SYSTRA

Creative Financial Engineer

MT4 Expedition

vol.1

(Start System-trading with MT4)

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1. Installation

Step 1

Figure 1: The MetaTrader 4 setup window appears after clicking "Download"
(You can also download MetaTrader 4 from other FDMs)

Step 2

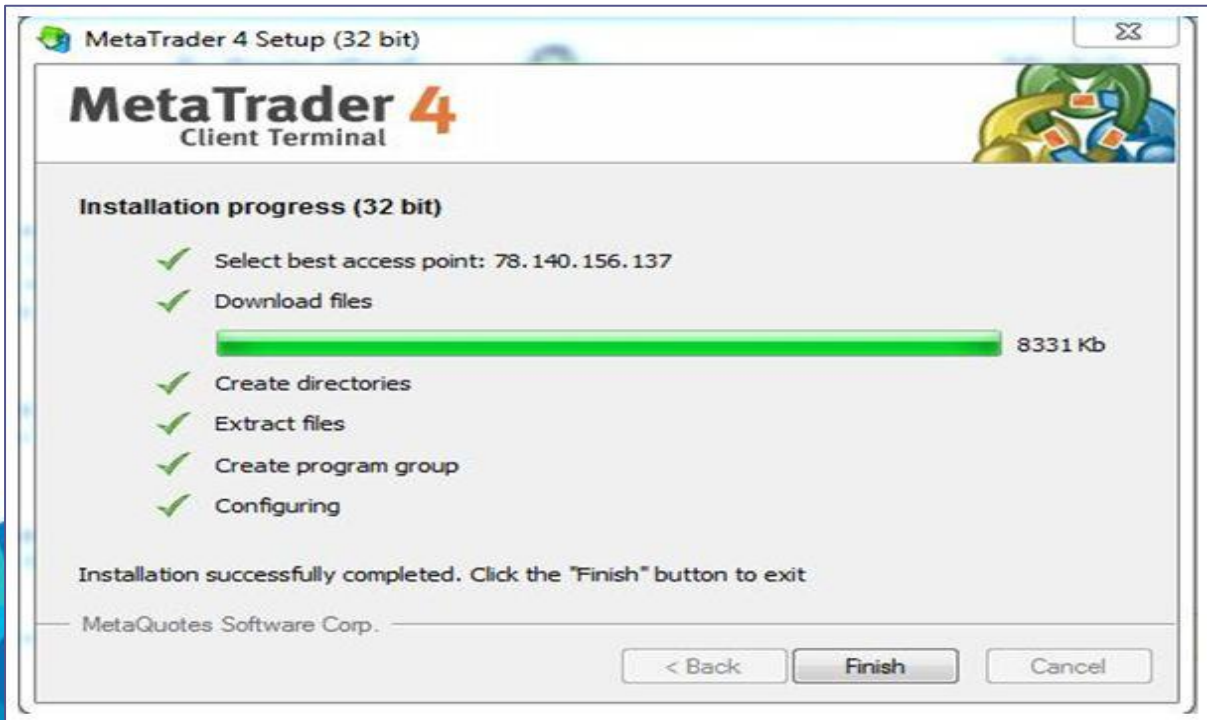**Figure 2**: Selecting an installation folder.

Step 3

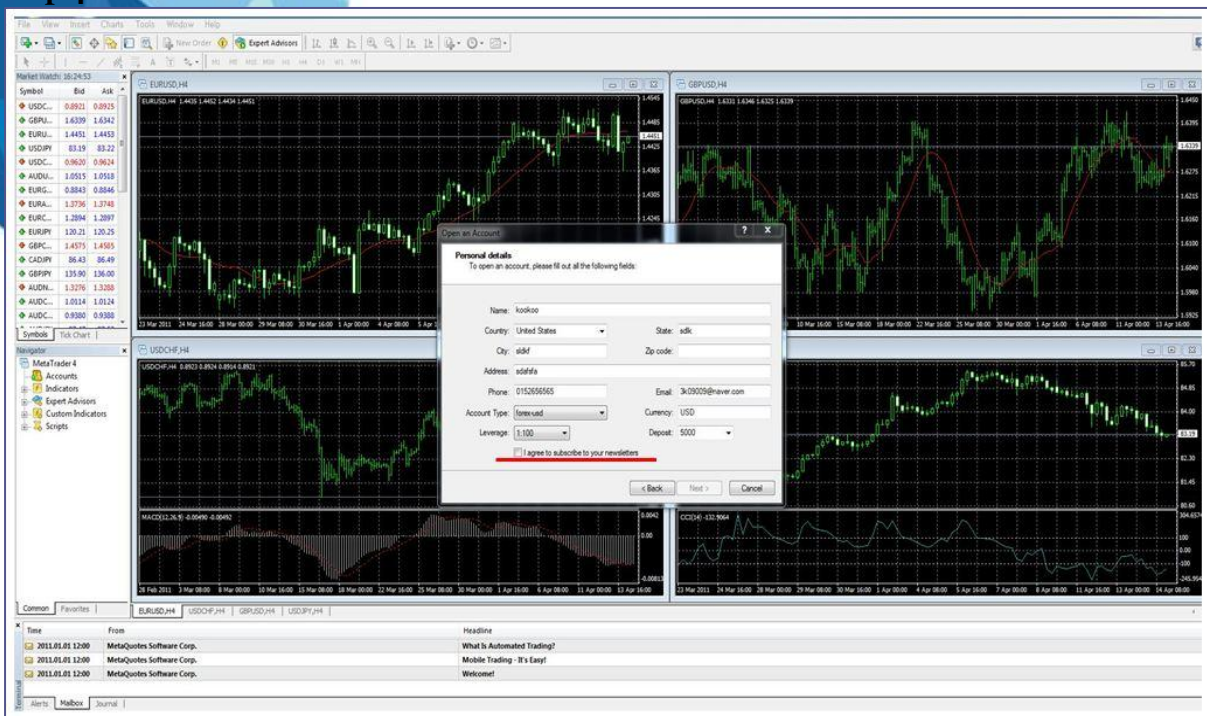**Figure 3:** Installation Progress

Step 4

Figure 4: After successful installation, the MT4 program will launch and prompt the user to open an account. The "I agree to subscribe to your newsletter" box (here, in the red line) must be checked to complete the installation.

