

# ALGORITHMIC TRADING

Automate your Low-Touch trades by providing traders with tools for best execution. Utilise the advantage of algorithmic trading and backtest your trading activity. With Quod, you can gain control over transaction costs and maintain speed and accuracy of your trades.



## Out of the box Algo Trading Solution

With 20+ Algos for all asset classes and Web-based Algo builder for designing your own strategies



## AI/ML Powered Algo Suite

With full TCA and Analytics to tune your Algo performance



## Quant as a service offering

Leverage our data science and quant team to backtest and optimise your trading strategies on a subscription basis

## Liquidity Seeking Algos

This class of algorithms is designed to find liquidity in a fragmented market, by implementing complex execution strategies. Different behaviour to seek liquidity in Lit, Dark, LPs/Venues, as well as internal pool is provided. With over 150+ parameters, a trader can manage the algorithm, with native support for most common order types, phase management, and risk management for anti-gaming, run-away algorithms and price variations. The algorithm increases its intelligence by gathering the data and statistical analysis on liquidity, historic performance, time of day, volatility, hit ratio, preferences, last look, latency, rejects etc.

## Trading and Execution Algos

Trading and Execution Algorithms are designed to achieve a specified trading or execution objective including market impact or generating alpha. Examples of this are: low market impact strategies. TWAP, VWAP, Participation/PoV, Arrival Price, Last Look Smoothed or Pair Trading (Alpha). These can be defined and customised by Quod or the client. As with all our Algos, every decision is clearly outlined and utilises real-time market information to adjust behaviour.

