submits an order to Sell 500 Bond Sep 03 futures at 109-03.
2. Trader C is given an acknowledgement to the order.
3. The order submitted by Trader C matches with that submitted by trader A (as the order is older than that submitted by Trader B). The trade takes place and the original order submitted by Trader A is deleted from the order book.
4. The two traders, A and C, are notified of the trade.

All subscribed traders are notified of the change in the central order book because there is a change to the best buy/sell prices.

See Appendix Examples: 1.1 Price-Time Trade Policy

### 2.7.6.2 Order Level Pro-Rata

In this algorithm, priority is given to orders at the best price (highest for a bid, lowest for an offer). If there are several orders at this best price, equal priority is given to every order at this price and incoming business is divided among these orders in proportion to their volume.

### Example 1: Order Level Pro-Rata

Assume that the three traders shown below have the following orders in the market at the same price. An incoming order will be assigned in the following way:

Trader A	Trader B	Trader C	Total	Incoming Order	Total Trade	Trader A Fill	Trader B Fill	Trader C Fill
15	25	20	60	45	45	11	19	15

#### 2.7.6.3 Order Level Pro-Rata Priority

This algorithm is the same as Order Level Pro-Rata described in 2.7.6.2, but a priority flag is given to the order that was the first to enter the market at the best price. This priority order is given all volume until it is filled. Any remaining volume is divided among the other orders on a pro-rata basis.

**Note:** Any order that gains priority during Pre-Open will lose it on Market Open.

Assume that the two traders shown below have the following orders in the market at the same price and that Trader A improved the market price by being the first to enter an order at this price. Therefore, Trader A has the priority flag assigned.

An incoming order for 300 lots will be assigned in the following way:

Trader A Time: 12:00	Trader B Time: 12:01	Total	Incoming Order	Total Trade	Trader A Fill	Trader B Fill
400 P	100	500	300	300	300	0

Since Trader A has priority he will receive all 300 lots and Trader B will receive none.

#### 2.7.6.4 Order Level Pro-Rata Priority Order and Volume Cap

This algorithm is the same as Pro-Rata Priority, but the order with the priority flag assigned will only take all incoming volume up to a certain volume cap. When this volume cap is reached all remaining volume is divided among this order and the other orders by the pro-rata algorithm.

##### Example 1: Pro Rata Priority and Volume Cap – Below Volume Cap

Assume that the volume cap is set at 500. Trader A creates a new price by entering an order of 400 lots and gains priority. Traders B and C enter orders of 200 and 150 lots at the same price as Trader A.

When an incoming order for 500 lots is entered:

Trader A Time: 12:00	Trader B Time: 12:01	Trader C Time: 12:02	Total	Incoming Order	Total Trade	Trader A Fill	Trader B Fill	Trader C Fill
400 P	200	150	750	500	500	400	57	43

Trader A will get all his volume and the remaining business will be divided Pro-Rata among the other traders. Trader A's order size is below the volume cap.

### Example 2: Pro-Rata Priority and Volume Cap – Above Volume Cap

Assume the volume cap is again set at 500 and Trader A has gained priority by creating a new price. If the following volumes are in the order book and 1200 lots of incoming business enter the market, it will be assigned in the following manner:

Trader A Time: 12:00	Trader B Time: 12:01	Trader C Time: 12:02	Total	Incoming Order	Total Trade	Trader A Fill	Trader B Fill	Trader C Fill
600 P	555	640	1795	1200	1200	554	300	346

Trader A receives 500 lots (up to the Volume Cap) and remaining business is divided Pro-Rata among all traders (including Trader A's remaining volume).

#### 2.7.6.5 Order Level Pro-Rata Priority Order and Minimum Volume

This algorithm is the same as Pro-Rata Priority, but at the best price a priority flag is only given to the order that was the **first** to enter the market at the best price if that order is above a certain volume.

### Example 1: Pro-Rata Priority and Minimum Volume – Above Minimum Volume

Assume that the minimum volume is set at 50 lots and exactly the same orders in Example 2.7.6.3 enter the market in the same sequence.

Trader A Time: 12:00	Trader B Time: 12:01	Total	Incoming Order	Total Trade	Trader A Fill	Trader B Fill
400 P	100	500	300	300	300	0

Trader A again gains the priority flag, since his volume is over 50 lots. The orders trade in exactly the same manner as 2.7.6.3 Order Level Pro-Rata Priority Order.

### Example 2: Pro-Rata Priority and Minimum Volume – Below Minimum Volume

Assume that the minimum volume is again set at 50 lots. Trader A enters an order for 40 lots at a new price, but since his order is below 50 lots does not get a priority flag. **Trader B then enters an order for 60 lots at this price. There is no priority flag assigned to Trader B.**

An incoming order of 10 lots enters the market:

Trader A Time: 12:00	Trader B Time: 12:00	Total	Incoming Order	Total Trade	Trader A Fill	Trader B Fill
40	60	100	10	10	4	6

This business is divided Pro-Rata with no priority assigned.

#### 2.7.6.6 Order Level Pro-Rata Priority Order, Volume Cap and Minimum Volume

This combines the features of the previous two algorithms. A priority flag is only given to the order that was first to enter the market at the best price if that order is above a certain volume. When this priority flag is assigned it will only gain all incoming volume up to a certain volume cap. When this volume cap is reached, all remaining volume is divided Pro-Rata among this order and the other orders at the best price.

Assume the volume cap is again set at 500 and the minimum volume requirement is 50.

Trader A Time: 12:00	Trader B Time: 12:01	Trader C Time: 12:02	Total	Incoming Order	Total Trade	Trader A Fill	Trader B Fill	Trader C Fill
570 P	80	90	740	623	623	536	41	46

#### 2.7.6.7 Rules regarding Order Level Pro-Rata Priority

The following examples illustrate additional rules that apply to Order Level Pro-Rata Priority:

- Implied prices do not gain priority.
- Resting orders never gain priority as a result of other orders trading out.
- Priority is gained by improving the price currently in the market regardless of any previously traded prices.
- Priority is lost if order volume is revised up.
- Priority is lost if order volume is revised down to less than the minimum volume.
- Priority is lost if a price is revised so that it is no longer the best price.
- Priority may be gained if a price is revised so that it becomes the best price.

See Appendix Examples: 8.6 Order Level Pro Rata Priority Trade Policy

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## 2.7.7 Preferencing

### 2.7.7.1 Introduction

LIFFE CONNECT<sup>®</sup> supports a preference trading model configurable at product level. Preferencing allocates a percentage of incoming orders to Market Maker (MM) orders resting in the market at best price and is available for outright and strategy markets. Implied out and implied in prices generated by orders submitted by a MM have no preference and are treated in the same way as non-preferenced orders.

There are two key elements to preferencing functionality. First how the preferencing status is allocated to various market making orders and second how the traded volume is allocated according to preferencing rules in conjunction with the underlying trade policy.

### 2.7.7.2 Allocation of Status

For an order to be allocated preference status all the following criteria must be satisfied:

- Have the correct preference class for the particular product. Preference classes are either:
  - Primary Market Maker (PMM) - allocated traded volume in preference of CMM and rest of market. The percentage allocated is configured on a per contract basis as is the number of PMMs in each product.
  - Competitive Market Maker (CMM) - allocated traded volume in preference of market. The percentage allocated is configured on a per contract basis as is the number of CMMs in each product.
- Market state must be Open. Preferencing does not occur during Pre-Open nor is it included in the uncrossing algorithm.
- Qualifying MM order with the account code set to M. GTC orders are specifically excluded.
- MM order must be best price. This will include prices which have previously been in depth as the preference status is assigned when the order becomes best price.
- A minimum volume constraint, which is specified on a per product basis, must be met for preference status to be assigned.
- If order volume is revised down below the minimum volume preference status will be lost. However, if partially traded below minimum volume, preference status remains as the order maintains preference through multiple trade clips.
- If the order price is revised, or if volume is revised upward preference status is not lost but the timestamp assigned to the order will change.

### 2.7.7.3 Allocation of Market Volume

Preference volume is allocated to those orders with preference status, subject to the following restrictions:

- The Market Maker will never receive priority over the order which gained Priority at best, in accordance to the Pro Rata with Priority Trading algorithm. However if the Market Maker has both Priority and Preference priority, the Market Maker will receive both sets of priority volume.

- 
- The order of allocation is:
    - Allocate Priority Volume if the Pro Rata Priority algorithm is used
    - Calculate  $1/100^{\text{th}}$  of the MM percentage category, then multiply by the tradable volume (also known as the category volume)
    - If the category volume > maximum cap, it will be reduced to the maximum cap
    - If the category volume is > 1 but not a whole number it will be rounded to the nearest number
    - If the category volume is < 1 the rounding will be set on a per product basis
    - If groups of PMM and CMM are within the best price, preference will be sorted according to:
      - Primary V Competitive Market Makers – with primary attaining preference
      - Timestamp – with the oldest attaining preference
    - Category volume is applied in sequence
- See Appendix Examples: 8.7 Preferencing

## **3. Market Operations and Control**

e-cbot Market Operations will be based in Chicago with improved technical tools to monitor network and server issues – providing first level support.

LIFFE CONNECT® will provide second and third level technical support in the U.S. for hardware and network support.

The Monitor and Control (M&C) system allows control of the LIFFE CONNECT® market to be performed by Market Operations staff. This includes actions such as locking out users at the ITM level, enabling or disabling markets, setting price and volume limits, sending messages at the ITM level and pulling orders.

### **3.1 Participant Control**

#### **3.1.1 Pull Orders**

Market Operations can withdraw (or 'pull') any active order that has been accepted in the Trading Host's central order book at the e-cbot User ID, Individual Trader Mnemonic (ITM) or member firm level.

#### **3.1.2 Log-out**

If an ITM is logged out of LIFFE CONNECT® by Market Operations, for example, in the event of problem with their Client Application, all orders submitted by User ID's under that ITM excluding GTCs are transferred to the nominated replacement ITM. If there is no nominated replacement, the orders are deleted. The ITM can then log straight back in.

##### **3.1.2.1 Level**

Market Operations can log-out an individual ITM, a selected group or all the ITMs currently logged on for a member firm.

##### **3.1.2.2 Messages**

The Trading Host sends a message to each ITM of a member firm to notify that the ITM has been logged out.

#### **3.1.3 Lock-out**

In the event that an ITM, or their Client Application, is behaving in a way that is deemed to be contrary to the Trading Rules, and/or threatening in any way the integrity of the markets, Market Operations has the capability to immediately revoke their access to the market.

If it is necessary to force an ITM out of the market, Market Operations will activate a 'lockout'. This will send the Client Application a 'forced logout' message and immediately log off the ITM. All orders for e-cbot User IDs under that ITM, including GTCs will be cancelled. These orders are not transferred to a nominated replacement ITM and the ITM cannot log back in.

Market Operations can lock out an ITM even if it is not logged on.

### **3.1.3.1 Messages**

The Trading Host sends a message to notify the ITM that it has been locked out.

### **3.1.4 Text Message**

From time to time it will be necessary for Market Operations to send text messages to ITMs currently in the market. Receipt of text messages will depend on the Independent Software Vendor (ISV) or member firm developed client application. Messages can be sent to the following:

- All ITMs
- ITMs subscribed to a specific product (Product based messaging).
- Individual ITMs.

These text messages will be received by the relevant Client Applications, using one of the API functions, and should be displayed (and/or printed) for the ITMs information.

## **3.2 Price Controls**

### **3.2.1 Introduction**

As a precaution against manifest error in the submission of orders, and to maintain market integrity, LIFFE CONNECT<sup>®</sup> provides price limit functionality for each product month/series and will reject attempts to enter orders into the central order book which breach these price limits. In the event of an outer price limit breach, the Trading Host will send a message to the Client Application indicating the reason for the order rejection.

Price limits only apply during the Open period (also Pre-Open for futures) and are calculated throughout the trading day based upon prevailing market prices. Price limits will only be adjusted in response to the generation of a new reference price, which may be manually amended, if deemed appropriate by Market Operations.

The price limit for bids is the 'allowed spread' greater than the reference price, while the price limit for offers is the 'allowed spread' lower than the reference price. If a bid or offer is entered at a price outside these limits the order will be rejected.

### **3.2.2 Inner and Outer Price Limits**

LIFFE CONNECT<sup>®</sup> calculates Inner and Outer Price Limits. The Inner price limits for futures are defined as the Indicative Market Price +/- the outright inner price limit, which is a configurable value.

The inner and outer price limits for options are calculated on the Options Pricing system (see 3.5 Options Price Limits).

### **3.3 Futures Price Limits**

Futures price limits are calculated from a price limit spread applied either side of the Reference Price in that expiry month.

The price limit spreads are set in ticks by Market Operations for each expiry month of a product based upon exchange policy and prevailing market conditions. Inner and outer spreads and resulting inner and outer price limits exist for each expiry month.

Orders entered within inner limits are accepted without alert. Orders entered outside inner limits but inside outer limits are accepted but flagged to Market Operations. Orders that are entered outside outer limits are automatically rejected by the Trading Host.

#### **3.3.1 Strategies**

The appropriate price limits for each strategy are calculated by using the strategy price limits for each month set by Market Operations. The price limits for any particular strategy are calculated from these limits and a parameter known as the leg ratio. The leg ratio is the number of futures to be traded by a particular leg of the strategy. For instance, the leg ratio for the outer legs of a Butterfly is one and for the middle leg is two.

### **3.4 Futures Settlements**

#### **3.4.1 Types of Settlement**

The following functions are available to generate and publish settlement prices and manage the settlement process:

- Daily Settlement
- Close
- Expiry

Each type of settlement has its own specific message in the API. An Exchange can decide whether to issue settlement prices or not.

##### **3.4.1.1 Daily Settlement**

Daily Settlement Prices (DSP) are generated for margining purposes based upon reference prices. These can originate from an external source, for example, the trading floor or the cash market but can also be generated from trade information generated by the Trading Host during an indicative period.

### 3.4.1.2 Close

Daily Closing Reference Prices are generated for all futures products listed. These prices then provide a reference for market opening on the following trading day. As the name suggests, closing prices are generated following the close of the market.

### 3.4.1.3 Expiry

Exchange Delivery Settlement Prices (EDSP) are generated upon expiry of certain months. This price then becomes the settlement price for the expiry month.