2. Metatrader Navigation/Main Window

Figure5: The different sections of the MT4 screen
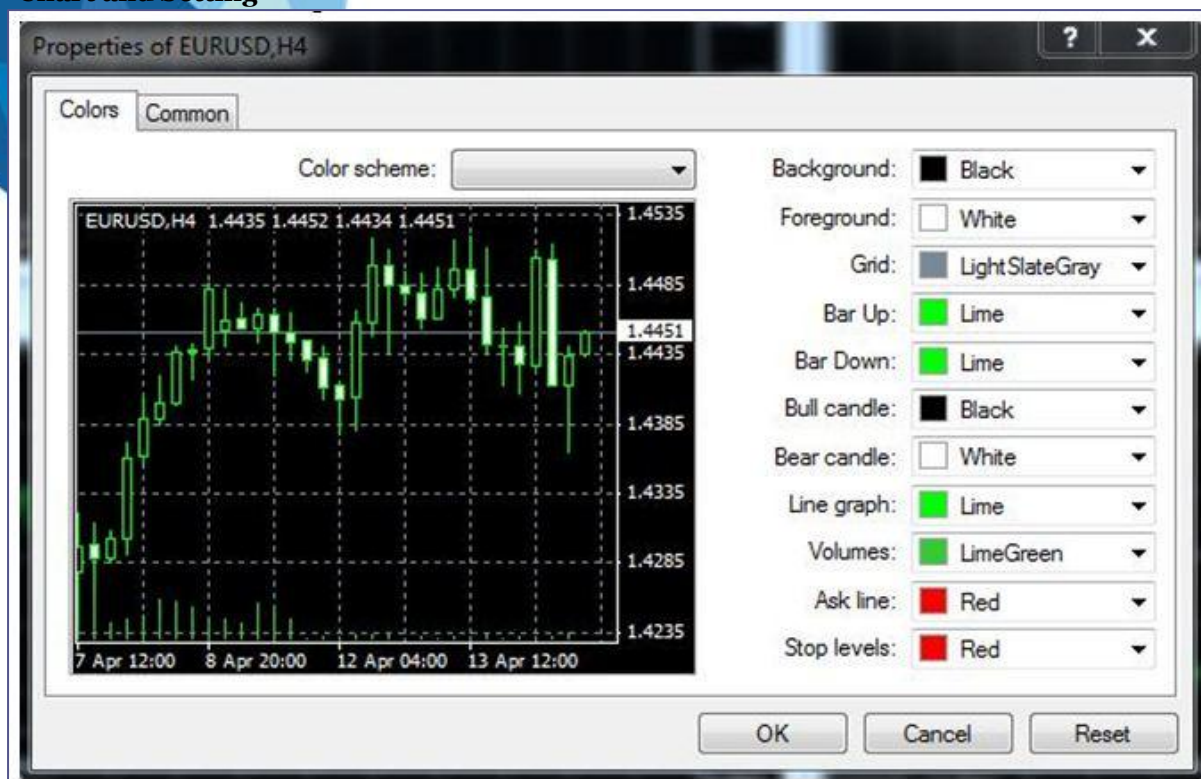
*Chart and Setting

Figure 6: The "Properties" window can be accessed by right-clicking on any price chart and selecting "Properties"

3. Navigator

a. Indicators

Indicators are imposed into the chart from the "Navigator" window by means of Drag'n'Drop technique, by execution of the "Insert – Indicators" menu command, or by pressing of the "Indicators" button of the toolbar.

b. Custom Indicators

Custom Indicator is a program file developed in MetaQuotes Language 4 by the user.
Custom Indicators are located at c:\Program Files\experts\indicators folder.
The Custom Indicators can be accessed from the Navigator window – Custom indicators list
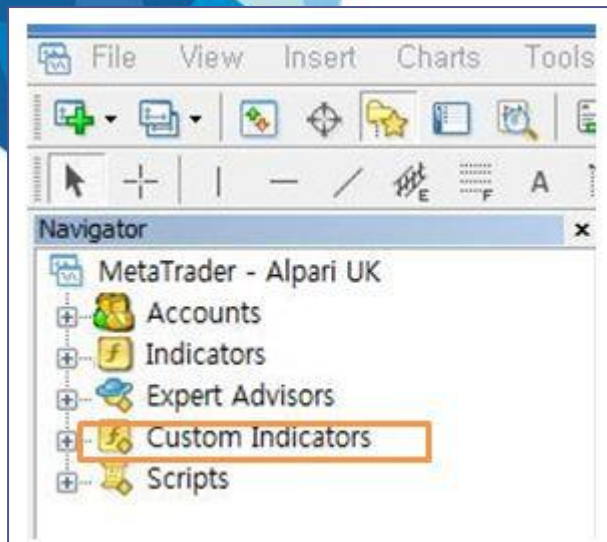
Figure 7: Navigator window – custom indicators list

- Right-click on the Custom Indicators in the Navigator – Custom Indicator window and select "Attach to a chart"; or
- Double-click on the Custom Indicator in the Navigator – Custom Indicator window; or
- Drag-and-drop the Custom Indicator to the desired chart.

To insert an indicator to the chart, you must first active the chart by clicking it. Then, go to the Navigator window to choose the indicator you want to insert and right-click on it. You'll get a sub-

menu like the one showed in Figure 8.
From this menu, you have to choose "Attach to a chart" command.
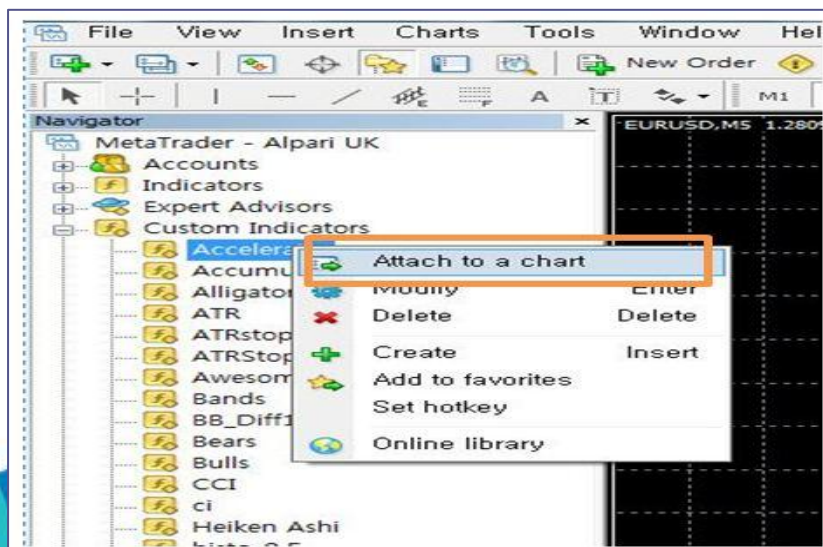
Figure 8: Custom Indicators sub-menu

c.   Scripts

The Scripts is a program written in MQL4.
Scripts are located at c:\Program Files\experts\scripts folder.
Scripts are executed on single request. In other words, a script has completed the function once, and stops functioning by itself.

The Scripts can be accessed from the Navigator window – Scripts list

- Right-click on the Scripts in the Navigator – Scripts window and select "Execute on chart"; or
- Double-click on the Scripts in the Navigator – Scripts window; or
- Drag-and-drop the Scripts to the desired chart.