# Quod Algo Suite for Equities, FX, Futures



Algo	Including	Description
<b>Liquidity Seeking</b>		A real-time algorithm which reacts to market events such as market data, execution and a set of other criteria to dynamically update the decision tree to seek liquidity on lit and not-lit (dark) venues. An example is Quod Smart Order Routing Algorithm.
	Adaptive Behaviour	Creates different combinations of "solutions" to execute the available liquidity and chooses the best one. Adapts its decision-making based on market events.
	Statistical Behaviour	Integrates real-time / near-time statistical analysis to enrich the adaptive decision making process.
	Sniping	Takes a set of predefined triggers such as the bid/offer trigger price and quantity/child order slice to hunt for liquidity.
	Dark Pool	Maximizes the executed quantity by dividing the order over the different dark pools, either by spreading it equally or by placing it sequentially.
	Lit&Dark	Combines liquidity seeking and optimal executions across lit and dark pools.
<b>VWAP</b>		A slicing algorithm that submits equal size slices over a certain time horizon to get an average execution price as close as possible to the time-weighted average price during the same time horizon. Every slice benefits from the adaptive execution that takes into account the current market conditions and the aggressivity of the algorithm.
	Multi-Venue VWAP Curve Construction	For all multi-listed instruments, the VWAP volume curve is built based on the historical volume observed on all venues the order is set to participate on, including the MTFs. The calculation then combines the volume for all of these to build the VWAP curve. The calculation can also exclude Auction and Dark volumes if necessary.
	Machine Learning Volume Curve Prediction (Equity)	Forecasts the VWAP volume curve on multiple instruments using Machine Learning approach using order books' states, volume profiles, etc.
	Real-Time Aggressivity Adjustment	Based on the execution progress and the position in the slice time window, the child order's type/time-in-force is adjusted in order to always allow full execution of the slice.
	Auction Trading	Balances impact and disperses the orders into and during the auctions. The algorithm phase management detects different market phases, with distinct parameters (e.g. move intra-day from trading to an intra-day auction phase). Either based on a direct execution or on a specific auction algorithm (see below Auction Volume Percentage).
	Minimum / Maximum Participation	Any child can be restrained to a maximum or/and a minimum participation cap. The theoretical quantity (without any constraint) is calculated and compared with the participation quantity.
	Would Price	Ability to define a price at which the order can be completed immediately (up to a defined percentage of the order). When a Would opportunity occurs, the algorithm trades aggressively whenever the price is available.
<b>TWAP</b>		A slicing algorithm that submits equal size slices over a certain time horizon to get an average execution price as close as possible to the time-weighted average price during the same time horizon. Every slice benefits from the adaptive execution that takes into account the current market conditions and the aggressivity of the algorithm.
	Real-Time Aggressivity Adjustment	Based on the execution progress and the position in the slice time window, the child order's type/time-in-force is adjusted in order to always allow full execution of the slice.
	Machine Learning Aggressivity Optimisation (FX)	Intelligence able to know when the TWAP should aggress based on how much time and quantity is left for the current slice, the TWAP algorithm's optimal execution curve and an execution probability estimated from several market indicators (liquidity, volume profile, special events, etc.). The optimal execution probability is fed by the Machine Learning Peg Offset (see below).
	Auction Trading	Balances impact and disperses the orders into and during the auctions. The algorithm phase management detects different market phases, with distinct parameters (e.g. move intra-day from trading to an intra-day auction phase). Either based on a direct execution or on a specific auction algorithm (see below Auction Volume Percentage).
	Minimum / Maximum Participation	Any child can be restrained to a maximum or/and a minimum participation cap. The theoretical quantity (without any constraint) is calculated and compared with the participation quantity.
	Would Price	Ability to define a price at which the order can be completed immediately (up to a defined percentage of the order). When a Would opportunity occurs, the algorithm trades aggressively whenever the price is available.
<b>Participation (Percentage of Volume - PoV)</b>		A participation algorithm which aims to execute a given percentage of visible liquidity in the market in order to limit market impact. Integrates real-time / near-time analysis to enrich the adaptive decision making process.
	Real-Time Market Volume Calculation	Calculates real-time market volume by combining newly received trades at time, previous cumulated volume traded in the market and quantity already executed by the strategy when trades are received.
	Reactive Trading	Reacts to real-time trade volumes and places aggressive orders by comparing the already executed quantity to the overall volume that was traded on the considered markets.
	Anticipative Trading	Anticipates future market trades by looking at the visible volume placed on the various order books and placing passive orders against it.
	Auction Trading	Balances impact and disperses the orders into and during the auctions. The algorithm phase management detects different market phases, with distinct parameters (e.g. move intra-day from trading to an intra-day auction phase). Either based on a direct execution or on a specific auction algorithm (see below Auction Volume Percentage).
	Minimum Participation	When the executed quantity gets lower than the minimum participation cap, the algorithm goes "super-aggressive" until it rises back to an acceptable participation. Includes also an improvement of the average execution price.
	Would Price	Ability to define a price at which the order can be completed immediately (up to a defined percentage of the order). When a Would opportunity occurs, the algorithm trades aggressively whenever the price is available.
<b>Auction Volume Percentage</b>		An algorithm which places orders during auctions to ensure a target participation rate against an estimated auction volume. The algorithm phase management detects different market phases, with distinct parameters.
	Auction Volume Construction	Auction volume is built based on the estimated auction volume (either historical or predicted) and the indicative auction volume.
	Machine Learning Auction Volume Prediction (Equity)	Forecasts the auction volume using Machine Learning approach using order books' states, volume profiles, etc.
	Optimal Placement / Queue Management	It allows early entry of auction slices, optimal queue management and frequent order amendments, increasing in frequency towards the expected uncross.
	Would Price	Triggers a slice which is placed at a price defined by the user as the most favourable possible price. Includes adjustment and rebalance between active slice and Would slice depending on its marketability.