## 3.4.2 Futures Settlement Process

The Daily Settlement and Closing prices can either be imported via a spreadsheet or manually modified and copied to provide the official prices.

## 3.5 Options Price Limits

Options price limits are dynamic and are produced for both outright options and strategy markets by the Options Pricing system.

### 3.5.1.1 Delta Limits

Using a similar principle to price limits, LIFFE CONNECT<sup>®</sup> will validate delta neutral trades to ensure that the requested delta for a trade is acceptable. The Trading Host will only allow the creation of volatility strategies where the specified delta falls within these delta limits.

As with price limits, delta limits are calculated using a reference value and defined spreads. The reference delta for every strike of a particular option product is calculated by the Options Pricing system and sent to the Trading Host.

When more than one option leg exists in a delta neutral strategy the reference delta of each leg is combined to form an overall strategy delta that is validated against delta limits. The deltas for sell call legs and buy put legs are added to form overall figure and the deltas for buy call legs and sell put legs are subtracted from it. This overall delta is validated against delta limits and the trade is accepted or rejected.

#### Example 1: Delta Limits

Assume that a trader enters a volatility trade with a delta of 39%, the current reference delta is 34.87% and the current delta limit is 10%. The delta validation permits the strategy to be created because the requested delta is between 24.87% and 44.87%. Strategies created with a delta outside this range will be rejected by the Trading Host. Similarly prices submitted into a previously created strategy where the delta is no longer within the range will also be rejected.

### **Example 2: Strategy Delta Limits**

For example, assume that a trader enters a straddle volatility order with delta of 14%. The current reference delta is 42.16% in the put option leg and 24.51% in the Call option leg and the delta limits are set at 10%.

Since the legs of a straddle are buy Put, buy Call, the overall strategy reference delta is  $42.16 - 24.51 = 17.65\%$ . Since the delta of the order is between 7.65% and 27.65% it will be accepted.

Both the upper and lower delta limits are always the same sign as the reference delta. For instance, if the reference delta for a trade is 4.37% and the delta spread is 10%, then the delta limits will be 0.01% and 14.37%.

#### **3.5.1.2 Underlying Volatility Limits**

This corresponds to the maximum deviation allowed on the underlying last traded price in delta neutral trades. It follows the same principal as delta limits.

#### **Example 1: Underlying Volatility Limits**

Assume the last traded CBOT® DJIA<sup>SM</sup> futures price is 9730 and the Underlying Volatility limits are set to 10 pts. Orders with futures legs outside the range of 9710 and 9740 will be rejected by the Trading Host.

## **3.6 Options Settlements**

### **3.6.1 Types of Settlement**

The following functions are available to publish settlement prices generated in the Options Pricing system:

- Daily Settlement
- Close.

#### **3.6.1.1 Daily Settlement**

The Options Settlement function is used to publish daily settlement prices.

Daily Settlement Prices (DSP) are generated for margining purposes based upon reference prices. These can originate from an external source, for example, the trading floor or the cash market but can also be generated from trade information from the Trading Host during an indicative period. In addition, options prices can be generated from the theoretical pricing models.

### 3.6.1.2 Close

The Options Close function is used to publish daily closing prices. Closing prices then provide a reference for market opening on the following trading day and are published following the close of the market.

### 3.6.2 Options Settlement Process

Market Operations can use the option pricing model to determine the settlement prices for the Option product being settled. These prices are fed from Option Pricing system to the Trading Host, which passes them onto the M&C system.

If Market Operations is satisfied with the prices received from the Option Pricing system they can be published. If some of the prices need to be altered before being publishing, the option pricing model is changed so that it displays the required prices. The prices are then resent to the Trading Host and thereby onto the M&C system where they can again be checked, published or the cycle repeated any number of times.

**For the CBOT, the available floor prices will be imported and overwrite the prices calculated by the Options Pricing system for settlement.**

The published prices are always marked by the API as "Official Prices". Only those options products being monitored by a Market Operations Analyst can be settled or closed.

## 3.7 Import Settlement Prices

At launch for the CBOT all settlements will be uploaded from the floor. For the electronic only products there are different procedures.

For CBOT® mini-sized Dow<sup>SM</sup>, the CBOT® DJIA<sup>SM</sup> settlement is used. For mini-sized Eurodollar futures, the CME futures settlement is used. For CBOT® DJ-AIGCI<sup>SM</sup> futures, a fair value calculation for the underlying Dow Jones-AIG Commodity Index<sup>SM</sup> is used.

## 4. e-cbot Error Trade Policy

The CBOT's error trade policy is designed to preserve the integrity of CBOT product markets by striking an appropriate balance between trade certainty and erroneous price discovery. The policy provides a mechanism to promptly address transactions that are executed at obviously erroneous prices substantially inconsistent with the last trade price of the contract or alternative determination of the contract's fair value. This policy does not relieve market participants from potential financial responsibility or liability for the execution of trades that are deemed an "error trade" if their actions caused financial loss to other parties whose transactions were busted.

### 4.1 Invoking the Error Trade Policy

If an e-cbot user believes that he executed a trade through e-cbot at a price that was in error, he must contact e-cbot Market Operations ("e-cbot Operations") at **(312) 347- 4600** without delay. If e-cbot Operations is not notified within five minutes of the execution time of the asserted error trade, the trade will stand. A third party or e-cbot Operations may also call a trade into question within five minutes of the execution. Trades called into question within five minutes will be evaluated in accordance with sections 2 and 3 of this policy. However, e-cbot Operations has the authority, but not the obligation, to consider trades reported after the five minute deadline provided the trade price in question is grossly (i.e. multiple points) out of line with the last trade price or alternatively determined fair value of the respective contract.

Trades resulting from quantity errors generally will not be called into question.

### 4.2 Trade Price Within the "No Bust Range"

If a futures transaction is asserted to be at a price that is in error, the trade shall not be considered for review by e-cbot Operations unless the price of the asserted error trade is greater than the designated number of ticks (as outlined in Appendix 1) from the reference price. The reference price will be the last trade price preceding the entry of the error trade or an alternatively determined fair value of the contract. Fair value for futures contracts may be determined by the last trade price, preceding settlement price, spread relationships and/or other variables deemed relevant by e-cbot Operations. However, during side-by-side hours the reference price on a downside (upside) move will never be higher (lower) than the low (high) of the pit traded price for an equivalent contract during the time period that the prices of the contracts were disjointed. During non side-by-side hours, the reference price will never be higher (lower) than the low (high) of an equivalently traded contract.

If an option trade is asserted to be at a price that is in error, the trade shall not be considered for review by e-cbot Operations unless the price of the asserted error trade conforms to the following guidelines:

Trades must be greater than 2 ticks above or below the theoretical price in order to be busted.

Trades greater than 2 ticks away from the theoretical price, but less than 20 ticks away from the theoretical price, must be greater than 20% above or below the theoretical price, in order to be eligible to be busted.

Trades greater than 20 ticks above or below the theoretical price (40 ticks for the Soybean complex and Dow complex), may be busted even if the tick disparity is less than 20% of the theoretical value.

If an asserted trade entry error results in trade executions at multiple price levels, the referenced last trade price (if used to determine the reference price) shall be the last trade price prior to the entry of the alleged error trade.

If the asserted error trade is the first trade in a contract that has not previously been opened, e-cbot Operations will determine a fair value estimate for the contract, which then will be gauged against the error trade range to determine the final status of the trade.

If e-cbot Operations contacts a member user regarding a suspicious order and the user states that the order is entered correctly, the order (if subsequently executed) may only be called into question by a third party.

Trades that are executed outside of the daily price limits will be busted by e-cbot Operations irrespective of whether the trade(s) falls within the “no bust range” established above.

### **4.3 Trade Price Outside of the “No Bust Range”**

If the price of the asserted error trade is more than the specified number of ticks from the reference price, e-cbot Operations will send a broadcast message to the user community indicating that the trade has been called into question. If the asserted error trade is outside of the specified tick range and involves only two parties, e-cbot Operations will attempt to contact the parties to the transaction. If both parties agree to bust or re-price the transaction, e-cbot Operations shall send a broadcast message to the user community and an alert to the quote vendor network indicating that the trade was busted or re-priced.

If there is more than one contra-party to the order asserted to have been executed in error, e-cbot Operations will gauge the erroneous transactions against the error trade range to determine the final status of the trades.

### **4.4 e-cbot Operations Authority to Halt Markets**

e-cbot Operations shall have the authority to halt markets in any contract during extraordinary circumstances where there has been a major market movement without any apparent economic or fundamental basis for movement to have occurred.

### **4.5 Decisions of e-cbot Operations**

**A.** e-cbot Operations will review the circumstances surrounding the alleged error trade to determine whether it should be deemed an error trade and busted. However, subject to the mutual agreement of both parties, the trade may be re-priced in line with the contract’s fair value. If the trade is repriced to a level that is below a sell limit price or above a buy limit price, and the customer rejects the trade, the trade must be placed in the error account of the customer’s clearing firm. Parties to these transactions are permitted to make cash adjustments to settle losses that occur as a result of the error trade. Should parties to a disputed transaction be unable to mutually resolve financial disputes arising from such transactions, arbitration facilities are available through the Exchange. The Arbitration Committee may hold the party who entered the order that resulted in the error trade financially responsible for losses that occur as a result of the busted trade(s).

Trade certainty and the timely resolution of error trades are critical objectives of this policy. Therefore, if parties to a disputed transaction do not agree to the terms of resolution, e-cbot Operations reserves the final authority to determine the disposition of the questioned transaction.

During side-by-side trading hours, e-cbot Operations shall, unless impracticable, make its determination within 10 minutes of the broadcast message regarding the potential error trade. During non side-by-side trading hours, e-cbot Operations shall, unless impracticable, make its determination within 15 minutes of the broadcast message regarding the potential error trade. The decisions of e-cbot Operations shall be final, and e-cbot Operations shall send a broadcast message and an alert to the quote vendor network indicating whether the trade was busted, re-priced or allowed to stand.

**B.** In making its determination, e-cbot Operations may consider relevant factors including, but not limited to: market conditions immediately before and after the transaction; the prices of related contracts; whether one or more parties to the trade believe the trade was executed at a valid price; the extent to which the transaction appeared to trigger contingency orders and other trades; information related to the e-cbot Operations by third parties.

## **4.6 Procedures for Correcting Error Trades**

In the event a trade is busted, the parties to the transaction must reverse the transaction through applicable clearinghouse procedures. e-cbot Operations will notify OIA regarding any situation where a party fails to claim or misclear trades in a timely manner. Such failure may be deemed a violation of Rule 504.00, Acts Detrimental to the Welfare of the Association.

Under no circumstances shall the parties to an alleged error trade be permitted to reverse the error by entering into a prearranged transaction.

If the trade called into question is determined not to be an error trade, the parties to the trade are permitted to mutually agree upon a cash adjustment; any such adjustment must be reported to e-cbot Operations.

### **Spreads**

Because of the autoleg feature of the e-cbot system, spreads may be executed such that one leg of the spread is determined to be an error trade and the other leg is deemed to have been executed at a good price. In such circumstances, the party who enters an outright order that causes an error trade on an autolegged spread will be deemed to be the counterparty to the good leg of the spread (see Appendix 2). The parties to the transactions will reverse and claim the transactions as indicated through the applicable clearing house procedures.

## **4.7 Arbitration Procedures**

Arbitrations relating to asserted error trades are limited to trades that are determined by e-cbot Operations to be an error trade. A notice of intention to arbitrate must be filed within ten business days after the date of the error trade. The party that caused the error may be held responsible for realized losses incurred by parties whose trades were busted as a result of the error.

## **4.8 Error Trade Fees**

The party responsible for the error must pay a \$1,000 fee for the first two error trades, \$3,000 for the 3rd error trade, and \$5,000 for each subsequent error trade within a calendar year.

## 4.9 e-cbot Error Trade Policy Appendix 1

### Tick Breakdown Per CBOT Product

Product	Symbol	Minimum Tick Increment	"No Bust Range"*	Tick increment of "No Bust Range"
U.S. Treasury Bond Futures	ZB	1/32	96 Ticks	3 points
Options on U.S. Treasury Bonds	OZB	1/64	20 Ticks	20/64ths
CBOT mini-sized U.S. Treasury Bond Futures	YH	1/32	96 Ticks	3 points
10 Yr. Treasury Note Futures	ZN	(1/2)/32	192 Ticks	3 points
Options on 10 Yr. Treasury Notes	OZN	1/64	20 Ticks	20/64ths
CBOT mini-sized 10 Yr. Treasury Note Futures	YN	(1/2)/32	192 Ticks	3 points
5 Yr. Treasury Notes	ZF	(1/2)/32	192 Ticks	3 points
Options on 5 Yr. Treasury Notes	OZF	1/64	20 Ticks	20/64ths
2 Yr. Treasury Notes	ZT	(1/4)/32	384 Ticks	3 points
Options on 2 Yr. Treasury Notes	OZT	(1/2)/64	20 Ticks	10/64ths
2 Yr. When Issued Treasury Notes	WI2	¼ Basis Point	20 Ticks	5 Points
MuniNote Index	ZU	1/32	20 Ticks	20/32nds
Muni-Note Index Options	OZU	1/64	20 Ticks	20/64ths
30-Day Fed Funds	ZQ	½ Basis Point	20 Ticks	10 Points
Options on 30- DayFed Funds	OZQ	¼ Basis Point	20 ticks	5 Points
10 Yr. Interest Rate Swaps	SR	1/32	20 Ticks	20/32nds
10 Yr. Interest Rate Swaps Options	OSR	1/64	20 Ticks	20/64ths
5 Yr. Interest Rate Swaps	SA	(1/2)/32	20 Ticks	10/32nds
5 Yr. Interest Rate Swaps Options	OSA	1/64	20 Ticks	20/64ths