Figure 9: Navigator window – Scripts list

d.   Expert Advisors (how to download an Expert Advisor on your computer)

To install an EA into the Metatrader 4 platform, you must save the EA in the following folder "c:\Program Files\MetaTrader4\experts" as pictured below. (In my example below, I installed an EA file called "Price_Greater_MA_With_Binary[4].ex4"
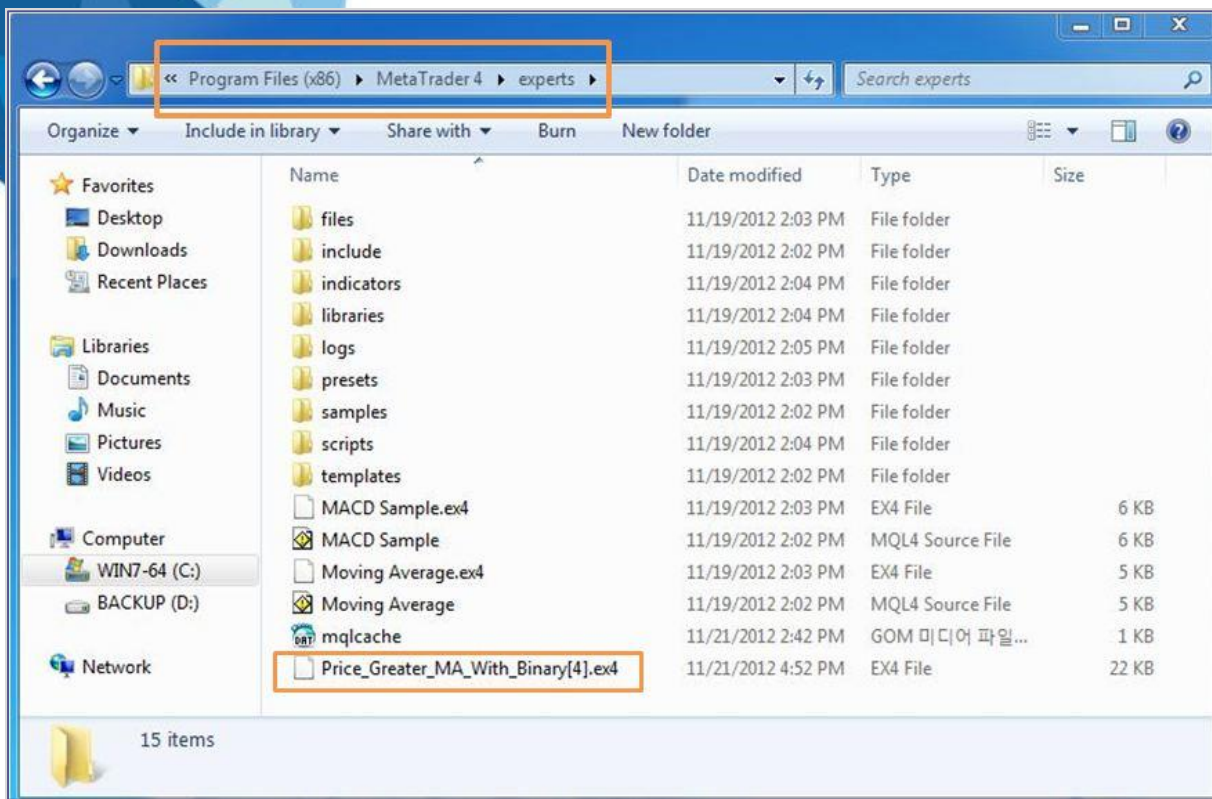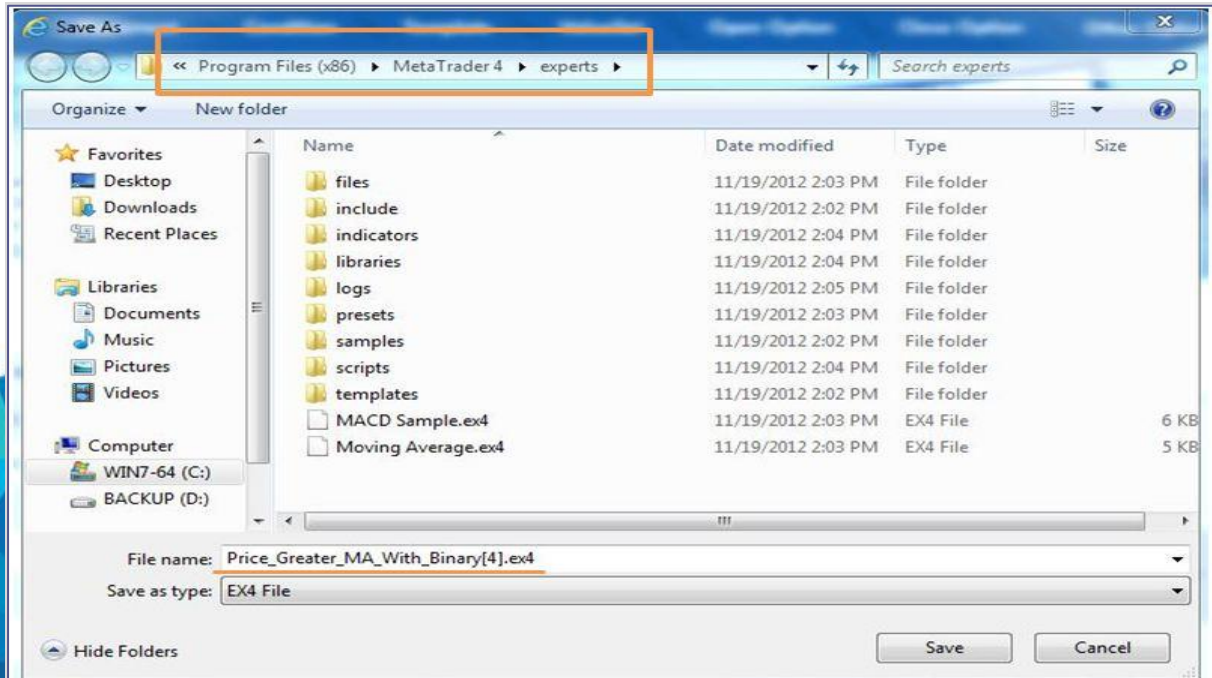
It has successfully installed EA

To double check that you were successful, open up the Metatrader 4 platform and the Expert Advisor will be listed under Expert Advisor in the Navigator Window.
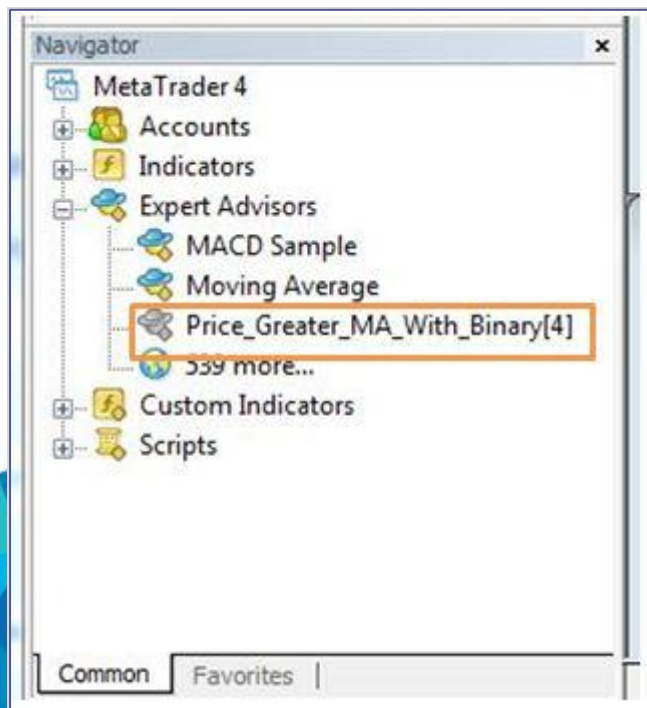
You must reboot the Metatrader 4 platform after installing the EA

4. Strategy Test

a. MT4 Historical Data

Many traders wish to review historical data in order to backtest trading strategies, or determine how a strategy would have performed in the past.

