# STOCK EXCHANGE OF MAURITIUS
# AUTOMATED TRADING SYSTEM (*SEMATS)*

The Stock Exchange of Mauritius (SEM) is pleased to make available this brochure to enable investors, market participants and the public at large to understand the automated trading system which will soon be operational at the Exchange. This brochure aims at explaining the basic features and operational aspects of the system and some of the changes that will underpin the new trading environment.

For an in-depth understanding of ***SEMATS*** and its underlying principles of operation, stakeholders are requested to refer to the Trading Rules which are available on SEM's website at the following address: *http://www.SEMDEX.COM* or to contact the Manager of the Trading Department at Tel: 212-9541.

## ***SEMATS*** *A NEW ERA FOR THE SEM*

The financial landscape worldwide has undergone a dramatic change during the last decade. The advent of electronic trade matching systems, the integration of financial markets via improved communication networks, the lifting of exchange control in many countries have all radically changed investors' behaviour and the conduct of stock market operations. As a result, stock exchanges worldwide are coming under intense competitive pressure to match world-class standards of operations, develop more efficient and transparent trading systems and improve the quality and flow of stock market information. Responsive to these challenges, the Stock Exchange of Mauritius implemented in 1997 a Central Depository and Settlement system (CDS) to ensure that stock exchange transactions are cleared and settled in line with G-30 Standards.

The setting up of an automated trading system at the SEM constitutes the next phase of a strategy, which aims at offering local and international investors a fully automated and integrated stock market system. The SEM Automated Trading System (***SEMATS)*** constitutes a state-of-the-art electronic trading system built on third-generation technology and designed for first class order-driven equity and debt markets.

***SEMATS*** was developed by Millennium Information Technologies, a leading technology firm in Sri-Lanka. Similar systems are operating successfully at the Colombo Stock Exchange (CSE) and the Malaysian Technology Stock Market (MESDAQ). The introduction of ***SEMATS*** will enhance transparency, liquidity and fairness for the benefit of investors.

***SEMATS*** will put an end to familiar trading patterns which have typified the Stock Exchange of Mauritius since its inception. Trading in securities will no longer be floor-based but will be conducted through dedicated trading workstations located at Stockbroking firms and linked by communication lines to the SEM trading engine.

***SEMATS*** can accommodate different types of financial instruments: Ordinary shares, Preference shares, Corporate and government debt instruments. Trading in these instruments can be done either through continuous trading or through the auction method.

## ***SEMATS*** *THE MAIN INNOVATIONS*

The technological revolution which will be brought about by ***SEMATS*** will carry far-reaching repercussions by reshaping the culture of trading in securities on the SEM. Based on flexible, sophisticated but understandable trading rules, ***SEMATS*** will render investment on the SEM friendlier and more efficient for local and international investors.

***SEMATS-*** *ELECTRONICAL MATCHING OF ORDERS*

When an investor sends a buy or sell order to his stockbroker, the broker will enter the order into one of the terminals located at his office. The order will be instantaneously transmitted electronically to the Stock Exchange and will enter the database of pending transactions on the Exchange computers.

In the event that there is another order already in the system that matches the incoming order, a trade will be immediately executed. A trade confirmation will immediately appear on the brokers trading screen. The investor can, therefore, be immediately informed that his order has been matched.

If there is no other order in the system that matches the incoming order, the latter will remain in the trading system in accordance with the various parameters given by the investor until it is electronically matched with a new incoming order with similar characteristics.

***SEMATS-*** *INTERNET TRADING FACILITIES*

***SEMATS*** will incorporate internet trading facilities, which will enable investors, from the comfort of their home or office, to follow the stock market on a real-time basis and act on a real-time basis. Through SEM's web page, investors will be able to access I-NET, the internet-based routing mechanism, assess the market situation and place orders to their stockbrokers. These orders will then be validated by the stockbrokers and transmitted to SEM's trading system for matching.

***SEMATS-*** *MULTIPLE PRICES FOR AN ORDER*

The matching of orders with the previous system was executed at one price. With ***SEMATS,*** an order may be executed at several prices. The order can be executed at the price stipulated by the investor or at better prices available on the market at that time. The order can also be executed in several parcels at different prices. This may reduce the purchase costs for the buyer and increase the sale proceeds for the seller.

*Example 1*: There are two sell orders in the order book for a security: 200 shares at Rs 11.00 and 200 shares at Rs 10.00. A buy order for 400 shares is entered at Rs 11.00. The buy order will be first matched with the sell order at Rs 10.00 and then with the sell order at Rs 11.00. The 400 shares will be purchased at an average price of Rs 10.50 per share, compared with the initial order price of Rs 11.00.