Product	Symbol	Minimum Tick Increment	"No Bust Range"*	Tick increment of "No Bust Range"
Bund Futures	GBL	.01 Points	20 Ticks	.20 Points
Bobl Futures	GBM	.01 Points	20 Ticks	.20 Points
Schatz Futures	GBS	.01 Points	20 Ticks	.20 Points
CBOT Dow AIG Commodity Index <sup>SM</sup>	AI	0.1 Points	40 Ticks	4 Points
CBOT Dow Jones Industrial Average <sup>SM</sup> Futures	ZD	1 Point	250 Points	250 Points
CBOT Dow Jones Industrial Average <sup>SM</sup> Options	OZD	½ Point	40 Ticks	20 Points
CBOT mini-sized Dow <sup>SM</sup> \$5 Multiplier Futures	YM	1 Point	250 Points	250 Points
CBOT mini-sized Dow <sup>SM</sup> \$5 Multiplier Options	OYM	1 Point	40 Ticks	40 Points
mini-sized Eurodollar	YE	½ Basis Point	10 Ticks	5 Points
100 oz Gold Futures	ZG	10 cents	40 Ticks	\$4.00
5000 oz Silver Futures	ZI	1/10 cent	80 Ticks	8 Cents
mini-sized Gold Futures	YG	10 cents	40 Ticks	\$4.00
mini-sized Silver Futures	YI	1/10 cent	80 Ticks	8 Cents
Corn	ZC	¼ cent	40 Ticks	10 Cents
Corn Options	OZC	1/8 cent	20 Ticks	2 ½ Cents
Wheat	ZW	¼ cent	40 Ticks	10 Cents
Wheat Options	OZW	1/8 cent	20 Ticks	2 ½ Cents
Oats	ZO	¼ cent	40 Ticks	10 Cents
Oat Options	OZO	1/8 cent	20 Ticks	2 ½ Cents
Rough Rice	ZR	½ cent	40 Ticks	20 Cents
Rough Rice Options	OZR	¼ cent	20 Ticks	5 Cents
Soybeans	ZS	¼ cent	80 Ticks	20 Cents

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<b>Product</b>	<b>Symbol</b>	<b>Minimum Tick Increment</b>	<b>“No Bust Range”*</b>	<b>Tick increment of “No Bust Range”</b>
Soybean Options	OZS	1/8 cent	40 Ticks	5 Cents
Soy Meal	ZM	10 cents	80 Ticks	\$8.00
Soy Meal Options	OZM	5 cents	40 Ticks	\$2.00
Soy Oil	ZL	1/100 cents	80 Ticks	.80 cents
Soy Oil Options	OZL	5/1000 cents	40 Ticks	.20 cents

\* Option products are shown in this chart to indicate the greatest number of ticks defined as the “No Bust Range”.

## 4.10 e-cbot Error Trade Policy Appendix 2

### EXAMPLE OF AUTOLEG ERROR

Trader "A" has a spread order in the book to buy June Bonds and sell September Bonds. (Please note that when you enter a spread order into the system, it assigns prices to the individual legs and the order is included in the outright order books.)

Trader "B" has an order to sell June Bonds.

Trader "C" makes an error by entering a bid in the September contract (he intended to bid June). Trader C's bid for September matches against Trader A's sell September portion of the spread, which triggers Trader A's buy June portion of the spread to match against Trader B's sell June order.

The September trade between Trader C and Trader A is determined to be an error trade. The June trade between A and B is executed at an economically justifiable price.

The September leg is determined to be an error trade and is busted. Trader C is then required to claim the June leg executed for Trader A.

### Summary

June Bonds		Sep Bonds	
Buy	Sell	Buy	Sell
A	B	C	A

Trader C is cause of error

Trader A vs. B = good price

Trader A vs. C = bad price

Trader A vs. C leg is determined to be an error trade and is busted

Trader A vs. B leg is reversed and Trader C is required to claim the trade so that Trader B is not harmed.

## 5. Products

### 5.1 Product Listings

The following table is a list of all the CBOT products that will be available on LIFFE CONNECT.®

Product	Symbol
<b>Financial Products</b>	
30 Year U.S. Treasury Bond Futures	ZB
30 Year U.S. Treasury Bond Options	OZB
mini-sized 30 Year U.S. Treasury Bond Futures	YH
10 Year U.S. Treasury Note Futures	ZN
10 Year U.S. Treasury Note Options	OZN
mini-sized 10 Year Treasury Notes Futures	YN
5 Year U.S. Treasury Note Futures	ZF
5 Year U.S. Treasury Note Options	OZF
2 Year U.S. Treasury Note Futures	ZT
2 Year U.S. Treasury Note Options	OZT
2 Year When Issued Treasury Note Futures	WI2
10 Year Municipal Note Index Futures	ZU
30 Day Federal Fund Futures	ZQ
30 Day Federal Fund Options	OZQ
10 Year Interest Rate Swap Futures	SR
10 Year Interest Rate Swap Options	OSR
5 Year Interest Rate Swap Futures	SA
5 Year Interest Rate Swap Options	OSA
mini-sized Eurodollar Futures	YE
Bunds	GBL
Bobls	GBM
Schatz	GBS

<b>Agricultural Products</b>	
Corn Futures	ZC
Corn Options	OZC
Wheat Futures	ZW
Wheat Options	OZW
Oat Futures	ZO
Oat Options	OZO
Rough Rice Futures	ZR
Rough Rice Options	OZR
Soybean Futures	ZS
Soybean Options	OZS
Soybean Meal Futures	ZM
Soybean Meal Options	OZM
Soybean Oil Futures	ZL
Soybean Oil Options	OZL
CBOT® Dow Jones AIG Commodity Index <sup>SM</sup> Futures	AI
<b>Metal Products</b>	
100 oz Gold Futures	ZG
5000 oz Silver Futures	ZI
CBOT mini-sized Gold Futures	YG
CBOT mini-sized Silver Futures	YI
<b>Equity Products</b>	
CBOT® Dow Jones Industrial Average <sup>SM</sup> Futures	ZD
Options on CBOT® DJIA <sup>SM</sup> Futures	OZD
mini-sized CBOT® Dow <sup>SM</sup> Futures	YM
Options on mini-sized CBOT® Dow <sup>SM</sup> Futures	OYM

## 5.2 Trading Times

### CBOT® Contract Symbols/Trading Hours Summary

Commodity	Open Auction Symbol	Open Auction Trading Times (CT)	Electronic Symbol	Electronic Trading Times (CT)
<b>Agricultural Futures</b>				
Corn	C	9:30am - 1:15pm	ZC	7:30pm-6:00am
Oats	O	9:30am - 1:15pm	ZO	7:33pm-6:00am
Rough Rice	RR	9:15am - 1:30pm	ZR	7:33pm-6:00am
Soybean Meal	SM	9:30am - 1:15pm	ZM	7:31pm-6:00am
Soybean Oil	BO	9:30am - 1:15pm	ZL	7:31pm-6:00am
Soybeans	S	9:30am - 1:15pm	ZS	7:31pm-6:00am
Wheat	W	9:30am - 1:15pm	ZW	7:32pm-6:00am
mini-sized Corn	YC	9:30am - 1:45pm	N/A	N/A
mini-sized Soybeans	YK	9:30am - 1:45pm	N/A	N/A
mini-sized Wheat	YW	9:30am - 1:45pm	N/A	N/A
CBOT® Dow Jones AIG Commodity Index <sup>SM</sup>	N/A	N/A	AI	8:15am-1:30pm

**Agricultural Options (call/put)**

Corn	CY/PY	9:30am-1:15pm	OZC	7:32pm-6:00am
Oats	OO/OV	9:30am-1:15pm	OZO	7:35pm-6:00am
Rough Rice	RRC/RRP	9:15am-1:30pm	OZR	7:35pm-6:00am
Soybean Meal	MY/MZ	9:30am-1:15pm	OZM	7:33pm-6:00am
Soybean Oil	OY/OZ	9:30am-1:15pm	OZL	7:33pm-6:00am
Soybeans	CZ/PZ	9:30am-1:15pm	OZS	7:33pm-6:00am
Wheat	WY/WZ	9:30am-1:15pm	OZW	7:34pm-6:00am

**Interest Rate  
Futures**

30 Yr U.S. Treasury Bond	US	7:20am-2:00pm	ZB	7:00pm-4:00pm
10 Yr U.S. Treasury Notes	TY	7:20am-2:00pm	ZN	7:00pm-4:00pm
5 Yr U.S. Treasury Notes	FV	7:20am-2:00pm	ZF	7:00pm-4:00pm
2 Yr U.S. Treasury Notes	TU	7:20am-2:00pm	ZT	7:01pm-4:00pm
2 Yr When Issued Treasury Notes	N/A	N/A	WI2	7:01pm-4:00pm
10 Yr Interest Rate Swap	NI	7:20am-2:00pm	SR	7:03pm-4:00pm
5 Yr Interest Rate Swap	NG	7:20am-2:00pm	SA	7:03pm-4:00pm
30 Day Federal Funds	FF	7:20am-2:00pm	ZQ	7:01pm-4:00pm
10 Yr Municipal Note Index	MB	7:20am-2:00pm	ZU	7:04pm-4:00pm

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Bund	N/A	N/A	GBL	8:00am - 7:00pm Central European time (typically 1:00am - 12:00pm Chicago time)
Bobl	N/A	N/A	GBM	8:00am - 7:00pm Central European time (typically 1:00am - 12:00pm Chicago time)
Schatz	N/A	N/A	GBS	8:00am - 7:00pm Central European time (typically 1:00am - 12:00pm Chicago time)
<b>Interest Rate Options</b>	<b>(call/put)</b>			
30 Yr U.S. Treasury Bond	CG/PG	7:20am-2:00pm	OZB	7:02pm-4:00pm
10 Yr U.S. Treasury Notes	TC/TP	7:20am-2:00pm	OZN	7:02pm-4:00pm
5 Yr U.S. Treasury Note	FL/FP	7:20am-2:00pm	OZF	7:02pm-4:00pm
2 Yr U.S. Treasury Note	TUC/TUP	7:20am-2:00pm	OZT	7:02pm-4:00pm
10 Yr Interest Rate Swap	NIC/NIP	7:20am-2:00pm	OSR	7:05pm-4:00pm
5 Yr Interest Rate Swap	NGC/NGP	7:20am-2:00pm	OSA	7:05pm-4:00pm
30 Day Federal Funds	FFC/FFP	7:20am-2:00pm	OZQ	7:02pm-4:00pm

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**Dow Futures**

CBOT® mini-sized Dow <sup>SM</sup> \$5 multiplier	N/A	N/A	YM	7:15pm-4:00pm
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CBOT® Dow Jones Industrial Average <sup>SM</sup> \$10 multiplier	DJ	7:20am-3:15pm	ZD	7:15pm-7:00am
--	----	---------------	----	---------------

**Dow Options (call/put)**

CBOT® mini-sized Dow <sup>SM</sup> \$5 multiplier	N/A	N/A	OYM	7:17pm-4:00pm
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CBOT® Dow Jones Industrial Average <sup>SM</sup> \$10 multiplier	DJC/DJP	7:20am-3:15pm	OZD	7:17pm-7:00am
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**Metal Futures**

100 oz Gold	N/A	N/A	ZG	7:16pm-4:00pm
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5000 oz Silver	N/A	N/A	ZI	7:16pm-4:00pm
----------------	-----	-----	----	---------------

CBOT mini-sized Gold	N/A	N/A	YG	7:16pm-4:00pm
-------------------------	-----	-----	----	---------------

CBOT mini-sized Silver	N/A	N/A	YI	7:16pm-4:00pm
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Note: Times are subject to change.

## 5.3 Product Algorithms

CBOT Products	Algorithm		Pro-Rata	
	Price/Time	Pro-Rata <sup>1</sup>	Min Volume <sup>2</sup>	Max Cap <sup>2</sup>
Treasury and German Debt Futures <sup>3</sup>	X		---	---
When Issued 2-Yr Treasury Note Futures <sup>3</sup>		X	1	500
Fed Funds, Swap, and Muni Futures		X	25	250
5 & 10 Year Treasury Note and 30 Year Treasury Bond Futures Reduced Tick Spreads		X	1	2500
2 Year Treasury Note Futures Reduced Tick Spreads		X	1	1500
Swap Futures Reduced Tick Spreads		X	1	None
Treasury, Fed Funds, and Swap Options <sup>3, 4</sup>		X	25	250
DJIA <sup>SM</sup> and mini-sized Dow <sup>SM</sup> Futures	X		---	---
DJIA <sup>SM</sup> Options <sup>4</sup>		X	25	250
mini-sized Dow <sup>SM</sup> Options <sup>3, 4</sup>		X	1	100
100 oz Gold, 5000 oz Silver, mini-sized Gold and mini-sized Silver Futures <sup>3, 5</sup>		X	1	100
Agricultural and Dow Jones-AIGCI <sup>SM</sup> Commodity Futures		X	10	100
Agricultural Commodity Options <sup>4</sup>		X	10	100

<sup>1</sup> Pro-rata with priority order algorithm with minimum volume and maximum volume cap requirements.

<sup>2</sup> Minimum volume requirements and maximum volume caps are only applicable with a pro-rata with priority order algorithm. No levels are set for price and time algorithm.

<sup>3</sup> Preferencing functionality will be utilized for German Debt, When Issued 2-Yr Treasury Note, 100 oz Gold, 5000 oz Silver futures, and mini-sized Dow<sup>SM</sup> options.

Preferencing functionality will also be utilized for Treasury Bond options, 10-Year Treasury Note options, Five-Year Treasury Note options, Two-Year Treasury Note options, and 30-Day Fed Fund options during extended market hours, from 2:00 p.m. to 7:00 a.m. Central Time, Monday to Friday, and from 7:00 p.m. to 7:00 a.m. Central Time, Sunday to Monday.

<sup>4</sup> Delta Neutral (Volatility) strategies will only match on a Price/Time basis, even if the underlying option or future utilizes Pro-Rata with Priority with or without Preferencing.

<sup>5</sup> 100 oz Gold and 1000 oz Silver begin trading October 6, 2004. mini-sized Gold and mini-sized Silver minimum volume for priority changed to 1 on October 6, 2004.

## 6. Member and User Setup

### 6.1 Introduction

Member and user setup on e-cbot is facilitated by the Functional Member Readiness team. This section provides an overview of the process to set up participants to enable them to trade or view the products on the e-cbot LIFFE CONNECT<sup>®</sup> platform.

#### 6.1.1 User Access Contact

The CBOT requires all clearing member firms with direct e-cbot connections to have at least one User Access Contact (UAC) who will be given access to a secure e-cbot User Access Website that enables them to set-up participants.