In order to download quotes from the History Center in your MetaTrader 4 terminal, please follow the steps described below:

1. Firstly, increase the 'max bars in history' in MetaTrader 4 by clicking on Tools>Options>Charts and entering '99999999999999'. Be aware that using larger volumes of data will increase the load on your PC
2. Go to the 'History Center' in MetaTrader 4 by clicking on Tools>History Center
3. Choose the time-frame for the particular instrument you are interested in (for example, double-click on EURUSD|1 min), double click on it and press **Download**.

MetaTrader 4 should now download the full history of M1 quotes for the specific instrument selected directly from the History Center and import it into MT4.
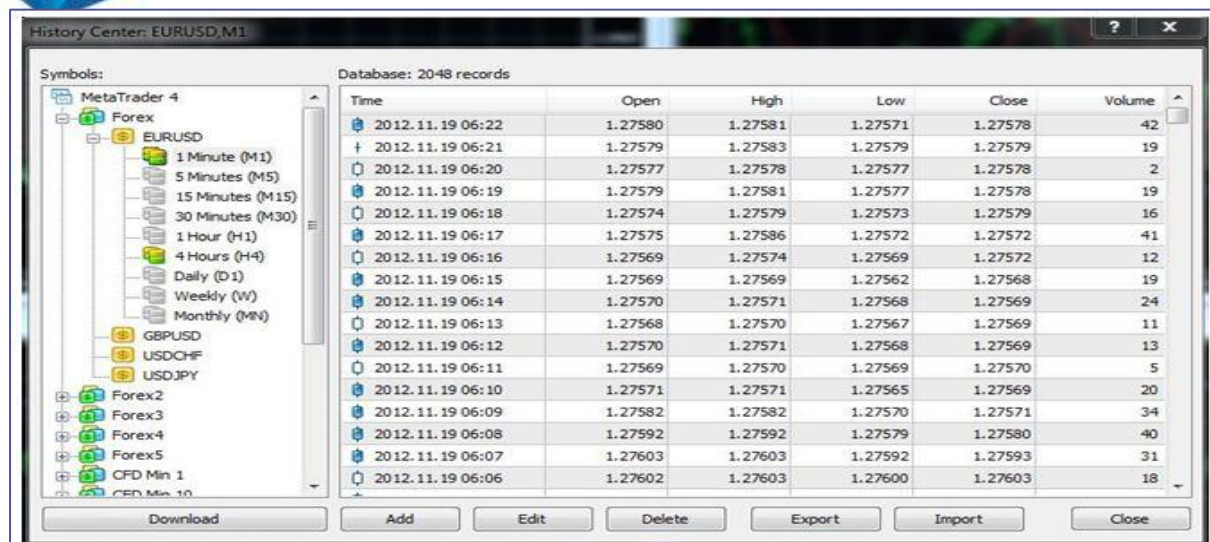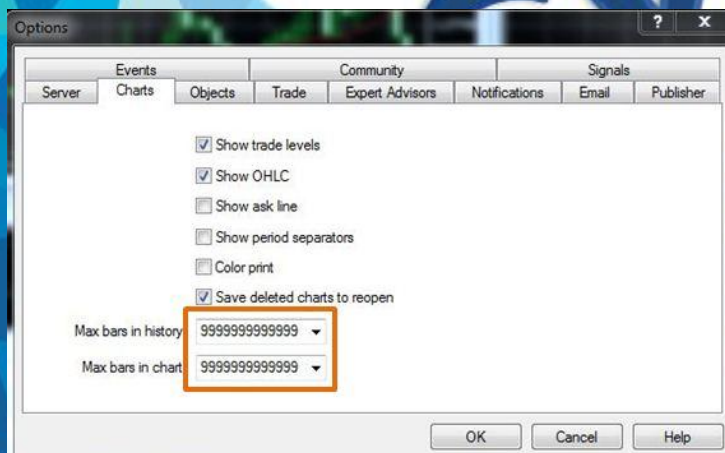
Figure 10: Downloading 1 Minute EURUSD data in the History Center

b.   Strategy Tester

MT4's "Strategy Tester" is a multifunctional window where traders can test trading strategies and also optimize an Expert's parameters to find the combination of variables that will produce the most favorable results. To pen the Strategy Tester window:
- In the Main Menu → View → Strategy Tester; or
- Press the Strategy Tester button in the Standard Toolbar; or
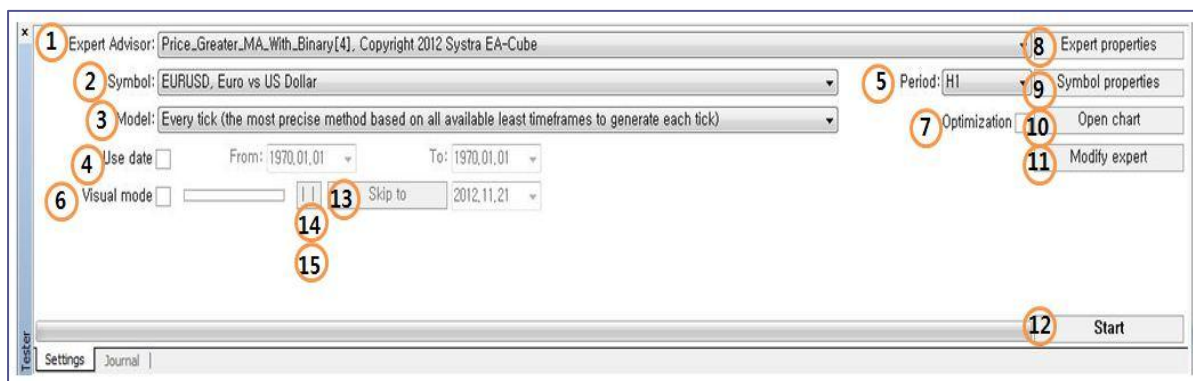- Press Ctrl + R.
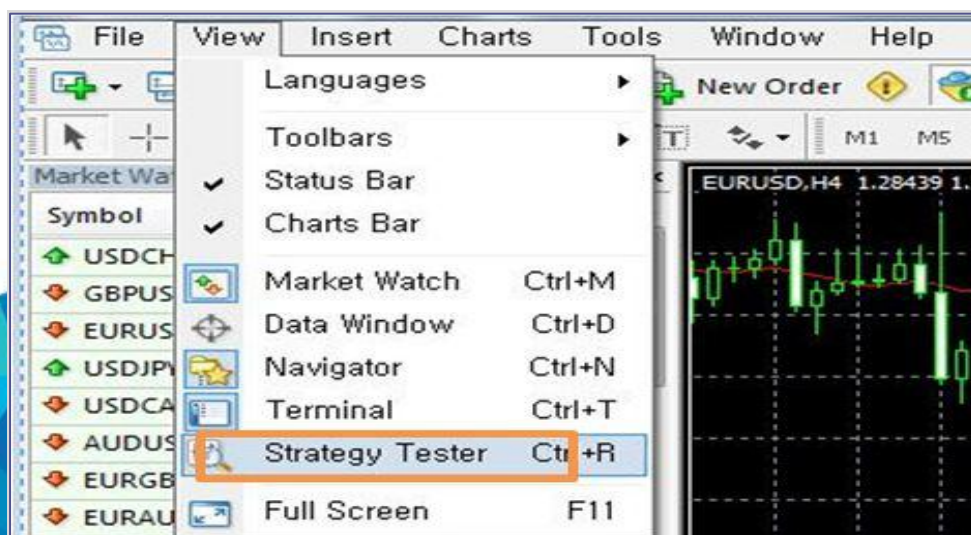
Figure 11: The Tester window appears at the bottom of the MT4 Screen.