<b>Scaling Participation</b>		An algorithm that regularly adapts its participation based on different price levels, in continuous trading and in auctions. The participation adjustment is based on real-market data and optimal slice amendments. The more passive price, the more participation.
	Continuous Scaling	Supports different levels of participation in continuous based on price.
	Auction Scaling	Supports different levels of participation in the auctions based on price. It allows early entry of auction slices, optimal queue management and frequent order amendments, increasing in frequency towards the expected uncross.
<b>Arrival Price / Implementation Shortfall</b>		An algorithm that regularly adapts its participation based on estimated market impact in order to remain within a given price band. Participation is increased when the probability of high market impact is low and decreased when the probability is high. Adaptation of the participation is based both on historical behaviour and real-time data.
	Multi-Venue Volume Curve Construction	For all multi-listed instruments, the VWAP volume curve is built based on the historical volume observed on all venues the order is set to participate on, including the MTFs. The calculation then combines the volume for all of these to build the VWAP curve. The calculation can also exclude Auction and Dark volumes if necessary.
	Real-Time Market Volume Calculation	Calculates real-time market volume by combining newly received trades at time, previous cumulated volume traded in the market and quantity already executed by the strategy when trades are received.
	Participation Adjustment	Decreases participation rate when prices move against arrival price and increases participation rate when price moves in favour of arrival price.
<b>Pegging</b>		An algorithm set to track a given reference price (possibly with a limit price). The "best effort" version conflates market data, reducing the frequency of price updates.
	Pegged Order	An order to the bid or ask with or without an offset. The display quantity will float with the bid or ask, up to the ultimate limit price of the order.
	Pegged Order with Price	An enhanced pegged order that pegs to the BBO using an offset (in ticks or price) as defined by the users. Additional conditions such as limit price, min/max quantity or a-would-price (which for buy and Above which for sell) are available to hunt for liquidity.
	Machine Learning Peg Offset (FX)	Enhances the pegging mechanism by predicting the optimal execution probability attached to a range of offsets. The goal is to execute orders as passively as possible while being able to execute most of the parent quantity. The prediction is based on a Machine Learning approach using market conditions (order book's states, volatilities, volume profiles, noise variance).
<b>External / Internal Combination</b>		Ability to combine "external" executions with "internal" Quod benchmark algorithms. The latter can manage two quantities simultaneously: an internal "benchmark" quantity managed and sent in lit pools, and an "external" quantity sent to an external broker using their own logic.
<b>Iceberg</b>		A slicing algorithm which randomly sends child orders onto the market, so it is not initially being recognised as such by other market participants.
<b>Pair Trading</b>		A neutral trading strategy enabling traders to profit from virtually any market conditions including uptrend, downtrend or sideways movement.
	Direct Trading Mode	Places direct aggressive orders to sell the outperforming instrument and buy the underperforming instrument based on a spread deviation condition.
	Participation Trading Mode	Participates at a certain percentage of volume on each instrument to trade passively on the spread. Child orders are triggered based on a spread deviation condition as well as a quantity equivalence condition.
<b>Auto-hedging</b>		Cross-asset class rule-driven autohedger based on position and real-time market data (delta, vega, gamma) for single trades or accrued positions.
<b>Synthetic Order Type</b>		Triggers a market child order whenever the specified market price on any of the order listings is less than or equal to (respectively greater than or equal to) the specified stop price.
	Synthetic Stop	A limit sell order for a given instrument which is managed by the system and triggered by falling price.
	Synthetic Take Profit	A limit sell order for a given instrument which is managed by the system and triggered by raising price.
<b>Trailing Stop</b>		A Stop-loss order which the stop loss price is set to some fixed percentage below the market price. The market price rises, the stop loss price rises proportionally
<b>Triggering</b>		Releases the order when the Market price (best ask for buy, best bid for sell) reaches a pre-determined value.
	Triggering on same instrument	Orders on instrument X triggered by X's market price reaching a pre-determined value.
	Triggering on different instrument	Orders on instrument X triggered by Y's market price reaching a pre-determined value.
<b>Synthetic OTO</b>		Triggers an order when another order is fully filled.
<b>Synthetic OCO</b>		Cancels an order when another one is fully filled.
<b>Synthetic Time-In-Force</b>		Synthesises a Good-Till-Date (GTD) or Good Till-Cancel (GTC) order type which is held away from the market and able to execute on a range of venues meeting the trade criteria.
<b>Timed Order</b>		Releases the order at a specific time to the exchange for execution.
<b>Percentage On Close</b>		Aims to emulate an ATC time-in-force by releasing the order when the corresponding trading phase is detected.
<b>Synthetic Block</b>		For some shares in ME markets, foreign investors have a trading limit that can be bypassed when another sells the shares. Trades cannot be identified so for all, orders are created to block the shares.
<b>Machine Learning Applications</b>		Machine Learning enhanced applications to improve our algorithmic strategies.
	Machine Learning Clustering (Equity)	Analyses the similarity of different equity instrument via cluster analysis, fully data driven and Machine Learning approach that aims to identify groups of instrument that perform similarly over short periods of time.
	Machine Learning Volume Curve Prediction (Equity)	Enhances the pegging mechanism by predicting the optimal execution probability attached to a range of offsets. The goal is to execute orders as passively as possible while being able to execute most of the parent quantity. The prediction is based on a Machine Learning approach using market conditions (order book's states, volatilities, volume profiles, noise variance).
	Machine Learning Peg Offset (FX)	
<b>Custom</b>		Builds client side algos or uses our native algo API for customising this menu and building your own. Over 150 parameters and unlimited logical decisions give you complete customisation of your strategies