#### 6.1.2 Responsible Person/Individual Trader Mnemonic/e-cbot User ID

e-cbot users log into the Trading Host through an Individual Trader Mnemonic (ITM) Key and password. Multiple e-cbot users may utilize the same ITM to access the trading host. As many users may share an ITM, the CBOT will rely on an e-cbot User ID to identify the individual that entered a particular order.

Through the User Access Website UACs are required to register a Responsible Person and a backup Responsible Person with the exchange for each Individual Trader Mnemonic (ITM) Key requested.

The Responsible Person registered with the Exchange is the first point of contact for all orders submitted under the ITM Key, including any trades submitted through an order routing system. The Responsible Person must have the authority to modify or withdraw any order submitted under his or her ITM Key at the request of the CBOT and must have the ability to immediately identify the source of any order. A Responsible Person (or in his absence a Backup Responsible Person) must be reachable via telephone by the Exchange at all times that any of the ITMs assigned to him are in use.

An e-cbot User ID is a unique character string populated in the Trader Card Reference field in the LIFFE CONNECT<sup>®</sup> 7.1.CBOT API that must be submitted with every e-cbot order.

The e-cbot User ID must be captured at workstation login and automatically populated with each order. The e-cbot User ID must be secure and unavailable to the user in the Trader Card Reference field.

The trading host will validate that an e-cbot User ID had been entered in the appropriate field, but will not validate the content of this field.

The e-cbot User ID is a minimum of 4 alphanumeric characters up to a maximum of 11 alphanumeric characters and must be left justified within the Trader Card Reference Field in the API.

Trader Card Reference field	16 Character free format value
e-cbot User ID	4 - 11 characters – left justified

Registered e-cbot User IDs are assigned by the Exchange upon request from a firm's User Access Contact. Registered e-cbot User IDs are required for each of the following types of users:

1. CBOT Member or Delegate Member
2. Non-member proprietary trader for CBOT member firm
3. Non-member clerk of member or member firm
4. Non-member employee of 9B.04 Registrant (non-member firm)

Although an e-cbot User ID is required to be submitted with each order for all other users as well, these e-cbot User IDs are not assigned by or registered with the Exchange.

When an e-cbot User ID request is made via the User Access Website, the tool will generate a unique e-cbot User ID structured as follows: two randomly generated characters, followed by the first letter of the participant's first name and the participant's last name, up to a maximum of 11 characters.

Additionally, the tool will require the user type to be identified for each individual for whom an e-cbot User ID is requested. If an individual's user type changes, the UAC must update the user type of that Person within the User Access Website. Those users whose e-cbot User IDs are not assigned by the Exchange must have User IDs structured as follows: 99, followed by 3 - 9 alphanumeric characters.

The concept of multiple participants using a single ITM Key allows member firms to facilitate order routing among their customers, trading desk, sales desk, individual member traders, etc.

An ITM Key can only have a single connection to e-cbot at anytime, therefore multiple participants must be connected to a common API session in order to share an ITM Key.

### 6.1.3 Creation and Distribution of Security Keys

Individual Trader Mnemonic (ITM) keys are generated by the LIFFE CONNECT<sup>®</sup> Key Management Facility (CKMF).

Euronext.liffe employs a simple PKI (Public Key Infrastructure) to enable participants to access LIFFE CONNECT<sup>®</sup>.

In addition to the creation of keys for users to trade, keys are also created for external software developers, including ISVs and Member developers to enable them to test and conform their systems for trading on LIFFE CONNECT<sup>®</sup>.

**Note:** Keys created for the test (simulation) system cannot access the Live system. LIFFE CONNECT<sup>®</sup> does not allow the same ITM to be issued to more than one member firm.

#### **6.1.4 Key Deactivation**

ITM Keys will need to be deactivated to preclude an ITM from logging onto the e-cbot platform. The User Access Website enables ITM Keys to be deactivated by changing the value of the "Access Enabled" field to No. Should it be necessary to stop an ITM from trading intra-day, Market Operations can lock-out an ITM Key (See 3.1.3 Lock-out).

### **6.2 Risk Management**

Risk Management needs to be provided on the LIFFE CONNECT<sup>®</sup> platform by third party independent software vendor (ISV) or member developed risk management applications.

## 7. Interfaces, Equipment, Simulation Environment, and eFills

### 7.1 Application Program Interface

#### 7.1.1 Introduction to the API

The following functions are available to a member's Client Application through the API:

<b>Market Access</b>	These are used for establishing, maintaining and managing sessions on the LIFFE CONNECT <sup>®</sup> system.
<b>Data</b>	These functions are used for requesting standing data on the markets, creating new markets and distributing updates of changes to the list of available markets.
<b>Market Information</b>	These are used for requesting and updating market information during the Trading Day.
<b>Trading And Order Handling</b>	These functions are used for trading, order handling, Request For Quotes (RFQs), and Ex-Pit trades.
<b>Market Control</b>	These functions are used for receiving Market Operations warnings and messages during system operation.

#### 7.1.2 LIFFE CONNECT<sup>®</sup> Gateway

The LIFFE CONNECT<sup>®</sup> Gateway acts as a message interface between the LIFFE CONNECT<sup>®</sup> Trading Host and the Client Applications at member sites. Messages from the Trading Host are distributed by the Gateway to the relevant Client Application and messages from the Client Applications are sent to the Trading Host for processing.

Each Trading Host supports multiple gateways and each gateway supports multiple API connections. The maximum number of API sessions that a Gateway can support is configurable.

Client Applications must establish a connection, via the LIFFE CONNECT<sup>®</sup> API, to the Gateway application, in order to obtain an onward connection to the Trading Host. To facilitate the upgrading of the API, the Gateway is backwards compatible to two old versions of the API.

There are two Gateway configurations - Local and Central.

A gateway located at a member site is referred to as a local Gateway. These are connected to the Trading Host over a Wide Area Network.

Central Gateways are located at a Data Center for use by members. Central Gateways are also used by any Client Applications installed at the Data Center.

Each morning before trading commences, the Trading Host transmits standing data to each connected Gateway. Standing Data information includes valid product details, strategy markets, expiry

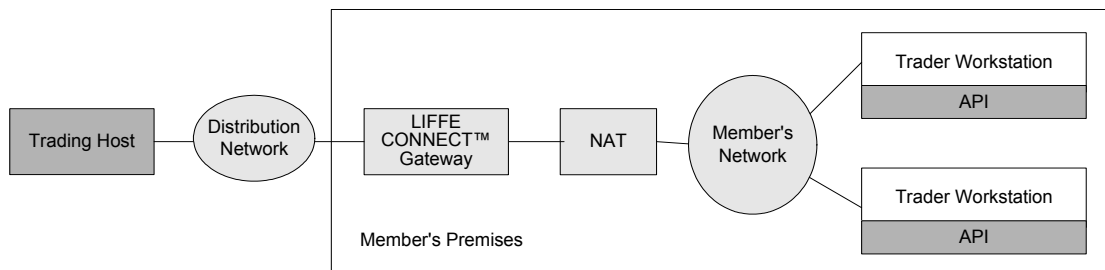
months, strategy legs currently trading in the Host. The Gateways cache the standing data, any changes are transmitted by the Trading Host when they happen.

### 7.1.2.1 Connectivity to LIFFE CONNECT®

The following diagrams represent the typical system configuration for access to LIFFE CONNECT® via Client Applications using either a single or multiple API implementation.

At a member's premises a separate LIFFE CONNECT® Gateway is required to connect to each Trading Host.

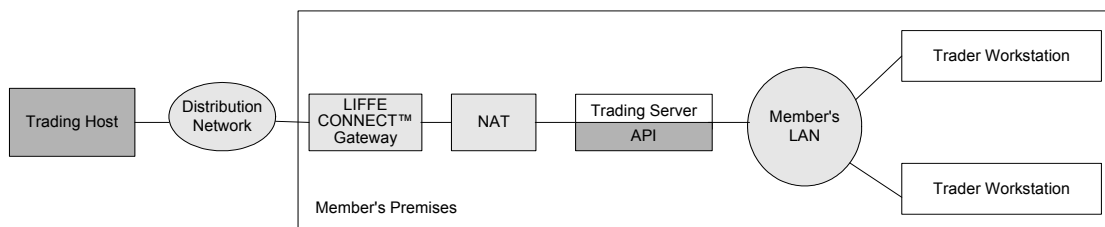
Figure 1: Multiple API Implementation



The diagram above shows the implementation using a Local Gateway.

- The Network Address Translator (NAT) represents the demarcation point between the Exchange and the member.
- Each trader workstation accesses the market via an independent LIFFE CONNECT® API.

Figure 2: Single API Implementation



The diagram above shows the implementation using a Local Gateway.

- The Network Address Translator (NAT) represents the demarcation point between the Exchange and the member.
- Each trader workstation accesses the market via a single API running on the Trading Server

**Please note that the system diagrams represented above are typical network configurations to which some variations may apply.**

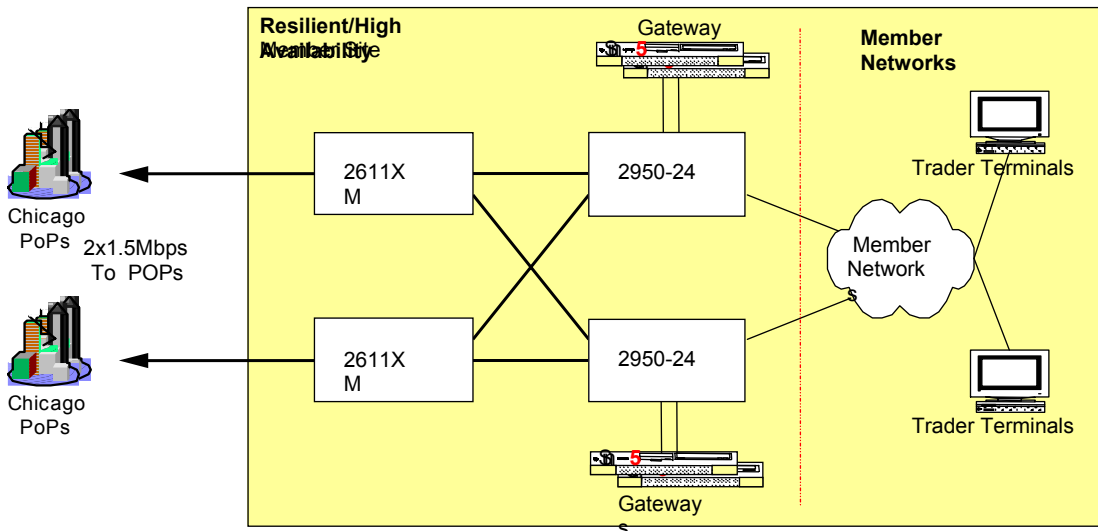
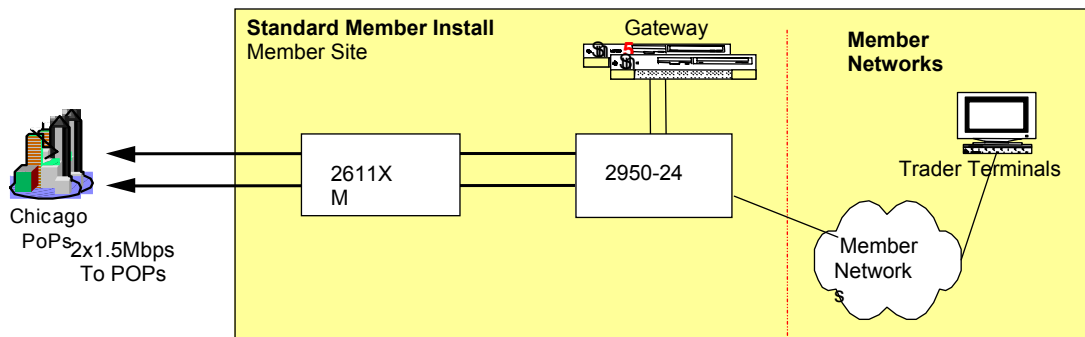
## 7.2 e-bot Equipment Configurations

### Standard Configuration

- Two diversely routed full T1 lines
- 1 Cisco 2611XM router
- 1 Cisco 2950 switch/NAT
- Sun Microsystems SunFire v100 gateways (up to 5)

### Resilient/High Availability Configuration

- Two diversely routed full T1 lines
- 2 Cisco 2611XM routers
- 2 Cisco 2950 switch/NATs
- Sun Microsystems SunFire v100 gateways (up to 20)



## 7.3 Simulation Environment

The e-cbot Simulation environment is also referred to as Environment 58. This is the existing conformance environment for Independent Software Vendors (ISVs) and Member Developers.

The purpose of the Simulation environment is to provide Members and ISVs the opportunity to 1) train prospective traders at member firms on trading functionality and products, 2) test ISV and Member Developed software solutions, 3) prepare for new products and releases prior to launch and 4) test readiness for new member installations.

Prior to connecting to e-cbot, Members must install conformant application software which has been certified by the CBOT as conforming with the current release of CBOT API for the LIFFE CONNECT® platform.

All of the e-cbot products are available in the Simulation environment. Members and ISVs will be notified by an e-cbot Bulletin when new products are added to the Simulation environment for testing.

Trading hours for the e-cbot Simulation Environment are as follows:

8:00 p.m – 5:00 p.m. Chicago time

9:00 p.m. – 6:00 p.m. New York time

2:00 a.m. – 11:00 p.m. London time

Any changes to the Simulation Environment trading hours will be communicated by an e-cbot Bulletin. Contact a Key Account Manager for additional information regarding the Simulation environment.

## 7.4 e-Fills

eFills is the secure web based application for viewing persistent fill information from e-cbot in near real time. Initial query results display time of the fill, Individual Trader Mnemonic, commodity code, month, put/call/future, option strike price, buy/sell, quantity, fill price, account number, give up firm mnemonic, and trading host assigned order number. Additional trade detail is also available. Queries can be downloaded in CSV, Excel, XML, Tab Delimited, or Plain Text format. Contact a Key Account Manager for more information.