1) **Expert Advisor** – select the expert advisors to be tested in the list. The expert advisors must be complied and placed in the /experts director. All newly created expert advisors will be automatically placed in to this directory;
2) **Symbol** – select one of the securities available;
3) **Model** – select the method of bars modeling;
   - Every tick (based on all available least timeframes with fractal interpolation of every tick);
   - Control points (based on the nearest less timeframe with fractal interpolation of 12 control points);
   - Open prices only (fastest method to analyze the bar just completed);
   *Every tick > Control points > Open Prices only (> more high-quality)
4) **Use date** – use range of dates when testing. If this option is enabled, the data from the given range will be used during testing. Otherwise, all available data for the given symbol and period are used;
5) **Period** – select the symbol timeframe.
6) **Visual mode** – enable the mode of the visual displaying the test process on a graph. You can adjust the speed of the testing visualization using the lever located to the right. You can also specify a date in the "Skip to (9) field to skip visualizing the test till that date. Pause(14) ||, Play(15) >>
7) **Optimization** – enable the parameters optimization mode. More details about expert parameters optimization can be found in the section of the same name;
8) **Expert properties** – open the "Expert Properties" window that allows to manage the expert parameters when testing and optimizing;
9) **Symbol properties** – view the symbol parameters. These data are given in the *.FXT file heading and used to emulate the server operation;
10) **Open chart** – create a new chart window for the symbol selected for testing. When being tested, the expert advisor works with a virtual chart. Signs of opening and closing of positions, objects and indicators used by the expert, are imposed in this chart. This chart can be opened only after the expert advisor has been tested. For opening of a virtual chart, the TESTER.TPL template is used, and, if it is not available, the default settings are used. You can also give a template the same name as that of an Expert Advisor. In this case, that exact template will be used when opening the chart of the Expert Advisor;
11) **Modify expert** – open the "MetaEditor" and start to edit the selected expert. This is useful if there is a need to introduce small changes and recompile the expert fast;
12) **Start** – start testing or optimization. After this button has been pressed, one can estimate the speed of testing or optimization in progress bar in the lower part of the window. After the testing has been started, the "Start" button will be replaced with the "Stop" button. Having pressed this button during testing/optimization, one can stop the process.
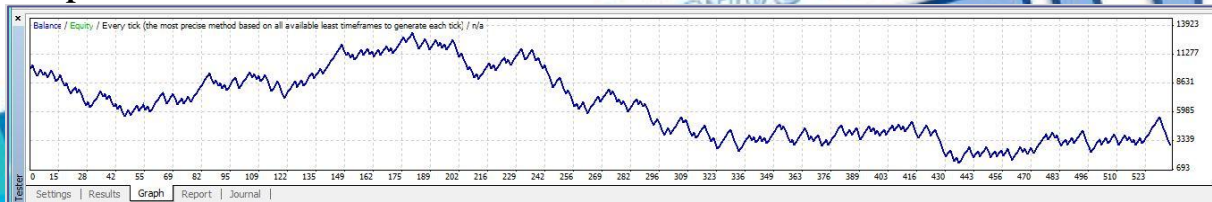
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c. Strategy Tester Report

After testing, you can see the result.

See images below.

-Result

#	Time	Type	Order	Size	Price	S / L	T / P	Profit	Balance
1	2010.01.07 00:02	buy	1	1.00	1.44144				
2	2010.01.07 00:03	modify	1	1.00	1.44144	1.43644	1.44444		
3	2010.01.07 00:30	t/p	1	1.00	1.44444	1.43644	1.44444	300.00	10300.00
4	2010.01.07 00:30	buy	2	1.00	1.44461				
5	2010.01.07 00:30	modify	2	1.00	1.44461	1.43961	1.44761		
6	2010.01.07 02:48	s/l	2	1.00	1.43961	1.43961	1.44761	-500.00	9800.00
7	2010.01.07 04:13	buy	3	1.00	1.44143				
8	2010.01.07 04:13	modify	3	1.00	1.44143	1.43643	1.44443		

Settings | Results | Graph | Report | Journal |

-Graph

Balance / Equity / Every tick (the most precise method based on all available least timeframes to generate each tick) / n/a

Settings | Results | Graph | Report | Journal |

-Report

Bars in test	13747	Ticks modelled	29510528	Modelling quality	n/a
Mismatched charts errors	102				
Initial deposit	10000.00				
Total net profit	-7000.00	Gross profit	97500.00	Gross loss	-104500.00
Profit factor	0.93	Expected payoff	-13.11		
Absolute drawdown	8885.00	Maximal drawdown	12349.00 (91.72%)	Relative drawdown	91.72% (12349.00)
Total trades	534	Short positions (won %)	0 (0.00%)	Long positions (won %)	534 (60.86%)
		Profit trades (% of total)	325 (60.86%)	Loss trades (% of total)	209 (39.14%)
	Largest	profit trade	300.00	loss trade	-500.00
	Average	profit trade	300.00	loss trade	-500.00

Settings | Results | Graph | Report | Journal |

*__Modeling quality__ – the quality of ticks modeled during testing, in per cents. Modeling is shown elementarily as a band in the next line of the report. The band can be of one of three colors:
- Gray: this part of available data was not involved into testing;
- Red: modeling was not performed in this space because of missing available data of a less timeframe;
- Green: modeling was performed in this space. And the brighter is the color, the higher modeling quality was.

The report can be copied to the clipboard or saved in the hard disk as an HTML file. To do so, one has to execute the context menu commands of "Copy" and "Copy as Report", respectively. The report can also be copied to the clipboard by pressing of accelerating keys of Ctrl+C.

Strategy Tester Report
Price_Greater_MA_With_Binary[4]
FXCM-USDDemo01 (Build 445)

Symbol	EURUSD (Euro vs US Dollar)		
Period	1 Hour (H1) 2010.01.03 23:00 - 2012.11.21 23:00 (2010.01.01 - 2012.11.22)		
Model	Every tick (the most precise method based on all available least timeframes)		
Parameters	StoplossUse=true; Stoploss=50; TakeprofitUse=true; Takeprofit=30; TrailingstopUse=false; TrailingstopMode=1; Trailingstop=30; Trailingstep=5; ReversecloseUse=false;		

(1) Bars in test	13747	**(2)** Ticks modelled	29510528	**(3)** Modelling quality	n/a

Mismatched charts errors	**102**

(4) Initial deposit	10000.00	**(6)**		
(5) Total net profit	-7000.00	Gross profit	97500.00	**(7)** Gross loss	-104500.00
(8) Profit factor	0.93	**(9)** Expected payoff	-13.11	
(10) Absolute drawdown	8885.00	**(11)** Maximal drawdown	12349.00 (91.72%)	**(12)** Relative drawdown	91.72% (12349.00)