***SEMATS-*** *ORDER EXECUTION*

With ***SEMATS***, an order can be executed on different boards at different prices.

*Example 2:* A buy order of 1246 shares will be broken down in the following manner by a broker: 1200 will be posted to the Equity Board and 46 will be posted to the Odd Lot Board. This can result in the initial order being matched at different prices.

***SEMATS -*** *PRICE AND VOLUME LEVELS AVAILABLE IN REAL-TIME.*

The broker trading screen will show the price at which a particular share is trading. The screen will also show the best five buy and the best five sell prices and volumes. This will provide the broker with a clear picture of the state of the market. In the event that his client's order is pending in the system, the investor will be able to advise his client to amend his price closer to the market to improve his ability to trade.

***SEMATS -*** *IMPROVED MARKET DATA*

The new system will provide brokers and investors with a much-improved data base and a large amount of information upon which investment decisions can be based and the state of the market assessed.

***SEMATS -*** *PRICE, VOLUME OF TRADES AND INDEX REPORTED ONLINE.*

The system will display the price and quantity of all trades done. It will also display the indices online continuously. This will give brokers and investors a good feel of the market.

***SEMATS -*** *CORPORATE ANNOUNCEMENTS WILL BE REPORTED ONLINE.*

All corporate announcements will be introduced into the system online by the Stock Exchange and hence brokers will be made aware of the event as soon as a corporate announcement is made.

***SEMATS -*** *TRACKING THE STATUS OF ORDERS.*

The system will show the status of an order from the time of input and allow brokers to keep track of pending orders. Based on the available information, orders can be suitably modified so as to increase their chances of execution.

***SEMATS -*** *FAIRNESS IN ESTABLISHING ORDER PRIORITY.*

Order priority will be determined by two parameters: first- best price, second- time of entry. ***SEMATS*** guarantees First-in, First-out integrity for all orders entered at the same price. Since priority setting is computerised, its complete accuracy and reliability is guaranteed.

***SEMATS -*** *AUTOMATIC, MONITORED, FRIENDLY*

***SEMATS*** will offer fully computerised mechanisms that will guarantee high-performance operations. Trading will be conducted with the utmost efficiency and transparency. The system will alert against possible errors and allow for changes in unexecuted orders.

***SEMATS*** – *SEEING THE ENTIRE PICTURE*

Brokers and investors will get an ongoing, accurate and broad market picture. At each point in time, the system will provide data on best bid and offer prices, the depth of the order book and details on trades. The continuous visual display of market activity will be available through the various screens and these screens will be updated whenever a change occurs, enabling a continuous monitoring of the market.

## ***SEMATS*** *MARKETS AND BOARDS*

The SEM currently operates two types of markets: the Official Market and the Over The Counter Market (OTC).

With the implementation of ***SEMATS,*** the Official market will comprise four different boards, namely:

1. **The Equity Board** – This Board will trade listed ordinary shares and preference shares. The trading unit will be in multiples of 100 securities subject to a minimum of 100 securities. Securities denominated in local and foreign currencies will be traded on this board.

2. **The Odd Lot Board** – This Board will trade listed ordinary shares and preference shares in multiples of one security subject to a maximum of 99 securities. Securities denominated in local and foreign currencies will be traded on this board.

3. **The Debt Board** – This Board will trade in corporate and government debt instruments.

4. **The Special Terms Boards** – These Boards will undertake specific types of trades as and when need arises based on specific market requirements. They will consist of the *All or None Board, the Crossing Board and the Buy-In Board.*

The Over-The-Counter Market will comprise the **OTC Board**

***SEMATS*** *EQUITY BOARD*

Trading on the Equity Board will take place Monday through Friday and will comprise different sessions with the following operating hours:

| | |
|---|---|
| Market days | Monday to Friday |
| **Sessions** | **Time** |
| Pre-opening | 9.00 a.m. to 10.00 a.m. |
| Opening | 10.00 a.m. |
| Continuous | 10.00 a.m. to 11.30 a.m. |
| Closing | 11.30 a.m. |
| Trade Amendments/Cancellation | 11.30 a.m. to noon |
| Publication of Official Market Information Sheet | 12.30 p.m. |

## *The Pre-Opening Session (9.00 a.m. to 10.00 a.m.)*

During the pre-opening session, orders will be entered by brokers from the computers located at their offices into the trading engine. However, no trades will take place at this stage.

Each time a new order is entered, it will be added to the order book. Order status per security (total buy orders and total sell orders) will be dynamically calculated by ***SEMATS*** and disseminated to the market. Typical information that will be displayed include the total number of securities on the buy side and total number of securities on the sell side. The order status per security will provide useful information on the spread between buying or selling pressure on a security at this initial phase of a trading day.