## 8. Appendix Examples

### 8.1 Pricing of Strategies Net Premium

#### Example 1: Futures Calendar Spread (Positive)

MONTH	BID	OFFER
Jun 03	109-10 (10)	109-12 (10)
Sep 03	109-05 (10)	109-09 (10)
Jun 03 Sep 03	0.04 (10)	

In the example above the trader is bidding 0.04 for 10 lots. This means the trader is attempting to buy 10 lots of Jun 03 and sell 10 of Sep 03 at a differential of 0.04. Based on prices shown if the trader were to be successful a typical allocation of legs deriving from the trade would be:

Jun03: + 109-10 (10)

Sep03: - 109-06 (10)

+ 0.04

#### Example 2: Futures Calendar Spread (Negative)

MONTH	BID	OFFER
Jun 03	105-18 (10)	105-19 (10)
Sep 03	105-22 (10)	105-24 (10)
Jun 03 Sep 03	-0.05 (10)	

In the example above the trader is bidding -0.05 for 10 lots. This means the trader is attempting to buy 10 lots of Jun 03 and sell 10 lots of Sep 03 at a differential of -0.05. Based on prices shown if the trader were to be successful a typical allocation of legs deriving from the trade would be:

Jun03: + 105-18 (10)

Sep03: - 105-23 (10)

= -0.05

**Example 3: Butterflies (Positive Bids)**

A Butterfly can be expressed as buying (selling) one calendar spread against selling (buying) another. A trader wanting to buy the Jun/Sep/Dec Butterfly would therefore need:

Buy Jun

Sell Sep (x2)

Buy Dec.

MONTH	BID	OFFER
Jun 03	105-20 (10)	105-22 (10)
Sep 03	105-11 (20)	105-12 (20)
Dec 03	105-10 (10)	105-13 (10)
Jun/Sep/Dec (Butterfly)	0.06 (10)	

In the example above the trader is bidding 0.06 for 10 lots. This means the trader is attempting to buy 10 lots of Jun 03, sell 20 Sep 03 and buy 10 lots of Dec 03 at a differential of 0.06. Based on prices shown if the trader were to be successful a typical allocation of legs deriving from the trade would be:

Jun03: + 105-20 (10)

Sep03: - 105-12 (20)

Dec03: + 105-10 (10)

+ 0.06

**Example 4: Butterflies (Positive Offers)**

MONTH	BID	OFFER
Jun 03	105-24 (10)	105-26 (10)
Sep 03	105-20 (20)	105-22 (10)
Dec 03	105-12 (10)	105-18 (10)
Jun/Sep/Dec (Butterfly)		- 0.044 (10)

In the example above the trader is offering - 0.044 for 10 lots. This means the trader is attempting to sell Jun 03, buy Sep 03 (x2) and sell Dec 03 at a differential of - 0.04. Based on prices shown if the trader were to be successful a typical allocation of legs deriving from the trade would be:

Jun03: - 105-26 (10)  
 Sep03: + 105-20 (20)  
 Dec03: - 105-189558 (10)

#### Example 5: Butterflies (Negative Offers)

MONTH	BID	OFFER
Jun 03	105-19 (10)	105-22 (10)
Sep 03	105-25 (20)	105-27 (20)
Dec 03	105-06 (10)	105-10 (10)
Jun/Sep/Dec (Butterfly)		0.18 (10)

In the example above the trader is offering 0.18 for 10 lots. This means the trader is attempting to sell Jun 03, buy Sep 03 (x2) and sell Dec 03 at a differential of 0.18. Based on prices shown if the trader were to be successful a typical allocation of legs deriving from the trade would be:

Jun03: - 105-22 (10)  
 Sep03: + 105-25 (20)  
 Dec03: - 105-10 (10)  
 + 0.18

#### Example 6: Call Spreads

For a call spread, a trader attempting to buy the Jun 105/106 call spread would buy the 105 (strike) calls, against selling the 106 calls.

STRIKE	BID	OFFER
105	0.04 (10)	0.06 (10)
106	0.02 (10)	0.03 (10)
105/106 (call spread)	0.02 (10)	

In the example above the trader is bidding 0.02 for 10 lots. This means that the trader is attempting to buy the 105 calls and sell the 106 calls at a differential of 0.02. Based on the prices shown if the trader were to be successful a typical allocation of legs deriving from the trade would be:

105 calls: + 0.05  
 106 calls: - 0.03  
 + 0.02

**Note:** In options a negative call spread would not occur under normal circumstances because the lower strike will always be worth a higher premium than the higher strike. If however a 2:1 ratio call spread was created/quoted this could attract a negative price (see example below).

#### Example 7: 2:1 Ratio Call Spread

STRIKE	BID	OFFER
105	0.04 (10)	0.06 (10)
106	0.02 (10)	0.03 (10)
105/106 (2:1 Ratio call spread)	-0.01 (10)	

In the example above the trader is bidding -0.01 for 10 lots. This means that the trader is attempting to buy the 105 calls and sell the 106 calls (x2) at a differential of -0.01. Based on the prices shown if the trader were to be successful a typical allocation of legs deriving from the trade would be:

105 calls: + 0.05  
 106 calls: - 0.03. (x2)  
 - 0.01

#### Example 8: Buying the Straddle

For a straddle a trader attempting to buy the 105 straddle would buy both the calls and puts for the strike at a combined premium (i.e. call and put premium added together).

105 STRIKE	BID	OFFER
Calls	0.04 (10)	0.05 (10)
Puts	0.03 (10)	0.04 (10)
Straddle	0.08 (10)	

In the example above the trader is bidding 0.08 for 10 lots. This means that the trader is attempting to buy the 105 calls and buy the 105 puts at a combined premium of 0.08. Based on the prices shown if the trader were to be successful a typical allocation of legs deriving from the trade would be:

105 calls: + 0.05

105 puts: + 0.03

+ 0.08

### Example 9: Selling the Straddle

105 STRIKE	BID	OFFER
Calls	0.04 (10)	0.06 (10)
Puts	0.03 (10)	0.05 (10)
Straddle		0.10 (10)

In the example above the trader is offering 0.10 for 10 lots. This means that the trader is attempting to sell the 105 calls and sell the 105 puts (at a combined premium of 0.10. Based on the prices shown if the trader were to be successful a typical allocation of legs deriving from the trade would be:

105 calls: + 0.05

105 puts: + 0.05

+ 0.10

#### 8.1.1.2 Pricing of Futures Strips, Packs and Bundles

The following Futures Strategies require the previous day's settlement prices as a reference price in order to calculate leg prices.

- Strips
- Packs
- Bundles

The above strategies are calculated as an aggregate +/- from the previous day's settlement prices so that to trade each leg at the previous working day's settlement price (YDSP) the strategy would trade at 0.00.

#### Example 1

##### 8 Month Strip

Month	Mar 03	Jun 03	Sep 03	Dec 03	Mar 04	Jun 04	Sep 04	Dec 04
YDSP	95.30	95.28	95.26	95.22	95.20	95.18	95.16	95.12

If a Strip was created and a price of 0.01 for 10 was entered this would signify that the trader was prepared to pay one tick more (on aggregate) than the prices shown above for the 8 month strip.

If the bid was accepted (traded with) the potential leg prices given could be as follows:

Month	Mar 03	Jun 03	Sep 03	Dec 03	Mar 04	Jun 04	Sep 04	Dec 04
YDSP	95.30	95.28	95.26	95.22	95.20	95.18	95.16	95.12
Trade Price	95.31	95.29	95.27	95.23	95.21	95.19	95.17	95.13

### Example 2

If a strip is now traded at a price of 0.32 this reflects the trader's willingness to pay thirty two ticks more (on aggregate) than the previous day's settlements. In this case the difference can be equally adjusted to all legs, by four ticks, and the following leg prices would be given:

Month	Mar 03	Jun 03	Sep 03	Dec 03	Mar 04	Jun 04	Sep 04	Dec 04
YDSP	95.20	95.18	95.16	95.12	95.10	95.08	95.06	95.02
Trade Price	95.24	95.22	95.20	95.16	95.14	95.12	95.10	95.06

**Note:** When a new month is introduced following expiry, it cannot for part of a Strip, Pack or Bundle because it will have no reference price.

## 8.2 Pricing of Implied Ins and Implied Outs

### 8.2.1 Implied In

#### 8.2.1.1 Implied 'In' Order Process for Futures

Implied In prices are derived from explicit prices in the outright legs.

#### Implied In Examples

Assume the following prices are in the futures outright market:

MONTH	BID VOLUME	BID PRICE	OFFER PRICE	OFFER VOLUME
Jun	10	105-30	105-31	10
Sep	10	105-25	105-28	10
Dec	15	105-20	105-24	5

A Sep/Dec Calendar Spread and a Jun/Sep/Dec Butterfly Spread can both imply in prices.

### Example 1: Implied In Calendar Spread Pricing

Calendar Spread: Buy Near Month / Sell Far Month

1. The Implied Calendar Spread Bid is created from the outright Bid in Sep and the outright Offer in Dec:

$$105-25 - 105-24 = 0.01$$

5 lots are created since this is all the volume available in the Dec Offer.

2. The Implied Calendar Spread Offer is created from the outright Offer in Sep and the outright Bid in Dec:

$$105-28 - 105-20 = 0.08$$

10 lots are created since this is all the volume available in the Sep Offer.

### Example 2: Implied In Butterfly Pricing

Butterfly: Buy Near Month, Sell (x2) Middle Month, Buy Far Month

1. The Implied In Butterfly Bid is created from the outright Bid in Jun, the outright Offer in Sep and the outright Bid in Dec:

$$105-30 - 2(105-28) + 105-20 = -0.06$$

5 lots are created since this is half the volume available in the Sep Offer (as two middle legs are required).

2. The Implied In Butterfly Offer is created from the outright Offer in Jun, the outright Bid in Sep and the outright Offer in Dec:

$$105-31 - 2(105-25) + 105-24 = 0.05$$

5 lots are created since this is all the volume available in the Dec Offer.

### Example 3: Implied Strategies Created

In summary, the following strategy prices are calculated by the Trading Host, although not disseminated through the LIFFE CONNECT<sup>®</sup> API:

STRATEGY	BID VOLUME	BID PRICE	OFFER PRICE	OFFER VOLUME
E (Sep/Dec)	5	0.01	0.08	10
B (Jun/Sep/Dec)	5	-0.06	0.05	5

**Example 4: Implied In Calendar Spread**

TRADER	DEC	MAR
Trader 1	100-00 Bid 100 lots	
Trader 2		100-10 Offered 100 lots
Strategy	-0.10 Bid 100 lots Implied In	

In the above example two explicit quotes in separate months generate an Implied-In Strategy quote. Trader 1 enters a bid of 100-00 for 100 lots in Dec. Trader 2 enters an offer of 100 lots at 100-10 in Mar. This implies a - 0.10 bid for 100 lots in the Dec/Mar spread. Only explicit leg prices are used in this calculation.

**8.2.1.2 Implied 'In' Order Process for Options**

Implied In prices are derived from explicit prices in the outright legs.

**Implied In Examples**

Assume the following prices are in the options outright market:

STRIKE	BID VOLUME	BID PRICE	OFFER PRICE	OFFER VOLUME
105C	15	0.04	0.06	15
105 P	10	0.01	0.03	10
106 P	20	0.02	0.04	25

A Put Spread 106 P 105 P and an Options straddle 105P/105C can both Imply In Prices:

**Example 1: Implied In Put Spread Pricing**

Put Spread: Buy Put / Sell Put at Lower Strike

1. The Implied Put Spread 106P 105P Bid is priced as:

$$0.02 - 0.03 = -0.01$$

10 lots are created since this is all the volume available in the 105P Offer.

2. The Implied Put Spread 106P 105P Offer is priced as:

$$0.04 - 0.01 = 0.03$$

10 lots are created since this is all the volume available in the 105P Bid.

### Example 2: Implied In Straddle Pricing

Straddle: Buy Put / Buy Call at Same Strike

1. The Implied Options straddle 105P 105C Bid is priced as:

$$0.01 + 0.04 = 0.05$$

10 lots are created since this is all the volume available in the 105P Bid.

2. The Implied Options straddle 105P 105C Offer is priced as:

$$0.06 + 0.03 = 0.09$$

10 lots are created since this is all the volume available in the 105P Offer.

### Example 3: Implied Strategies Created

In summary, the following strategy prices are calculated by the Trading Host, although not disseminated through the LIFFE CONNECT<sup>®</sup> API:

STRATEGY	BID VOLUME	BID PRICE	OFFER PRICE	OFFER VOLUME
D (96125P 96000P)	10	-0.010	0.03	10
S (96000P 96000C)	10	0.05	0.09	10

### Example 4: 101 100 Put Spread - Implied In Price

TRADER	STRIKE/STRATEGY	BID	OFFER
Trader 1	Dec 100 P		10 A 150 lots
Trader 2	Dec 101 P	25 B 100 lots	
Trader 3	D (P) Dec 101/100 Implied In	15 B 100 lots Implied In	

In the above example Trader 1 enters a 150 lots at 10 offer in the Dec100 P; Trader 2 enters a 25 bid for 100 lots in the Dec 101 P; Trader 3 has a client who is interested in trading the Dec Put spread and therefore creates this strategy market. Upon successful creation of this strategy the Trading Host will hold a hidden implied in-price of 15B for 100 lots.

### 8.2.1.3 Further Implied In Examples

#### Example 1: Implied in Bids

In the first implied in example below, the outright bid at 95.50 for June and offer at 95.45 for Sep are equivalent to a June/Sep Calendar Spread of  $(95.50 - 95.45) = 0.05$  and will be traded as such in the strategy market if a matching strategy order is present:

	BID	OFFER
JUN	95.500	
SEP		95.450
JUN/SEP	0.050 Implied	

#### Example 2: Implied In Offers

The same principle applies to the creation of offers in the strategy market. The calendar spread offer in this example will be priced at  $(95.600 - 95.510) = 0.090$ :

	BID	OFFER
JUN		95.600
SEP	95.510	
JUN/SEP		0.090 Implied

**Example 3: Negative Implied In Bid**

And to negative Implied In Prices for both Bids and Offers. This example will be priced at  $(95.550 - 95.560) = -0.010$ :

	<b>BID</b>	<b>OFFER</b>
<b>JUN</b>	95.550	
<b>SEP</b>		95.560
<b>JUN/SEP</b>	-0.010 Implied	

**Example 4: Negative Implied In Offer**

This example will be priced at  $(95.430 - 95.560) = -0.130$ :

	<b>BID</b>	<b>OFFER</b>
<b>JUN</b>		95.430
<b>SEP</b>	95.560	
<b>JUN/SEP</b>		-0.130

**Example 5: Implied in Bids**

A particular case of implied Ins is the creation of a zero spread to enable two outright orders to trade in different months at the same price:

	<b>BID</b>	<b>OFFER</b>
<b>JUN</b>	95.450	
<b>SEP</b>		95.450
<b>JUN/SEP</b>	0.000	

## 8.2.2 Implied Out

Calendar spreads, Call Spreads, Put Spreads and Straddles entered into LIFFE CONNECT® can be traded in two ways; as explicit orders or through Implied prices.