(13) Total trades	534	**(14)** Short positions (won %)	0 (0.00%)	**(15)** Long positions (won %)	534 (60.86%)
		(16) Profit trades (% of total)	325 (60.86%)	Loss trades (% of total) **(17)**	209 (39.14%)
(18) Largest	profit trade	300.00	loss trade **(19)**	-500.00
(20) Average	profit trade	300.00	loss trade **(21)**	-500.00
(22) Maximum	consecutive wins (profit in money)	9 (2700.00)	consecutive losses (loss in money) **(23)**	5 (-2500.00)
(24) Maximal	consecutive profit (count of wins)	2700.00 (9)	consecutive loss (count of losses) **(25)**	-2500.00 (5)
(26) Average	consecutive wins	2	consecutive losses **(27)**	2

Balance / Equity / Every tick (the most precise method based on all available least timeframes to generate each tick) / n/a

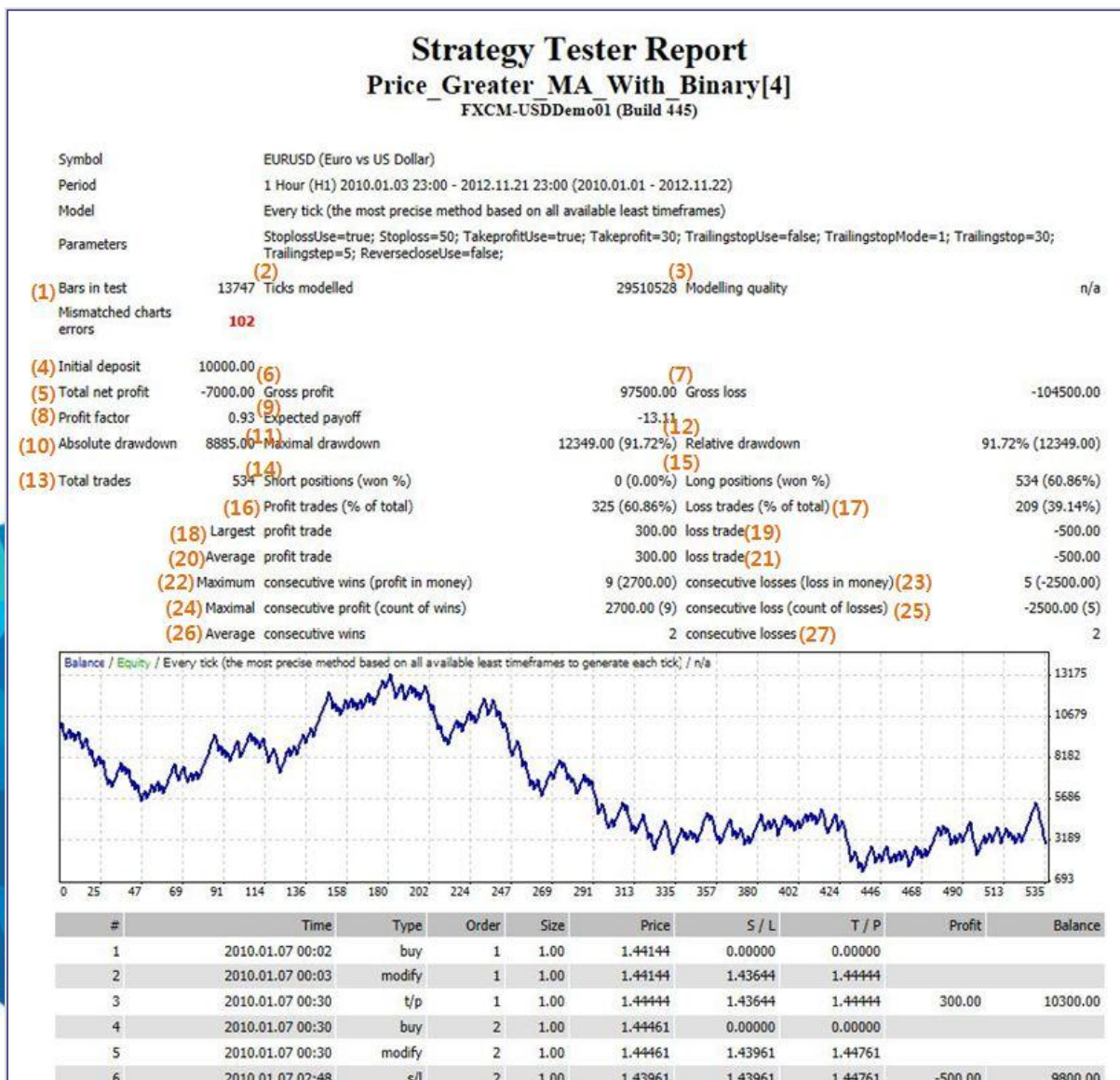| #	Time	Type	Order	Size	Price	S / L	T / P	Profit	Balance
1	2010.01.07 00:02	buy	1	1.00	1.44144	0.00000	0.00000		
2	2010.01.07 00:03	modify	1	1.00	1.44144	1.43644	1.44444		
3	2010.01.07 00:30	t/p	1	1.00	1.44444	1.43644	1.44444	300.00	10300.00
4	2010.01.07 00:30	buy	2	1.00	1.44461	0.00000	0.00000		
5	2010.01.07 00:30	modify	2	1.00	1.44461	1.43961	1.44761		
6	2010.01.07 02:48	s/l	2	1.00	1.43961	1.43961	1.44761	-500.00	9800.00

Figure 12: Strategy Tester Report

1) Bar in test – the amount of history data modeled in bars;
2) Ticks modeled – the amount of ticks modeled;
3) Modeling quality – the quality of ticks modeled during testing, in per cents. Modeling is shown elementarily as a band in the next line of the report. The band can be of one of three colors;
  - Gray: this part of available data was not involved into testing. Gray color can appear if there was a date rage specified in the testing settings;
  - Red: modeling was not performed in this space because of missing available data of a less timeframe. At that, only data of the timeframe selected in the testing settings were used;
  - Green: modeling was performed in this space. And the brighter is the color, the higher modeling quality was. For example, at testing on the H1 period, the deep-green band means that data of M30 period were used for testing, and the brightest one does that M1 data were used;
[If the fastest method ("Open prices only") was selected in the testing settings, the entire band will be red. At that, "n/a" (no modeling was performed) will be written in the "Modeling quality" field;
4) Initial deposit – the amount of initial deposit;
5) Total net profit – financial result of all trades. This parameter represents the difference between "Gross profit" and "Gross loss";
6) Gross Profit – the sum of all profitable trades in monetary units;

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7) Gross loss – the sum of all unprofitable trades in monetary units;

8) Profit factor – the ratio between the gross loss in per cents. One means that these sums are equal;

9) Expected payoff – mathematical expectation of win. This parameter to be calculated statistically represents average profit/loss factor of one trade. It can also be considered as showing the expected profitability/unprofitability of the next trade;

10) Absolute drawdown – the largest loss is below initial deposit value;

11) Maximal drawdown – the largest loss of the local maximum in the deposit currency and in per cents of the deposit;

12) Relative drawdown – the maximal loss in percent of the maximum equity value and its corresponding money value;

13) Total trades – total amount of trade positions;

14) Short positions (won %) – amount of short positions and the profit percentage thereof;

15) Long positions (won %) – amount of long positions and the profit percentage thereof;

16) Profit trades (% of total) – the amount of profitable trade positions and their part in the total trades, in per cents;

17) Loss trades (% of total) – the amount of unprofitable trade positions and their party in the total trades, in per cents;

18) Largest profit trade – the largest profit among all profitable positions;

19) Largest loss trade – the largest loss among all unprofitable positions;

20) Average profit trade – average profit value within a trade (sum of profits divided into the amount of profitable trades);

21) Average loss trade – average loss value within a trade (sum of losses divided into the amount of unprofitable trades);

22) Maximum consecutive wins (profit in money) – the longest series of profitable trade positions and sum of their wins;

23) Maximum consecutive losses (loss in money) – the longest series of unprofitable trade positions and sum of their losses;

24) Maximal consecutive profit (count of wins) – the maximal profit within one series of profitable trades and the corresponding amount of profitable trades;

25) Maximal consecutive loss (count of losses) – the maximal loss within one series of unprofitable trades and the corresponding amount of unprofitable trades;

26) Average consecutive wins – average amount of profitable positions in consecutive profitable series;

27) Average consecutive loss – average amount of unprofitable positions in consecutive unprofitable series.