Any new incoming order or order cancellation will automatically result in a recalculation of the order status of the security. Price information will not be displayed during this session.

## *The Opening Session(10.00 a.m)*

During this session, an opening price will be set for each security. Prices and transactions will be established by multilateral trading. The opening price of each security will be the price at which the highest trading volume will be achieved.

The opening price for each security will be determined within a few seconds and the determination of the opening prices of all the securities will be completed in a matter of seconds. Unfilled orders in the opening session will be automatically transferred to the continuous trading phase.

Example 2 highlights the mechanics of the opening session:

| Bid | | | Offer | | |
|---|---|---|---|---|---|
| Buy Orders | Cumulative Buy orders from highest price | Price Limit | Cumulative Sell orders From lowest price | Sell Orders | Trading Volume |
| 200 | 200 | 92.00 | 2100 | 100 | 200 |
| 400 | 600 | 91.50 | 2100 | 500 | 600 |
| 0 | 600 | 91.00 | 1500 | 500 | 600 |
| 400 | 1000 | 90.50 | 1000 | 600 | 1000 |
| 500 | 1500 | 90.00 | 400 | 400 | 400 |
| | | | | | |

Opening Price: Rs 90.50
Opening trading volume: 1000 shares

The highest trading volume is achieved at Rs 90.50, where 1000 shares are brought and 1000 shares are sold. The opening price will be Rs 90.50. At any other price, a lower volume of shares will be exchanged. At Rs 91.50, for instance, only 600 shares will be traded.

All unmatched orders will automatically be transferred to the continuous trading session at the original time priority and price limit.

## *The Continuous Session (10.00 a.m-11.30 a.m)*

After the opening price is calculated, a continuous bi-lateral order-driven trading of each security will begin. New orders will be continuously entered into the system.

Incoming orders will be checked against existing orders in the order book. ***SEMATS*** will attempt to match each incoming order with existing opposite orders in the order book and hence create a trade or several trades. An order will be matched with the best opposite order and subsequent best orders until it is partly or fully executed and no further matching is possible. An order may be executed at the initial stated price or at better prices, depending on the status of the order book.

All unexecuted or partially executed orders will be registered in the order book.

The **highest bid** and the **lowest offer** will have *precedence* over all other orders. Orders are ranked by **price sequence** in the order book. If orders are placed at the same price, then the one *entered earlier* will have *priority* over those entered subsequently.

## *The Closing Session (11.30 a.m)*

This short session will be invoked after the end of the continuous session. During this session, SEMATS will essentially calculate the closing price for each security. The closing price of a security will be its last execution price during a trade day.

The last execution price will be adjusted if ever it is affected by a trade cancellation.

The closing price of a security will default to its opening price if there have been no trades in the security during the continuous session. The closing price will default to the previous day's closing price if no trade is effected during the different sessions of the day.

At the end of the trading day, all unexecuted orders, except day orders will be transferred to the next market day. Unexecuted day orders will be automatically deleted.

### *Trade Cancellation/Amendment (11.30 a.m-noon)*

Trades executed can be amended or cancelled based on the mutual agreement between the stockbroking companies involved in the trade and with the approval of the Stock Exchange.

Trade cancellation/amendment will be effected on the market day on which the trade takes place.

### *Publication of Official Market Information Sheet (12.30 p.m)*

The Official Market Information Sheet will be available as from 12.30 p.m. This Sheet will contain relevant market statistics such as the closing price of each security, the closing market indices, volumes and values traded, P/E ratios etc.

The OTC Market Information Sheet will be available as from 2.30 p.m.

## ***SEMATS*** *MARKET INDICES*

Market indices will be based on the prices of executed trades effected on the Equity Board of the Official Market.

The computation of opening market indices will be based on the opening prices.

During the continuous session, market indices will be updated on a real-time basis as and when trades are effected.

The closing market indices will be determined at the end of the trading cycle on the basis of prices of the last executed trades.

## ***SEMATS*** *ODD LOT BOARD*

The Odd Lot Board will be used to trade equities, whose buy and sell orders are expressed in quantities less than 100.

*Example 3:* If an investor wants to purchase 743 shares of Company A, his broker will enter a buy order for 700 shares on the Equity Board and the balance of 43 shares will be entered on the Odd-Lot Board.

Odd lots will be traded in a separate order book in accordance with the price/ time priority principle. Odd lot orders can only be entered as limit orders. Trading on the Odd Lot Board will take place from 9.00 a.m to 11.30 a.m through continuous trading.