Explicit trades will have the same counterparties on all legs and will occur when matching strategy orders are entered into the market.

An implied out order will be created and transmitted through the API when existing outright and strategy orders can be combined to create an implied out that is better than the best price currently in the appropriate month. If the implied out is traded both the component legs (strategy and outright) will be traded as a result.

Implied out prices are best illustrated by example.

Implied Out prices are derived from explicit strategy prices and explicit leg prices to produce an implied out price in the respective outright leg. Negative implied out prices cannot be created or displayed, so a price must be positive to trade.

### 8.2.2.1 Implied 'Out' Order Process for Futures

Implied Out functionality is available across all contract delivery months and will be generated both forwards and backwards. An implied price needs to have explicit orders as its 'parent' for it to be generated. Implied prices are calculated in depth but not shown so incoming orders will trade and receive improved prices that were unseen (if it trades in depth).

#### Example 1: Implied Out Calendar Spread

	BID	OFFER
<b>DEC</b>	99.480 Implied (100)	99.500 (100)
<b>MAR</b>	99.580 (100)	99.600 Implied (100)
<b>DEC/MAR</b>	-0.100 (100)	

In the above example two explicit orders have been entered as well as an explicit strategy, implying prices out from the strategy into the outright markets. From the bid in the strategy and explicit of 100 lots at 99.500, an Implied Out price of 100 lots at 99.600 has been generated (forward) into the Mar contract. Alternatively, the strategy price and the bid of 99.580 for 100 lots in Mar will implied out a bid (backward) of 99.480 into the Dec contract. Any trade with the implied quote will automatically facilitate the strategy trade with the explicit leg.

#### Example 2: Forward Implied Out Bid from Spread Offer

In the first example an outright bid at 95.260 is in the June expiry when a Jun/Sep calendar spread at 0.050 is entered into the market. LIFFE CONNECT® will generate an implied out bid at 95.210 to enable both the outright bid and the calendar spread to trade if a Sep offer is entered at a matching price:

	BID	OFFER
<b>JUN</b>	95.260	
<b>SEP</b>	95.210 Implied	
<b>JUN/SEP</b>		0.050

### Example 3: Forward Implied Out Offer from Spread Bid

Similarly, if an outright offer at 95.770 is in the June expiry when a Jun/Sep calendar spread bid at 0.040 is entered into the market, LIFFE CONNECT<sup>®</sup> will generate an implied out offer at 95.730 to enable both the outright offer and the calendar spread to trade if a Sep bid is entered at a matching price:

	BID	OFFER
<b>JUN</b>		95.770
<b>SEP</b>		95.730 Implied
<b>JUN/SEP</b>	0.040	

### Example 4: Backward Implied Out Bid from a Spread Bid

Using exactly the same principal, 'backward' Implied outs can be created from calendar spreads and outright orders which are either both bids or both offers:

	BID	OFFER
<b>JUN</b>	96.450 Implied	
<b>SEP</b>	95.880	
<b>JUN/SEP</b>	0.570	

The June bid is implied by adding the Sep explicit bid and the Jun/Sep explicit bid:

Sep	95.880
Jun/Sep	0.570
	96.450

**Example 5: Backward Implied Out Offer from a Spread Offer**

	<b>BID</b>	<b>OFFER</b>
<b>JUN</b>		96.360 Implied
<b>SEP</b>		95.370
<b>JUN/SEP</b>		0.990

The June offer is implied by adding the explicit Sep offer and the explicit Jun/Sep offer:

Sep            95.370  
 Jun/Sep:    0.990  
                  96.360

**Example 6: Negative Forward Bid from a Spread Offer**

Negative calendar spreads can also create both 'forward' and 'backward' implied outs:

	<b>BID</b>	<b>OFFER</b>
<b>JUN</b>	95.980	
<b>SEP</b>	96.080 Implied	
<b>JUN/SEP</b>		-0.100

The Sep bid is implied by subtracting the explicit Jun/Sep explicit offer from the explicit Jun bid:

Jun            95.980  
 Jun/Sep    -0.100  
                  96.080

**Example 7: Negative Forward Offer from a Spread Bid**

	<b>BID</b>	<b>OFFER</b>
<b>JUN</b>		95.220
<b>SEP</b>		95.250 Implied
<b>JUN/SEP</b>	-0.030	

The Sep offer is implied by subtracting the Jun/Sep explicit bid from the Jun explicit offer:

Jun            95.220  
 Jun/Sep      -0.030  
                  95.250

**Example 8: Negative Backward Offer from a Spread Offer**

	<b>BID</b>	<b>OFFER</b>
<b>JUN</b>		95.420 Implied
<b>SEP</b>		95.440
<b>JUN/SEP</b>		-0.020

The Jun offer is implied by adding the explicit Sep offer and the explicit Jun/Sep offer:

Sep            95.440  
 Jun/Sep      -0.020  
                  95.420

**Example 9: Negative Backward Bid from a Spread Bid**

	BID	OFFER
<b>JUN</b>	95.440 Implied	
<b>SEP</b>	95.470	
<b>JUN/SEP</b>	-0.030	

The Jun bid is implied by adding the explicit Sep bid and the explicit Jun/Sep bid:

Sep            95.470  
 Jun/Sep      -0.030  
                  95.440

**8.2.2.2 Implied 'Out' Order Process for Options**

Implied Out prices are derived from explicit strategy prices and explicit leg prices to produce an implied price in the respective outright leg.

**Example 1: Implied Out Call Spread**

MARKET	BID	OFFER
D (C) Dec 99250 / 99500	0.0600 (100)	
Dec 99250 C		0.0950 (100)
Dec 99500 C		0.0350 (100) Implied Out

In the above example, the Dec 99250 99500 Call Spread bid of 60 for 100 lots and the Dec 99250 Call offer of 95 for 100 lots are explicit in the market. The Trading Host will then generate an implied out price from these two orders of 35 for 10 lots in the 99500 Call offer.

This means that if the implied order is able to sell 100 lots at 35 the Trading Host will then trigger an order on behalf of the Call Spread to buy 100 lots at 95 in the 99250 Calls and subsequently the 60 Bid for 100 lots in the Call Spread, which has been filled on legs, is pulled.

**Example 2: Implied Out Negative Prices**

MARKET	BID	OFFER
Dec 98250 C	0.0500	0.0750 Implied
Dec 99500 C		0.0200
Dec (C) 98250 / 99500		0.0550

The 98250 Call and the Dec 98250/99500 Call creates an implied out of -0.005. As negative implied out pricing is not supported by the Trading Host, the market is not notified of this price.

The Dec 98250/99500 Call of 0.055 offered is rounded down to 0.045. This now creates an implied out of 0.005 which trades.

**8.3 Uncrossing****8.3.1 Two Stage Uncrossing for Futures Products: Outright Uncrossing****Example 1: Market Bid volume but no market Offer**

BID	OFFER
98.180 (50)	98.160 (20)
98.140 (20)	98.150 (30)
98.130 (100)	

In this example, the 98.180 bid for 50 lots is uncrossed with the 98.150 offer on 30 lots and then the 98.160 offer on 20 lots. As there are no remaining offers but only bids in the market once the uncrossing algorithm has been applied, the price at which all these orders are uncrossed is 98.180. The price assigned is the last uncrossed bid price.

**Example 2: Market Offer volume but no market Bid**

BID	OFFER
98.180 (50)	98.190 (10)
	98.160 (20)
	98.150 (30)

As in the previous example, the 98.180 bid for 50 lots are uncrossed with the 98.150 offer on 30 lots and then the 98.160 on 20 lots. In this instance as there are no remaining bids but only offers in the market once the uncrossing algorithm has been applied. The price assigned is the last uncrossed offer price, 98.160.

**Example 3: No bid/offer left**

BID	OFFER
98.180 (50)	98.160 (20)
	98.150 (30)

In this example, the 98.180 Bid for 50 lots is uncrossed with the 98.150 offer on 30 lots and then the 98.160 Offer on 20 lots. In this instance there are no remaining Offers or Bids in the market once the uncrossing algorithm has been applied. The price at which these orders are uncrossed at is 98.170. The price assigned is the average of the Bid and Offer from the last trade ( $98.180 + 98.160 / 2 = 98.170$ ).

**Example 4: Market Bid and Offered volume remaining**

BID	OFFER
98.180 (50)	98.190 (10)
98.140 (20)	98.160 (20)
98.130 (100)	98.150 (30)

In this example the 98.180 Bid for 50 lots are uncrossed with the 98.150 Offer on 30 lots and then the 98.160 on 20 lots. The price at which all these orders will be uncrossed is 98.170.

Determine what the Best Offer Price (98.190) and the Bid Price from the Last Trade (98.180). The 'High Price' is the lowest of these 98.180.

Determine what the Best Bid Price (98.140) and the Offer Price from the Last Trade (98.160). The 'Low Price' is the highest of these 98.160.

The Uncrossing Trade Price is the average of the 'High' and 'Low' prices: ( $98.180 + 98.160 / 2 = 98.170$ ).

**Example 5: Market Offer volume remaining**

BID	OFFER
98.180 (50)	98.190 (10)
98.140 (20)	98.160 (30)
98.130 (100)	98.150 (30)

In this example, the 98.180 Bid for 50 lots are uncrossed with the 98.150 Offer on 30 lots and then 20 lots of the Offer at 98.160.

The price at which all the uncrossed volume is traded is determined by applying the following scenario:

Determine what the Best Offer Price (98.160) and the Bid Price from the Last Trade (98.180). The 'High Price' is the lower of these 98.160.

Determine what the Best Bid Price (98.140) and the Offer Price from the Last Trade (98.160). The 'Low Price' is the highest of these 98.160.

The Uncrossing Trade Price is the average of the 'High' and 'Low' prices:  $(98.160 + 98.160) / 2 = 98.160$ .

#### Example 6: Market Bid volume remaining

BID	OFFER
	98.190 (10)
	98.160 (20)
98.180 (60)	98.150 (30)
98.140 (20)	
98.130 (100)	

In this example, the 98.180 Bid matches with the 98.150 on 30 lots and the 98.160 on 20 lots, leaving 10 lots Bid over at 98.180.

The price at which all the uncrossed volume is traded is determined by applying the following scenario:

Determine what the Best Offer Price (98.190) and the Bid Price from the Last Trade (98.180). The 'High Price' is the lower of these 98.180.

Determine what the Best Bid Price (98.180) and the Offer Price from the Last Trade (98.160). The 'Low Price' is the highest of these 98.180.

The Uncrossing Trade Price is the average of the 'High' and 'Low' prices:  $(98.180 + 98.180) / 2 = 98.180$ .

#### Example 7: Market Bid and Offer volume remaining

BID	OFFER
98.190 (60)	98.180 (10)
98.160 (5)	
98.140 (20)	98.150 (30)
98.140 (20)	98.140 (30)
98.130 (100)	

In this example, the 98.190 Bid for 60 lots is uncrossed with the 98.140 Offer for 30 lots and the 98.150 offer for 30 lots. Once the market has been uncrossed, the market will be left 98.160 bid for 5 lots and 10 lots offered over at 98.180. The price at which all the uncrossed volume is traded is determined by applying the following scenario:

Determine what the Best Offer Price (98.180) and the Bid Price from the Last Trade (98.190). The 'High Price' is the lowest of these 98.180.

Determine what the Best Bid Price (98.160) and the Offer Price from the Last Trade (98.150). The 'Low Price' is the highest of these 98.160.

The Uncrossing Trade Price is the average of the 'Low Price' and 'High Price' ( $98.180 + 98.160 / 2 = 98.170$ ).

#### Example 8: Market Bid and Offer volume remaining

BID	OFFER
98.880 (1)	98.290 (1)
98.680 (1)	98.200 (1)
98.600 (1)	98.190 (1)
98.200 (1)	98.180 (1)
98.190 (1)	
98.180 (1)	
98.170 (1)	
98.190 (1)	
98.190 (1)	

One final example, the 98.880 bid matches with the 98.180 offer, the 98.680 bid matches with the 98.190 offer and the 98.600 bid matches with the 98.200 offer. This leaves the market 98.200 bid/ 98.290 offered once the market has been uncrossed. The price at which the uncrossed volume is traded is 98.240.

Once again because there is market bid and offer, volume left over after the market has been uncrossed, the price at which all uncrossed volume is traded, is determined by applying the following scenario:

Determine what the Best Offer Price (98.290) and the Bid Price from the Last Trade (98.600). The 'High Price' is the lowest of these 98.290.

Determine what the Best Bid Price (98.200) and the Offer Price from the Last Trade (98.200). The 'Low Price' is the highest of these 98.200.

The Uncrossing Trade Price is the average of the 'High Price' and 'Low Price' ( $98.290 + 98.200 / 2 = 98.245$ ).

As previously noted, where products are traded only in full ticks, but where a half tick Uncrossing Trade Price is calculated, the price allocated to all uncrossed business will be rounded down where this price is positive, but rounded up where this price is negative. LIFFE CONNECT® rounds towards zero.

## 8.4 Delta Neutral Strategies

### 8.4.1 Example 1: Index Options with no residual volume

Assume that an Index Option delta neutral order is traded wholly with a matching Index Option volatility order.

The underlying of the Index Option is the Future in the same index. The Option has a lot size of 1 (i.e. one Option is based upon one Future). This will be the value for the lot size in the product details table.

The value of Delta is 0.42 and all 68 Options in the order book are traded, leaving no residual volume.

Therefore, using the underlying traded volume algorithm for delta neutrals:

$$\begin{aligned} \text{Underlying Traded Volume} &= \text{round}(68 \times 0.42 \times 1) - \text{round}(0 \times 0.42 \times 1) \\ &= \text{round}(28.56) - \text{round}(0) \\ &= 29 \end{aligned}$$

So 29 Index Futures are traded as the underlying leg of the delta neutral trade.

### 8.4.2 Example 2: Equity Options with no residual volume

Assume that an Equity Option delta neutral order is traded wholly with a matching Equity Option delta neutral order.