5. Optimization

Performing this optimization can help traders determine the inputs that have the most favorable results. To set up an optimization, traders must specify which variables will be optimized by clicking on the "Expert properties" button in the Tester window.
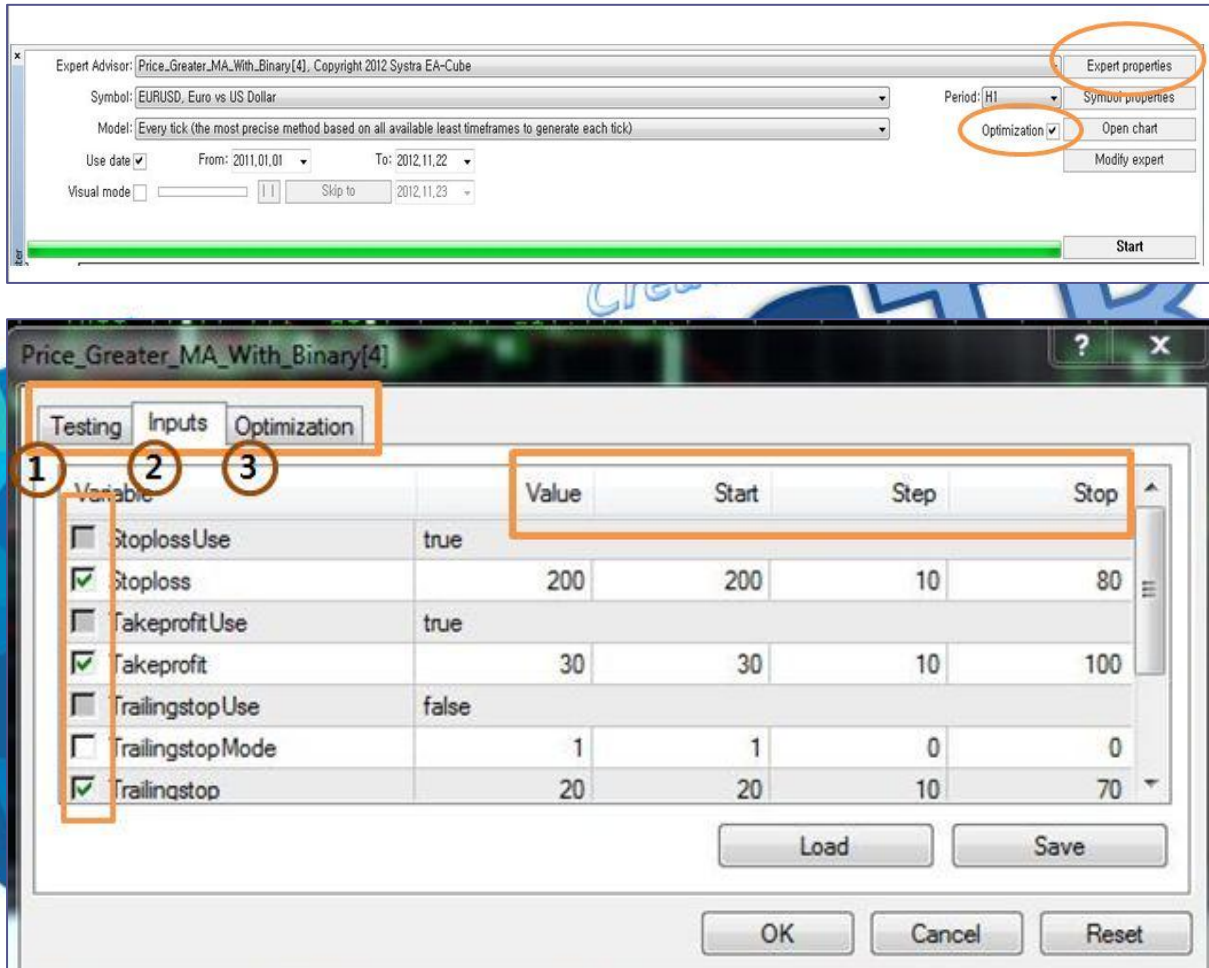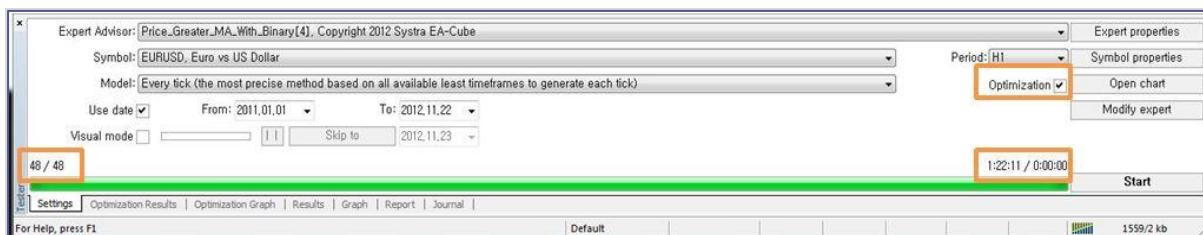

Figure 13: Set the Testing, Inputs and Optimization parameters to perform an optimization.

1) Testing – general optimization parameters
2) Inputs – inputs are variables that affect the Expert's operation. Check to include inputs in the optimization; leave unchecked to disregard during optimization. If checked, double-click in each filed to specify the values for Start (initial value), Step (change interval) and Stop (final value).
3) Optimization – the tab allows traders to apply limitations during optimization will be interrupted. Check to enable a limit condition, such as Profit Maximum and Consecutive Loss.

After making the desired selections, click "OK" to close the window. Be sure the box next to the Optimization field on the Tester window is checked (to enable optimization), and click "Start" to begin the optimization. Optimizations take varying amounts of time depending on the type of data on which the optimization is performed and the complexity of the inputs. In general, multi-variable optimizations – those that test multiple levels of multiple variables – take the longest.