The execution prices on the odd lot board will not update market indices. Only volume and value traded for the market day will be updated.

**The Market days and operating hours of *SEMATS* for the Odd Lot Board will be as follows:**

| | |
|---|---|
| Market days | Monday to Friday |
| **Sessions** | **Time** |
| Opening | 9.00 a.m. |
| Continuous | 9.00 a.m. to 11.30 a.m. |
| Closing | 11.30 a.m. |
| Trade Amendment/Cancellation | 11.30 a.m. to 12.00 noon |

## ***SEMATS*** *DEBT BOARD*

The debt board will trade corporate and government debt instruments. Trading on the debt board will take place from 10.00 a.m to 11.30 a.m through continuous trading. Trading will take place in lots on one unit. Orders for debt instruments can be entered either on a price or on a yield basis.

*Example 4:* The last trade on a corporate debenture is executed at Rs 1000. At this price, the yield-to-maturity on this debenture is 12%. If an investor wants to buy 300 debentures on similar terms, hemay do so by telling his sbroker to input a buy order of 300 at 12% or a buy order of 300 at Rs 1000.

**The operating hours of *SEMATS* for the Debt Board are as follows:.**

| | |
|---|---|
| Market Days | Monday to Friday |
| Sessions:<br>Opening | <br>10.00 a.m. |
| Continuous | 10.00 a.m - 11.30 a.m |
| Closing | 11.30 a.m |
| Trade Amendment/ Cancellation | 11.30 a.m –12.00 noon |
| Publication of Market Information Sheet | 12.30 p.m |

## ***SEMATS*** *SPECIAL TERMS BOARDS*

The Special Terms Boards are designed for undertaking specific types of trades, as and when the need arises based on specific market requirements. They comprise of the Crossing Board, the All or None Board and the Buy-In Board.

**Crossing Board**

A crossing is a pre-arranged trade for a specified quality of securities at a specified price. Trades effected on the crossing-board will not update market indices, but volume and value traded will be updated accordingly. Only transactions with a value greater than Rs 5 million or representing more than 2% of the issued quantity of the security can be crossed. Crossing will be allowed within the allowable price spread of the security.

**All or None (AON) Board**

The All or None Board is meant to allow trading of large blocks of securities. In order to meet the requirements of the All or None Board, an order should represent more than 5% of the issued quantity of a security. Trading on the All or None Board will be done through auction where the original buyers price or the original seller's price may be bettered. All r None orders will not be subject to price limits. All or None trades will not affect indices. Volume and value traded statistics will, however, be updated accordingly.

**Buy-In-Board**

A Buy-In session will be organised by the Stock Exchange if it receives a request from The Central Depository & Settlement Co. Ltd (CDS). This will arise when CDS participants fail to deliver securities traded on the equity board, debt board and OTC board on the settlement date.

All Buy-Ins will take place on the Buy-In Board.

## ***SEMATS*** *OTC BOARD*

Trading on the OTC Board will take place on Tuesdays and Thursdays and will be done through the auction method. Brokers will enter clients' orders between 1.00 p.m and 2.00 p.m during the pre-auction session. At 2.00 p.m, the system will determine the execution price for each security based on the principle of volume maximisation. The price at which the highest number o f securities can be traded will be the execution price of the security for that trading day.

**The following schedule summarizes the operating hours of *SEMATS* for the OTC Board:**

| Market Days | Tuesdays and Thursdays |
|---|---|
| **Sessions** | **Time** |
| Opening | 1.00 p.m. |
| Pre-Auction | 1.00 p.m. – 2.00 p.m. |
| Auction | 2.00 p.m. |
| Closing | 2.00 p.m |
| Trade Correction/Cancellation | 2.00 p.m. – 2.15 p.m. |
| OTC Market Information Sheet | 2.45 p.m. |

## ***SEMATS*** *MARKET PRICE SPREAD*

The price spread of a security has been fixed at +/- 15% for the Official Market. This means that during a trading day, the price of a security can go up by a maximum of 15% relative to its previous day's closing price or its start-of-the-day reference price. The price can go down by a maximum of 15% relative to its previous day's closing price or its reference price.

The price spread for the OTC market has been fixed at +/- 20%.

## ***SEMATS*** *TYPE OF ORDERS*

In order to help an investor improve his investment performance and reduce his risk when trading, ***SEMATS*** offers a number of alternative options when placing an order. These options are referred to as order qualifiers . Order qualifiers are available on:

- **Price,**
- **Time** (validity period of order)
- **Volume** .