The underlyings of the Equity Option are the relevant shares in the cash market. The Option has a lot size of 100 (i.e. one Option is based upon one hundred shares). This will be the value for lot size in the product details table.

The value of Delta is 0.39 and all 34 Options in the order book are traded, leaving no residual volume.

Therefore, using the underlying traded volume algorithm for delta neutrals:

$$\begin{aligned} \text{Underlying Traded Volume} &= \text{round}(34 \times 0.39 \times 100) - \text{round}(0 \times 0.39 \times 100) \\ &= \text{round}(1326) - \text{round}(0) \\ &= 1326 \end{aligned}$$

So 1326 shares are traded as the underlying leg of the delta neutral trade.

### 8.4.3 Example 3: Financial Options with no residual volume

Assume that a Financial Option delta neutral order is traded wholly with a matching Financial Option delta neutral order.

The underlying of the Financial Option is the Future based upon the same interest rate. The Option has a lot size of 10 (i.e. one Option is based upon ten Futures). This will be the value for lot size in the product details table.

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The value of Delta is 0.48 and all 104 Options in the order book are traded, leaving no residual volume. Therefore, using the underlying traded volume algorithm for delta neutrals:

$$\begin{aligned}\text{Underlying Traded Volume} &= \text{round}(104 \times 0.48 \times 10) - \text{round}(0 \times 0.48 \times 10) \\ &= \text{round}(499.2) - \text{round}(0) \\ &= 499\end{aligned}$$

So 499 Futures are traded as the underlying leg of the delta neutral trade.

#### **8.4.4 Ex 4: Financial Options order matched with multiple incoming orders (1)**

Assume that a single Financial Option delta neutral order is matched with multiple incoming orders.

The underlying of the Financial Option is the Future based upon the same interest rate. The Option has a lot size of 1 (i.e. one Option is based upon one Future). This will be the value for lot size in the product details table.

The value of Delta is 0.56 and the sequence begins with 300 Options in the order book.

As each new incoming order is matched with the resting order, values for the required underlying volume are calculated using the underlying traded volume algorithm. Since the first incoming order is for 50 Options:

$$\begin{aligned}\text{Underlying Traded Volume} &= \text{round}(300 \times 0.56 \times 1) - \text{round}(250 \times 0.56 \times 1) \\ &= \text{round}(168) - \text{round}(140) \\ &= 28\end{aligned}$$

For this trade no rounding is required and 50 Options and 28 Futures are traded with the resting order and deducted from its remaining volume.

This sequence continues as the resting order is matched with other incoming orders:

Resting Order		Incoming Order			(Old Option Order Volume X Delta X Underlying Product Size)		(New Option Order Volume X Delta X Underlying Product Size)		
Order Volume Remaining	Underlying Volume Remaining	Order Volume	Traded Volume	Traded Underlying Volume	Calculated	Rounded	Calculated	Rounded	Delta
300	168	50	50	28	168	168	140	140	0.56
250	140	25	25	14	140	140	126	126	0.56
225	126	30	30	17	126	126	109.2	109	0.57
195	109.2	30	30	17	109.2	109	92.4	92	0.57
165	92.4	70	70	39	92.4	92	53.2	53	0.56
95	53.2	60	60	33	53.2	53	19.6	20	0.55
35	19.6	24	24	14	19.6	20	6.16	6	0.58
11	6.16	50	11	6	6.16	6	0	0	0.55
				Total = 168					

The trades above show when rounding is used in the underlying traded volume algorithm. In these cases the delta for each trade may not be exactly 0.56, but the overall delta for the sequence is:

$$\text{Overall Delta} = \text{Overall Underlying Volume Traded} / \text{Overall Option Volume Traded} = 168/300 = 0.56.$$

#### 8.4.5 Ex 5: Financial Options order matched with multiple incoming orders (2)

Assume that a single Financial Option delta neutral order is matched with multiple incoming orders.

Again, the underlying of the Financial Option is the Future based upon the same interest rate and the Option has a lot size of 1 (i.e. one Option is based upon one Future). The value of Delta is again 0.56 and the sequence begins with 500 Options in the order book.

This sequence develops as follows:

Resting Order		Incoming Order			(Old Option Order Volume X Delta X Underlying Product Size)		(New Option Order Volume X Delta X Underlying Product Size)		
Order Volume Remaining	Underlying Volume Remaining	Order Volume	Traded Volume	Traded Underlying Volume	Calculated	Rounded	Calculated	Rounded	Delta
500	280	50	50	28	280	280	252	252	0.56
450	252	25	25	14	252	252	238	238	0.56
425	238	30	30	17	238	238	221.2	221	0.57
395	221.2	30	30	17	221.2	221	204.4	204	0.57
365	204.4	70	70	39	204.4	204	165.2	165	0.56
295	165.2	60	60	33	165.2	165	131.6	132	0.55
235	131.6	24	24	14	131.6	132	118.16	118	0.58
235	131.6	24	24	14	131.6	132	118.16	118	0.58
211	118.16	50	50	28	118.16	118	90.16	90	0.56
161	90.16	50	50	28	90.16	90	62.16	62	0.56
111	62.16	50	50	28	62.16	62	34.16	34	0.56
61	34.16	50	50	28	34.16	34	6.16	6	0.56
11	6.16	10	10	5	6.16	6	0.56	1	0.50
1	0.56	5	1	1	0.56	1	0	0	1
				Total = 280					

In this example although the overall delta for the sequence is again correct, the last incoming order for a single Option will produce a volume of 1 in the underlying market, effectively giving a delta of 1 for this part of the sequence:

$$\begin{aligned}
 \text{Underlying Traded Volume} &= \text{round}(1 \times 0.56 \times 1) - \text{round}(0 \times 0.56 \times 1) \\
 &= \text{round}(0.56) - \text{round}(0) \\
 &= 1
 \end{aligned}$$

## 8.5 Price-Time Trade Policy

### 8.5.1 Example 1 - Order Submission (Implied In)

Assume that a Call spread is created in the June 2003 expiry of Dow Jones option with the strikes 8400 (C) 8500 (C) and the following explicit orders are submitted:

Market	Bid	Ask
8400 C	3100 (10)	
8500 C		2500 (10)
D (C) 8400 8500	600 (10) 600 (10) I	

The 8400 Bid of 3100 and the 8500 Ask of 2500 create an Implied in bid of 600 which joins the explicit bid of 600.

Should an incoming Ask of 600 be submitted into the 8400 8500 Call spread, the Time Price algorithm assigns priority in accordance to the timestamps of the explicit bid versus the youngest parent of the Implied in bid.

For example, assume the order of submission is:

- 1 - 8400 Bid of 3100
- 2 - 8500 Ask of 2500
- 3 - D (C) 8400 8500 Bid of 600

The Implied in price is generated on the submission of the second parent and a timestamp assigned. In this example the timestamp of the Implied In price is assigned prior to the submission of the explicit order in the call spread so that the time price algorithm assigns the trade to the Implied in price.

### 8.5.2 Example 2 - Revision of Orders (Implied In)

The timestamp assigned to an order whether implied or explicit is reassigned when the order is revised.

Market	Bid	Ask
8400 C	3100 (10)	
8500 C		2500 (5)
D (C) 8400 8500	600 (10) 600 (10) I	

Once again assume that the above orders have been submitted into the market in the following order:

1 - 8400 Bid of 3100

2 - 8500 Ask of 2500

3 - D (C) 8400 8500 Bid of 600

Currently the Implied In order has priority over the Explicit order as both parents were submitted prior to the explicit strategy bid. However should either of the parents be revised the timestamp would be reassigned.

**Note:** The exception to this rule is when an order volume is revised down whereupon the timestamp is not revised.

For example, the 8500 C Ask is revised to a volume of 10 lots and so the Implied In Bid timestamp is reassigned and Price Time priority is now assigned to the explicit bid. An Incoming Ask of 600 (10) will therefore trade completely against the explicit bid of 600 (10).

### 8.5.3 Example 3 - Pull Orders (Implied In)

When an outright order is pulled from the market the host will recalculate the Implied in prices. The timestamp assigned to this Implied In quote is set at the time of recalculation and not the submission time of the parent orders.

Market	Bid	Ask
8400 C	3100 (10)	
8500 C		2500 (10) 2400 (10)
D (C) 8400 8500	700 (10) I 600 (10)	

Assume that the above orders have been submitted into the market in the following order:

1 - 8400 Bid of 3100

2 - 8500 Ask of 2500

3 - 8500 Ask of 2400

4 - D (C) 8400 8500 Bid of 600

After the submission of the 8500 Ask of 2500 and Implied In price of 600 is created and a timestamp assigned. The second submission of the 8500 Ask of 2400 creates a better Implied In price of 700 is created and a new timestamp is assigned.

Assume the 8500 Ask of 2500 is pulled from the market.

The host recalculates the Implied in order at a price of 600. However as the timestamp is assigned upon recalculation, the explicit order of 600 has now priority in Price Time order.

### 8.5.4 Example 4 - Order Submission (Implied Out)

Assume that a Call spread is created in the June 2003 expiry of options on CBOT® Dow Jones Industrial Average<sup>SM</sup> with the strikes 8400 (C) 8500 (C) and the following explicit orders are submitted:

Market	Bid	Ask
8400 C	3050 (10)	
8500 C	2550 (10) 2550 (10) I	
D (C) 8400 8500		500 (10)

The 8400 Bid of 3050 and the 8400 8500 Ask of 500 create an Implied Out bid of 2550 which joins the explicit bid of 2550

Should an incoming Ask of 2550 be submitted into the 8500 Call, the Price Time algorithm assigns priority in accordance to the timestamps of the explicit versus the youngest parent of the Implied in Bid.

For example, assume the order of submission is:

1 - 8400 Bid of 3050

2 - D (C) 8400 8500 Bid of 500

3 - 8500 Bid of 2550

The Implied out price is generated on the submission of the second parent, which in this case in the Call Spread Bid of 500. A timestamp is assigned which in this example is prior to the submission of the explicit order submitted into the 8500 call so that a trade would be assigned to the Implied Out Price.

### 8.5.5 Example 5 - Revision of Orders (Implied Out)

Assume that a Call spread is created in the June 2003 expiry of Dow Jones option with the strikes 8400 (C) 8500 (C) and the following explicit orders are submitted:

Market	Bid	Ask
8400 C	3150 (5)	
8500 C	2450 (10) 2450 (5) I	
D (C) 8400 8500		700 (10)

The 8400 Bid of 3050 and the 8400 8500 Ask of 500 create an Implied Out bid of 2450 which joins the explicit bid of 2550

Upon the revision of an order a new timestamp is assigned, as with Implied In prices a new timestamp will be assigned upon the revision of either parent.

For example, assume the order of submission is:

- 1 - 8400 Bid of 3150 for 5 lots
- 2 - D (C) 8400 8500 Bid of 700 for 10 lots
- 3 - 8500 Bid of 2450 for 10 lots
- 4 - 8400 Bid of 3150 is revised up to 10 lots

The Implied out price is generated on the submission of the second parent, which in this case in the Call Spread Ask of 700. A timestamp assigned which in this example is prior to the submission of the explicit order submitted into the 8500 call so that priority is assigned to the Implied Out Price. However the revision of the 8400 Bid up to 10 lots results in a new timestamp being assigned, so that the explicit Bid of 2450 in the 8500 Call now has priority.

The exception to this is when an order volume is decreased, where upon the timestamp remains unchanged.

For example, assume the order of submission is:

- 1 - 8400 Bid of 3150 for 5 lots
- 2 - D (C) 8400 8500 Bid of 700 for 10 lots
- 3 - 8500 Bid of 2450 for 10 lots
- 4 - D (C) 8400 8500 Bid of 500 is revised down to 5 lots

The Implied out price is generated on the submission of the second parent, which in this case in the Call Spread Ask of 700. A timestamp assigned, which in this example is prior to the submission of the explicit order submitted into the 8500 call, so that Price Time priority is assigned to the Implied Out price. The revision of the 8400 8500 Ask of 700 reduces the volume available in this market which does not result in a new timestamp being assigned so Implied out bid of 2450 maintains its Price Time priority.

### 8.5.6 Example 6 - Pull Orders (Implied Out)

Assume that a Call spread is created in the June 2003 expiry of options on the CBOT® Dow Jones Industrial Average<sup>SM</sup> with the strikes 8400 (C) 8500 (C) and the following explicit orders are submitted:

Market	Bid	Ask
8400 C	3150 (5)	
8500 C	2450 (5) I 2400 (10)	
D (C) 8400 8500		700 (10) 750 (10)

The 8400 Bid of 3150 and the 8400 8500 Ask of 700 create an Implied Out bid of 2450 which becomes the best bid, with the 2400 explicit bid in depth.

For example, assume the order of submission is:

- 1 - 8400 Bid of 3150 for 5 lots
- 2 - D (C) 8400 8500 Bid of 750 for 10 lots
- 3 - D (C) 8400 8500 Bid of 700 for 10 lots
- 4 - 8500 Bid of 2400 for 10 lots
- 5 - D (C) 8400 8500 Bid of 700 is pulled from the market

The Implied out bid of 2450 is created upon submission of the second order into the 8400 8500 Call spread and a timestamp assigned.

The 8400 8500 Call spread at 700 is then pulled from the market which results in a new Implied Out price being calculated of 2400 which joins the explicit bid of 2400 in the 8500 Call. Although the parent orders of the Implied out bid are older and therefore have time priority over the explicit bid, an incoming order would instead trade against the explicit order as the timestamp of the Implied is done upon recalculation of said Implied price.

## 8.6 Order Level Pro-Rata Priority Trade Policy

### 8.6.1 Ex 1: Order at depth does not gain priority after Best Price traded through

Assume the following Bids and Offers are entered in the sequence shown:

Order (Bid) and Time Submitted	Bid Volume	Bid Price	Offer Price	Offer Volume	Order (Offer) and Time Submitted
A (12:00)	P 500	96-12			
B (12:01)	500	96-12			

The 500 Bid at 96-12 is the first to enter the market and creates a new best price. It is assigned the priority flag. A further Bid of 500 lots enters at the same price, but the first order retains the priority flag.