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Optimization Settings

Optimization results

- **Pass:** pass number.
- **Profit:** net profit (gross profit minus gross loss)
- **Total Trades:** total number of trades generated.
- **Profit Factor:** ratio between the total profit and total loss. Values less than one indicate a losing system.
- **Expected Payoff:** mathematical expectation of winning.
- **Drawdown $:** maximum drawdown in relation to the initial deposit.
- **Drawdown %:** maximum drawdown in terms of percentage.
- **Inputs:** dynamic values of inputs during each pass.
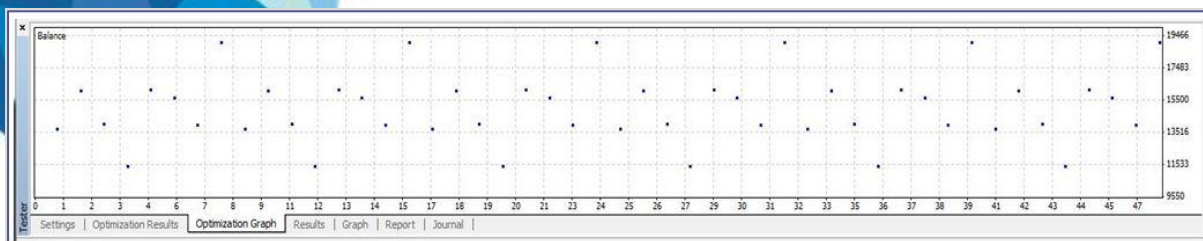
Optimization Graph

6. Expert Advisor Launch

You should now be able to see your Expert Advisor in the "Navigator" window in the bottom left hand corner of your Metatrader 4 platform.
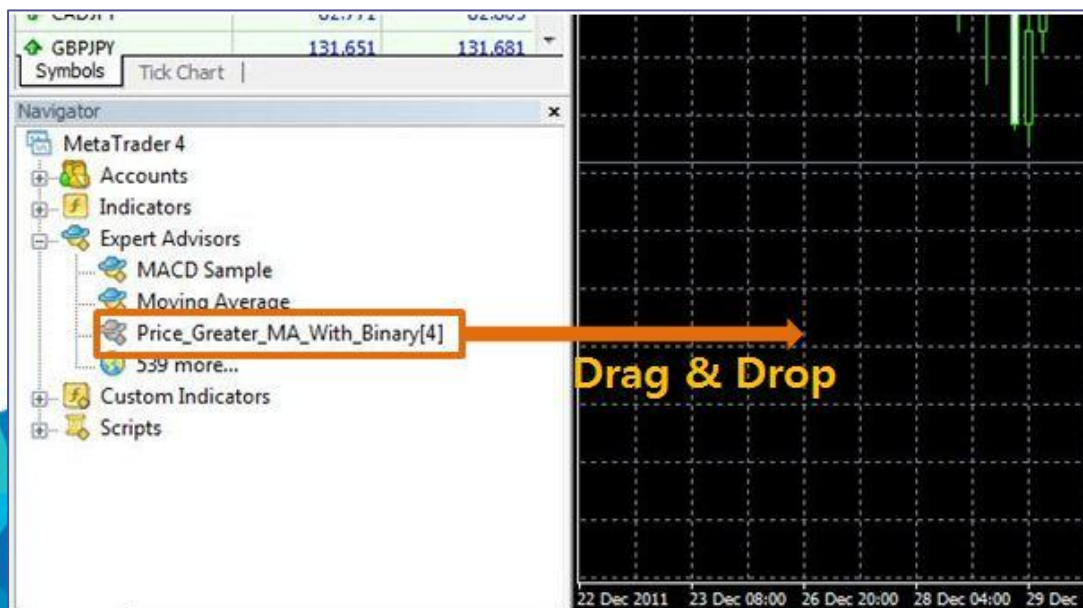

- Right-click on the Expert Advisor in the Navigator – Expert Advisors window and select "Attach to a chart";
- Double-click on the Expert Advisor in the Navigator – Expert Advisors window;
- Drag-and-drop the Expert Advisor to the desired chart.

Select the new EA that you loaded into your MT4 platform and drag in onto the chart of the currency pair that you'd like it to be applied to. It doesn't matter which chart you decide to attach EA to but we recommend to choose the pair that is traded more frequently.

Attach Price_Greater_MA_With_Binary [4] EA to 1 (one) chart only. Do NOT attach it to several charts as it may lead to improper functioning of the auto-trading.
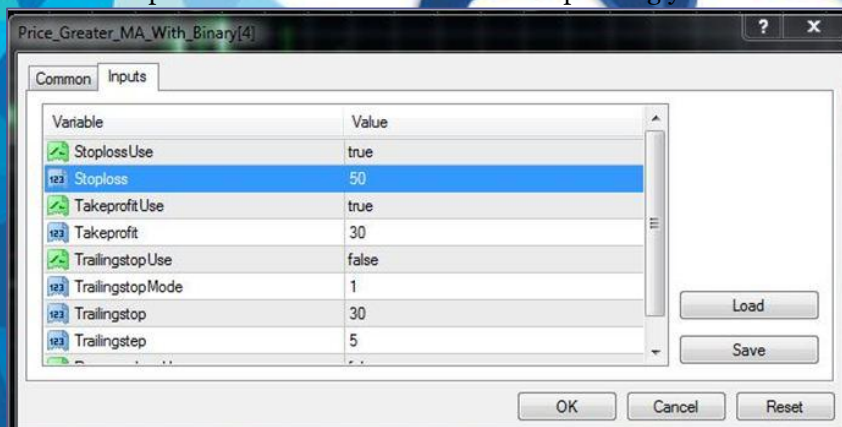
Double click on EA name (Price_Greater_MA_With_Binary[4]) to open EA settings window or Right-click and select Expert Advisors -> Properties

1. Choose Common Tab
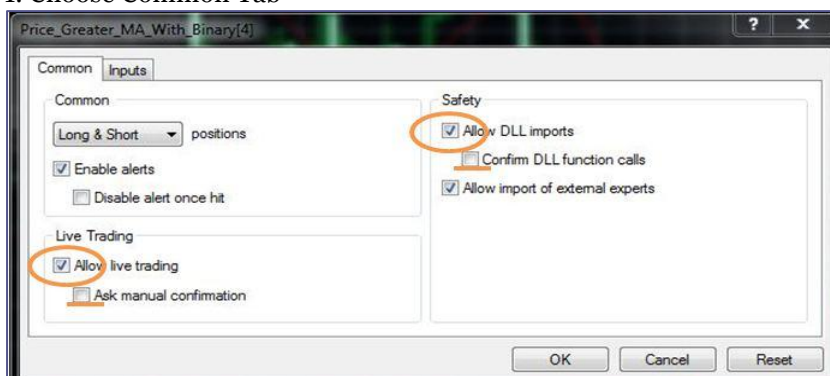
Check "Allow live trading" and "Allow DLL imports"
Uncheck "Ask manual confirmation" and "Confirm DLL function calls"

2. Choose inputs Tab and fill in the fields correspondingly.

Set a variable value which you want to change

3. Press OK to save the settings

Ensure that you have pairs you're planning to auto-trade via Price_Greater_MA_Wiht_Binary[4], selected in the Market Watch window of you MT4 platform

Your EA is now attached to the currency pair on that chart, but is not yet enabled to place trades. In order to activate your EA you must click the "expert advisor" button located to center of the platform. The button should show a green icon when active and a red icon when inactive.

- If you see "Price_Greater_MA_Wiht_Binary [4]" with a smiling face in the right upper corner of the chart, it means that the Expert Advisor is running:

- If you see an unhappy face in the right upper corner of the chart.
(Please go to "Price_Greater_MA_Wiht_Binary [4]" settings and make sure that "Allow live trading" is checked.)

See image below.