TCS BαNCS ALGORITHMIC Trading Solutions

TCS BaNCS allows traders to develop and execute their own algorithmic trading strategies

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"Quants" have transformed the trading floor.

Algorithmic Trading continues to trend upward, to the point that global traders now measure the maturity of a marketplace in terms of its ability to execute algorithmic trades. According to Celent estimates, algorithmic trading represents 70 percent of trading volume in developed markets and 25 to 30 percent in emerging markets worldwide. India, which only began to allow algorithmic trading in 2008, has quickly moved up the ranks with algorithmic trades at 30 percent of total trades on Bombay Stock Exchange (BSE) and 46 percent on National Stock Exchange (NSE).

Established marketplaces now face immense pressure to enable and attract algorithmic trades. Today's traders are equipped with smart order routing technology to more easily reach alternate trade venues, which means that liquidity can quickly migrate to marketplaces that execute algorithmic trades.

In response to the fast growth of algorithmic trading, buy-side and sell-side market participants now require ever–changing levels of sophistication with their own algorithmic trading and smart order routing capabilities.

Moreover, sell-side traders are being asked by institutional clients to supply the requisite tools to function in a fast-moving marketplace. Sophisticated clients with trading operations of their own require direct market access (DMA). They need to craft advanced algorithmic trading strategies that tap into their own insights and approaches to the market. They need to be fully supported by advanced order management capabilities that route orders to the most appropriate marketplace. For their own operations, they need full integration with their internal systems for risk management, compliance and other critical back-office functions.

For the buy side, viable participation in the markets demands a high level of performance across several dimensions and the sell side is expected to deliver the same. Accordingly, providers of algorithmic trading solutions must be able to empower the sell side with a comprehensive toolset that enables the following:

- Consistent execution
- Low impact on prices in the market
- Low-cost trading
- Anonymity to the extent possible
- Flexible technology with full integration
- Support for regulatory compliance

These are merely the fundamentals. Yet it's not enough to have a working solution that delivers high-speed, low-impact, low-cost and anonymous access to the marketplace. On top of that, traders need an edge.

Traders need the flexibility to develop a viable trading strategy that suits their portfolio, trading style, risk limits and objectives. With any trading style, algorithmic or otherwise, traders need to know that their strategies are as unique as possible and that they're not cookie-cutter variations of strategies being used elsewhere. These strategies have to generate higher returns than the market indexes, drawing upon traders' specific skills and competencies.

Traders expect to be hands-on with their trading strategies, and that's why traders are asking to work with the details behind their algorithms.

TCS BaNCS FOR SECURITIES TRADING

The Securities Trading solution of TCS BaNCS addresses three of the biggest issues for traders:

1. Rapid deployment of standard "black-box" algorithms
2. Custom development of "white-box" algorithms
3. Low-latency trading using high-performance computing (HPC) architecture

1. **"Black-box" algorithms** allow traders to execute program trades without having to know the details of the underlying algorithm. In many cases, this is sufficient, as a wide variety of black-box algorithms of varying complexity are available. Furthermore, providers of algorithmic trading solutions can optimize their standard black-box algorithms, allowing turn-key participation in the fastest-moving marketplaces.

   The black-box approach is the simplest and fastest way for TCS BaNCS clients to begin algorithmic trading. Standard algorithms operate natively within a separate "Algo Engine," which integrates with TCS BaNCS for order management or legacy systems if needed. The Algo Engine includes a wide range of Execution Algorithms and Arbitrage Algorithms developed by TCS and extensively used by clients.

   TCS BaNCS provides a real-time dashboard to monitor the performance of black-box algorithms. Users can input basic parameters to initiate trading strategies, and also make real-time adjustments to those parameters. By contrast, many other algorithmic trading engines in the marketplace operate on a "fire and forget" basis.

2. **"White-Box" algorithms** enable traders to create their own proprietary algorithms from scratch, or build upon a comprehensive set of standard black-box algorithms. Without being limited to the standard trading strategies enabled by black-box algorithms, traders can invent new approaches to the marketplace, respond to new developments or evolve quickly as former strategies lose their effectiveness.

   In response to the heavy demand for white-box algorithmic trading, TCS BaNCS has extended the Algorithmic Trading capabilities of its Securities Trading solution to encompass a full range of customizable trading strategies.

   Using the Algorithmic Trading Workbench in TCS BaNCS, traders can compose, back-test and deploy white-box algorithmic trading strategies that monitor, analyze and respond to market events. An advanced, built-in monitoring and control mechanism supports iterative refinement of trading strategies across all asset classes. Trading strategies can evolve quickly along with market conditions, while taking advantage of the unique capabilities of traders and their firms.