**Price Qualifiers**

***Limit Order*-** In a limit order, the investor states the price at which he is prepared to trade and the volume he intends to trade..

***Market Order*-** This type of order specifies the purchase or sale of a security at the best price prevailing on the market at that point in time. No price is specified for this type of order, but volume must be indicated. Market orders have priority over limit orders.

Market orders cannot be entered during ***Pre-Opening Session***

**Time Qualifiers**

***Day Order*** This order is valid only for the trading day in which it is entered. If the order cannot be executed during that market day, it is automatically deleted from the order book.

***Good Till Cancelled Order*** This order remains valid for 30 days from the day on which it was entered, but can be cancelled at any time during the above period. If unmatched at the end of 30 days, it is deleted from the order book.

***Good Till Days Order*** This order remains valid for a fixed number of days. If it is not executed within the validity period, it will expire at the end of the final day and be automatically deleted from the list of pending orders.

**Volume Qualifiers**

***Fill or Kill Order(FOK)*** This order requires the immediate purchase or sale of a specified quantity, at a given price or better. If the whole order cannot be filled immediately, it is cancelled. These orders do not get registered in the order book.

FOK orders cannot be entered during the ***Pre-Opening Session.***

***Fill and Kill Order(FAK)*** This order requires the immediate purchase or sale of the whole or part of the specified quantity at the specified or better price. If no immediate execution occurs the order is cancelled. If the order is partly executed, the remainder is immediately cancelled.

FAK orders cannot be entered during the ***Pre-Opening Session.***

***Disclosed/ Hidden Quantity Order*** The order size is revealed at the disclosed quantity and not at the full order quantity. The disclosed quantity will cause execution to occur in blocks of disclosed quantity. The hidden quantity will **not be visible to the market**.

When the disclosed quantity is matched, a new order with the same initial volume is generated automatically. This order will be given a new time stamp. The process will continue until the entire hidden quantity is matched or the order is cancelled or expired.

Disclosed quantity shall be equal to or greater than 25% of the order size.

The disclosed quantity attribute is not applicable to FOK or FAK orders.

***Minimum Fill Size***

An investor can indicate a minimum size of his order that can be matched with a contra-order.

*Example 5:*

Mr A places an order to buy 10,000 shares of Company B with a minimum fill size of 1000 shares. What this means is that if there is a seller prepared to sell 200 shares of Company B at the price stated by Mr A, the trade will not match as Mr A has decided not to accept an order less than 1000 shares. On the other hand if there is another seller prepared to sell 1,800 shares of Company B at the price sated by Mr a, this full 1,800 will be traded as it meets Mr A's minimum fill size of 1,000.

## ***SEMATS*** *SURVEILLANCE OF THE MARKET AND INVESTOR PROTECTION*

***SEMATS***, will provide the Exchange with sophisticated electronic surveillance tools which will enable the Surveillance staff of the Stock Exchange to take all possible steps to safeguard the integrity of the market and ensure an even playing field for the small investor.

The in-built surveillance system has many functions including :

- Suspension of trading of a security
- Trading Halts
- Market Halts

### ***Suspensions of trading of a security***

Occasionally SEM's Surveillance staff may suspend trading in a security to safeguard investors interests. For example, if a company has an unduly long delay in sending its half-yearly report or annual report, the surveillance department may suspend trading of that security. While the length of the suspension should be reduced to a minimum the lifting of suspension will depend on the promptness with which the management of the listed company responds to its listing obligations.

### ***Trading Halts***

Trading in a share may be halted till such time as price sensitive information is disseminated to the market. The length of the halt can vary from as little as few minutes for a routine announcement like a dividend, a rights or a bonus issue to a couple of days for more significant events like a take-over bid or a merger offer.

The market will be duly informed of any halt.

### ***Market Halts***

A market halt will occur under the following circumstances:

- A technical failure of ***SEMATS***
- ***SEMATS*** cannot be fully used by more than 25% of the stockbroking companies.
- Whenever the SEMDEX increases/decreases by more than 5% at the opening session, compared to its closing value or during the continuous session compared to its opening value.

## ***SEMATS*** *RELIABLE AND SECURE*

The Stock Exchange of Mauritius has invested considerable effort and resources in an attempt to ensure that ***SEMATS*** offers continuous accessibility and efficiently serves all stakeholders.

The system encompasses fault-tolerate features. In case of malfunction of the match trading server, a back-up server will be activated to ensure that trading continues smoothly.

The Stock Exchange has also arranged a back-up room to accommodate stockbroking companies who may occasionally have problems connecting to the system.

The above measures will enable SEMATS to operate with virtually no interference while maintaining the continuity of trading and the generation of quality market data.