Three more Bids now enter the market:

Order (Bid) and Time Submitted	Bid Volume	Bid Price	Offer Price	Offer Volume	Order (Offer) and Time Submitted
C (12:02)	P 50	96-13			
D (12:03)	55	96-13			
E (12:04)	45	96-13			
A (12:00)	500	96-12			
B (12:01)	500	96-12			

The 50 Bid at 96-13 gains the priority flag as it creates a new best price. Further orders for 55 and 45 lots are then entered at the same price, but do not take priority.

An Offer now enters the market:

Order (Bid) and Time Submitted	Bid Volume	Bid Price	Offer Price	Offer Volume	Order (Offer) and Time Submitted
C (12:02)	P 50	96-13	96-13	100	A (12:05)
D (12:03)	55	96-13			
E (12:04)	45	96-13			
A (12:00)	500	96-12			
B (12:01)	500	96-12			

Bid C takes 50 lots of the incoming 100 lots as a priority. The remaining 50 lots are divided Pro-Rata between Bid D and Bid E, giving 28 lots and 22 lots respectively.

$$\text{Bid D} = (55/100) \times 50 = 27.5$$

$$\text{Bid E} = (45/100) \times 50 = 22.5$$

All these shares are then rounded down to the nearest integer to give:

$$\text{Bid D} = (55/100) \times 50 = 27$$

$$\text{Bid E} = (45/100) \times 50 = 22$$

This leaves a single lot unassigned. This will be given to the trader with the largest volume in the market, in this case Bid D.

The following Bids remain in the market when a new Offer enters:

Order (Bid) and Time Submitted	Bid Volume	Bid Price	Offer Price	Offer Volume	Order (Offer) and Time Submitted
D (12:03)	22	96-13	96-13	50	B (12:06)
E (12:04)	28	96-13			
A (12:00)	500	96-12			
B (12:01)	500	96-12			

Offer B trades all the remaining volume in Bids D and E.

A third Offer enters the market:

Order (Bid) and Time Submitted	Bid Volume	Bid Price	Offer Price	Offer Volume	Order (Offer) and Time Submitted
			96-12	50	C (12:07)
A (12:00)	500	96-12			
B (12:01)	500	96-12			

Bids A and B each receive 25 lots of Offer C to leave the final order book as:

Order (Bid) and Time Submitted	Bid Volume	Bid Price	Offer Price	Offer Volume	Order (Offer) and Time Submitted
A (12:00)	475	96-12			
B (12:01)	475	96-12			

**Note:** Bid A does not gain priority in the last trade of the sequence, despite previously having a priority flag assigned. Resting orders in depth are not assigned priority after the best price has been traded through.

### 8.6.2 Ex 2: New best price gains priority despite previously traded better prices

Continue the sequence from the previous example. Assume that another Offer enters to clear the entire order book:

Order (Bid) and Time Submitted	Bid Volume	Bid Price	Offer Price	Offer Volume	Order (Offer) and Time Submitted
			96-12	950	D (12:08)
A (12:00)	475	96-12			
B (12:01)	475	96-12			

The order book will be empty.

Assume two Bids are entered, both of 200 at 96-10. The first order to be entered, gains priority. A new Offer then enters for 250 at 96-10:

Order (Bid) and Time Submitted	Bid Volume	Bid Price	Offer Price	Offer Volume	Order (Offer) and Time Submitted
F (12:09)	P 200	96-10	96-10	250	E (12:11)
G (12:10)	200	96-10			

Bid F has priority and trades 200 lots. Bid G trades the remaining 50 lots, leaving:

Order (Bid) and Time Submitted	Bid Volume	Bid Price	Offer Price	Offer Volume	Order (Offer) and Time Submitted
G (12:10)	150	96-10			

In this example Bid F was still able to gain a priority flag, despite being at a worst price to previous trades. This is because entry created a new best price in the current market.

### 8.6.3 Example 3: Implied In Prices do not gain priority

Assume that the following bids and offers exist in an outright market and create the following Implied In for the strategy market:

Outright Market

	BID	OFFER
JUN	(50) 96-05	(50) 96-10
SEP	(10) 96-04	(50) 96-12

Strategy Market

	BID	OFFER
JUN/SEP	(50) -0.07 Implied	(10) 0.03 Implied

This implied strategy Bid will be in the order book (although it will not be disseminated through the API).

Assume that 50 explicit calendar spreads Bid at -0.07 are also entered into the order book and that a matching Offer of 10 at -0.07 is then entered. The order book will be:

Order (Bid) and Time Submitted	Bid Volume	Bid Price	Offer Price	Offer Volume	Order (Offer) and Time Submitted
A (12:00)	Implied 50	-0.07	-0.07	10 Explicit	A (12:06)
B (12:05)	Explicit 50	-0.07			

This will trade out to leave:

Order (Bid) and Time Submitted	Bid Volume	Bid Price	Offer Price	Offer Volume	Order (Offer) and Time Submitted
A (12:00)	Implied 45	-0.07			
B (12:05)	Explicit 45	-0.07			

**Note:** The Implied In does not gain a priority flag, despite being the first order at the best price. Instead all business is divided Pro-Rata. Implied Ins do not gain priority.

## 8.6.4 The Effect of Order Revisions on Priority

### Example 1: Order volume is revised down but maintains minimum volume

Assume that the following orders exist in an outright market at the same price, for which Trader A has priority:

Trader A	Trader B	Trader C	Total	Incoming Order	Total Trade	Trader A Fill	Trader B Fill	Trader C Fill
500 lots	60 lots	45 lots	605					

Trader A revises the order volume down to 400 lots, which will maintain priority so that an incoming order of 500 lots will be traded as follows:

Trader A	Trader B	Trader C	Total	Incoming Order	Total Trade	Trader A Fill	Trader B Fill	Trader C Fill
				500 lots	500 lots	400	57	43

### Example 2: Order volume is revised up and priority is lost

Assume that the following orders exist within an outright market at the same price, for which Trader A has priority:

Trader A	Trader B	Trader C	Total	Incoming Order	Total Trade	Trader A Fill	Trader B Fill	Trader C Fill
100 lots	125 lots	95 lots	315 lots					

Trader A revises the order volume up to 150 lots and priority is consequently lost, so that an incoming order of 65 lots is traded as follows:

Trader A	Trader B	Trader C	Total	Incoming Order	Total Trade	Trader A Fill	Trader B Fill	Trader C Fill
				65 lots	65 lots	27	22	16

**Example 3: Order price is revised to best so that priority is gained**

Assume that the following orders exist;

Trader A: 96-000

Trader B: 96-010

Trader C: 96-010

Trader A	Trader B	Trader C	Total	Incoming Order	Total Trade	Trader A Fill	Trader B Fill	Trader C Fill
50 lots	15 lots	10 lots						

Trader A revises the price up to 96-050, followed by Traders B and C. An incoming order of 78 lots is traded, as follows:

Trader A	Trader B	Trader C	Total	Incoming Order	Total Trade	Trader A Fill	Trader B Fill	Trader C Fill
50 lots	100 lots	125 lots	175	78	78	50	12	16

**Example 4: Order price is revised down**

Assume the following orders exist in an outright market.

Trader A: 96-050

Trader B: 96-030

Trader C: 96-030

Trader A	Trader B	Trader C	Total	Incoming Order	Total Trade	Trader A Fill	Trader B Fill	Trader C Fill
55 lots	50 lots	25 lots	130					

Trader A revises the order to a price of 96-040, as this is still the best price priority is maintained. An incoming order of 96-030, 65 lots is consequently traded as follows:

Trader A	Trader B	Trader C	Total	Incoming Order	Total Trade	Trader A Fill	Trader B Fill	Trader C Fill
				65 lots	65 lots	55	7	3

However, assume Trader A had instead revised the order to a price 96.030, as this order is no longer the best price priority is lost. The incoming order of 96.030, 65 lots would now trade as follows:

Trader A	Trader B	Trader C	Total	Incoming Order	Total Trade	Trader A Fill	Trader B Fill	Trader C Fill
				65 lots	65 lots	28	25	12

#### Example 5: Order can re-gain priority

Assume the following orders exist in an outright market.

Trader A: 96-070 (500) - priority is gained

Trader B: 96-070 (100)

Trader C: 96-080 (1) - *Minimum volume requirement for priority not met*. Trader C then pulls the order from the market and Trader A re-gains priority:

Trader A	Trader B	Trader C	Total	Incoming Order	Total Trade	Trader A Fill	Trader B Fill	Trader C Fill
500 lots	100 lots	0 lots	600	300 lots	300 lots	300	0	0

NOTE: Trader A's order would re-gain priority even if if Trader C's order had traded (as opposed to being pulled) as Trader C did not meet the minimum volume requirement to gain priority.

#### Example 6: Priority is lost

Assume the following orders exist in an outright market.

Trader A: 96-070 (500) - priority is gained

Trader B: 96-070 (100)

Trader C: 96-080 (300) - priority is gained

Trader C then pulls the order. As Trader C had acquired priority, Trader A does not regain priority when the order is pulled:

Trader A	Trader B	Trader C	Total	Incoming Order	Total Trade	Trader A Fill	Trader B Fill	Trader C Fill
500 lots	100 lots	0 lots	600	400 lots	400 lots	334	66	0

## 8.7 Preferencing

In the examples, the user identifiers PMA and PMB are Primary Market Makers (PMMs) in the (unspecified) product; CMA and CMB are Competitive Market Makers (CMMs); TRA and TRB are ordinary traders. The following configuration is assumed:

- preference percentage for Primary Market Makers = 10
- preference percentage for Competitive Market Makers = 5

Primary Market Makers have precedence over Competitive Market Makers

- minimum volume needed to acquire preference status = 0
- the preference volume cap is 15 lots
- calculated volumes between 0 and 1 are rounded up to 1 lot
- the pro-rata priority volume cap is 50 lots

Each example shows an order book with the orders numbered in price-time sequence. The pro-rata priority order (where relevant) is indicated by an asterisk. The volume allocated to each order, together with the reason for doing so, is then shown for various trades. The number in parentheses following the volume allocated is the total volume allocated to that order so far in the trade.

**Note:** As the minimum volume requirement is zero, all orders owned by PMA, PMB, CMA, and CMB will have preference status.

### 8.7.1 Example 1: Preferencing with Price-Time

ORDER NUMBER	OWNER	BUY PRICE	VOLUME
1	TRA	95.400	100
2	CMA	95.400	100
3	TRB	95.400	100
4	PMA	95.400	100
5	PMB	95.400	100
6	CMA	95.400	100

An incoming order to sell 195 lots is received.

The category volumes are calculated as 10% of 195 = 19.5 for PMMs, and 5% of 195 = 9.75 for CMMs. The category volume for PMMs is then reduced to the volume cap of 15. The category volume for CMMs is already below the volume cap, but must be rounded down to 9.

ORDER NUMBER	ALLOCATION	REASON
4	15 (15)	Preference allocation. The category volume for PMMs to the highest precedence market maker's only order.
5	15 (15)	Preference allocation. The category volume for PMMs to the next highest precedence market maker's only order.
2	9 (9)	Preference allocation. The category volume for CMMs to the next highest precedence market maker's oldest order. Note that order number 6, also owned by CMA, is not allocated any volume due to preference status percentage allocation taken up by order 2.
1	156 (156)	Normal allocation. The remaining volume to the order with time priority.

### 8.7.2 Example 2: Preferencing with Order Pro-Rata

Same order book as example 1. An incoming order to sell 119 lots is received. The category volumes are calculated as 10% of 119 = 11.9 for PMMs, and 5% of 119 = 5.95 for CMMs. Both category volumes are below the volume cap, but both must be rounded down. The category volumes used are 11 for PMMs and 5 for CMMs.

ORDER NUMBER	ALLOCATION	REASON
4	11 (11)	Preference allocation. The category volume for PMMs to the highest precedence market maker's only order.
5	11 (11)	Preference allocation. The category volume for PMMs to the next highest precedence market maker's only order.
2	5 (5)	Preference allocation. The category volume for CMMs to the next highest precedence market maker's oldest order.
1	16 (16)	Normal allocation. The volume remaining to trade is 92, and there are 573 lots left in the order book. All orders had the same original volume, so allocation will occur in time order. This allocation is $(92/573)*100$ rounded down.
2	15 (20)	Normal allocation. $(92/573)*95$ rounded down.
3	16 (16)	Normal allocation. $(92/573)*100$ rounded down.
4	14 (25)	Normal allocation. $(92/573)*89$ rounded down.
5	14 (25)	Normal allocation. $(92/573)*89$ rounded down.
6	16 (16)	Normal allocation. $(92/573)*100$ rounded down.
1	1 (17)	Normal allocation (2 <sup>nd</sup> loop). The volume remaining to trade is 1, and there are 482 lots left in the order book. This allocation is $(1/482)*84$ rounded up to 1 lot.

### 8.7.3 Example 3: Preference Order Pro-Rata with Priority

ORDER NUMBER	OWNER	SELL PRICE	VOLUME
1	TRA	95.300	20
2	TRB	95.350	25
3	CMA	95.350	5
4*	TRA	95.400	80
5	CMA	95.400	10
6	CMA	95.400	50
7	PMA	95.400	50

\*The pro-rata priority order is indicated by an asterisk.

An order to buy 200 lots is received.

ORDER NUMBER	ALLOCATION	REASON
1	20 (20)	Normal allocation. The only order at best price.
3	5 (5)	Preference allocation. 5% of 180 (the volume remaining to trade) will initially be allocated to the only market maker at this price, but it is not possible to trade more than the order volume.
2	25 (25)	Normal allocation. The only remaining order at this price.
4	50 (50)	Pro rata priority allocation. Volume up to the cap is allocated.
7	10 (10)	Preference allocation. 10% of 100 (the volume remaining to trade) to the highest precedence market maker at this price.
5	5 (5)	Preference allocation. 5% of 100 will be allocated to CMA.
4	20 (70)	Normal allocation. The volume remaining to trade is 85, and there are 125 lots left in the order book at this price level. Orders will be allocated in order of volume at start of trade. This allocation is $(85/125)*30$ rounded down.
6	34 (34)	Normal allocation. $(85/125)*50$ .
7	27 (37)	Normal allocation. $(85/125)*40$ rounded down.
5	3 (8)	Normal allocation. $(85/125)*5$ rounded down.
4	1 (66)	Normal allocation (2nd loop). The volume remaining to trade is 1, and there are 52 lots left in the order book. This allocation is $(1/41)*10$ rounded up to 1 lot.