3. **Low-latency trading employing HPC architecture** ensures that trades are executed at exchanges at the extremely low latency required to compete in today's markets.

   Earlier versions of TCS BaNCS were designed for a distributed environment clustered with servers. With the evolution of more and more processing power on single servers, and the programming paradigms shifting to increased parallelism, TCS BaNCS was enabled to take advantage of the latest HPC processors.

   By harnessing the parallel processing capability of modern HPC processors, TCS BaNCS users have been able to reduce latency by 86 percent and double throughput performance. With the higher clock speed and improved micro-architecture, TCS was able to bring down the latency by a factor of eight.

BUILDING BETTER ALGORITHMS

TCS BaNCS for Algorithmic Trading enables clients to speed the development of production-ready algorithms while ensuring low-latency, top-quality order execution. The solution has already delivered immediate tangible benefits to clients in terms of performance improvement, larger trade volumes and higher desk efficiency.

Key advantages of the Algorithmic Trading capabilities of TCS BaNCS include:

- **High scalability:** Traders can use the standard algorithmic trading strategies or develop their own trading strategies based on shared data sources and algorithm libraries. In turn, firms can boost throughput and trading volume without having to increase the size of their dealing team, IT development team, or back-office support staff. In fact, using algorithmic trading, one TCS BaNCS client recently doubled its execution volumes from buy-side clients without having to expand staff or infrastructure.
- **Ease of deployment:** TCS has extensive experience and global resources to support deployments of TCS BaNCS for participants throughout the securities industry. For existing users of TCS BaNCS for Securities Trading, the latest algorithmic trading and DMA capabilities can be deployed without changing the existing infrastructure or experiencing any disruptions to the current business
- **Increased adoption:** The ease-of-use of the TCS algo strategies enabled one TCS BaNCS client to extend the use

of algorithmic trading across most of its trading floor, such that algorithmic trading strategies now drive 80 percent of its order flow.

- **Robust risk management:** Built-in risk and compliance checks ensure that trading strategies conform to a regulatory environment that gets ever more complex by the day.
- **Reduced time to market:** Off-the shelf, black-box algorithmic trading strategies can be readily deployed, tested and rolled into production. Also, the Workbench allows traders to create white-box algorithms using a powerful and intuitive user interface.
- **Increased efficiency:** Instead of handling manual tasks related to order routing, compliance and risk management, traders can focus on market strategy and algorithm development.
- **Improved customer service:** Sell-side firms can provide direct access to algorithmic trading capabilities with high strategic value, which boosts customer satisfaction while also reducing dealers' workloads.
- **Reduced latency:** TCS BaNCS drives low latency through a finely-tuned application, OS and system architecture that makes the most of the high-performance computing infrastructure of the latest parallel processing technology. ■

An Algorithmic Glossary

The world of algorithmic trading has its own language.

There are two main types of algorithms: Execution Algorithms, designed to minimize the price impact of large volume trade executions by "shredding" orders into smaller parcels before sending them to the exchange; and Arbitrage Algorithms, which read real-time market data based on tick signals and then capture arbitrage opportunities as soon as they surface. Orders are placed and modified with sub-millisecond latency.

Here are some of the strategies, approaches and technologies available in the Algorithmic Trading solution of TCS BaNCS:

TERM	DESCRIPTION
Time-Weighted Average Price (TWAP)	Execution Algorithm that breaks an order into several waves over a designated time period, potentially with a range of parameters. Ensures a smooth spread of executions over the period.
Volume-Weighted Average Price (VWAP)	Execution Algorithm that breaks an order into several waves. Each wave is weighted in size, according to a prediction of market volume at the specific time of day. Predictions are based on historical data for each instrument involved.
Percentage of Volume (POV)	Execution Algorithm that breaks an order into several waves, each calibrated to correspond to a target percentage of the overall market volume.
Iceberg	Execution Algorithm that shows only small lots to the market at any given time. Minimizes price impact for large-quantity orders.
Hidden	Execution Algorithm that achieves execution for an order as soon as any favorable liquidity arrives on the market.
Peg and Pounce	Takes liquidity ("pounce") when adequate size is available in a specified price range, otherwise passively supplies liquidity ("peg").
Cash Future Arbitrage	Arbitrage Algorithm that places simultaneous orders for stock futures and the underlying stocks.
Long roll/Short roll	Arbitrage Algorithm that places simultaneous futures order with one long and one short contract having different expiration dates.
Smart Order Routing (SOR)	A smart application that gets the best price for buy/sell orders across available exchanges.