



CME GROUP USES ORC TRADING FOR ADVANCED OPTIONS ANALYTICS, FURTHER ENHANCES CUSTOMER SERVICE

INTRODUCTION

CME Group (CME) is the world's largest and most diverse derivatives exchange handling over three billion contracts per year worth more than \$1,000 trillion. CME Group's electronic trading platform, CME Globex®, carries over 80% of CME Group's total volume.

To continue to support this massive amount of trading, which can be as much as 26 million contracts a day, the exchange's CME Globex Control Center (GCC) has added Orc Software's advanced trading platform, Orc Trading, as another tool to price options on futures.

The GCC is the Market Operations and Customer Service desk for trading on CME Globex and handles inquiries, issues and support requests from registered customer contacts for all components of the CME Globex platform. The addition of Orc Trading has provided a reliable tool in helping the GCC derive accurate pricing for options on futures contracts and to provide the services in options valuations its customers demand while handling the increasing trading volumes CME Group generates.

Orc Trading is now one of the software applications the GCC uses to accurately and quickly price thousands of options on futures contracts on U.S. Treasuries, foreign exchange, and equity indexes with volumes of almost 100 million trades per year.

HOW ORC TRADING IS USED

In November 2008, CME Group deployed Orc Trading, which was a novel use of the Orc Trading system as most customers today are those that trade on exchanges like CME Group. Orc's advanced derivatives trading functionality includes numerous

pricing and volatility models, which gives the GCC the flexibility to use the models that most accurately value each instrument. In addition, Orc Trading's volatility management functionality gives the GCC the ability to tune these models to their specifications, ensuring accurate, quick, and easy pricing when analyzing erroneous trades.

Orc Trading helps determine the prices derived by the volatility skews and displays these prices in "tradable ticks" so that the GCC staff can quickly see where

an instrument should be valued. As the markets move, Orc Trading updates the price in these same ticks to make it easy to understand how the market is moving.

CME Group does not take a position on the fair market price of an instrument. Instead, CME Group takes market prices and builds a sophisticated volatility curve to fit these prices. This volatility curve allows CME Group's GCC to see what the value of a given point along that curve should be based on that model. Trades that fall outside a given range around the exchange's "market" price, also known as a "price band", are automatically rejected.

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b#	Bid	Ask	a#	Val.bid	Net	Settl.	T.O. volume
275	822.00	822.25	175		-18.25	840.50	1,087,256
12	818.25	819.00	19		-18.25	837.25	725
23	812.00	818.00	3		-14.50	834.50	3

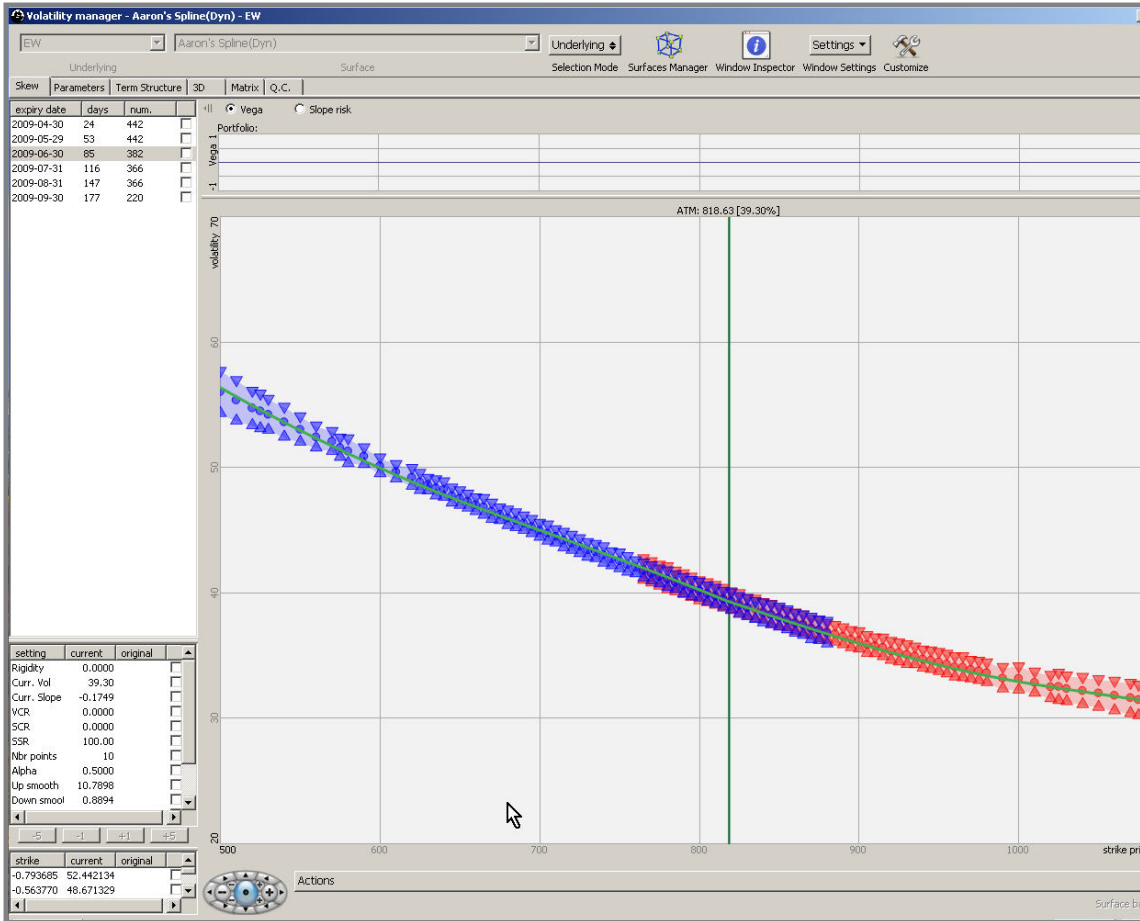
M	~Theor.	M	Ask	a#	Option delta	Settl.	Jun 690 Jun	Settl.	Option delta	b#	Bid	M	~Theor.	M	Ask	a#	ImpV(m)	Act.Vol
	149.00				0.81	165.00	Jun 690 Jun	17.50	-0.19	80	20.25		20.75		21.50	80	45.61	45.46
	145.00				0.80	161.00	Jun 695 Jun	18.75	-0.20	80	21.25		21.75		22.50	80	45.34	45.23
	141.25				0.79	156.50	Jun 700 Jun	19.50	-0.20	80	22.25		22.75		23.50	80	45.04	45.00
	137.25				0.79	152.75	Jun 705 Jun	20.75	-0.21	80	23.25		24.00		24.75	80	44.82	44.77
	133.50				0.78	148.50	Jun 710 Jun	21.50	-0.22	80	24.50		25.00		25.75	80	44.56	44.55
	129.75				0.77	144.75	Jun 715 Jun	22.50	-0.23	80	25.50		26.25		27.00	80	44.26	44.32
	126.00				0.76	140.50	Jun 720 Jun	23.50	-0.24	80	26.75		27.50		28.25	80	44.04	44.09
	122.25				0.75	136.50	Jun 725 Jun	24.50	-0.25	80	28.00		28.75		29.50	80	43.78	43.86
	118.50				0.74	132.75	Jun 730 Jun	25.75	-0.26	80	29.25		30.25		30.75	80	43.48	43.63
	115.00				0.73	129.25	Jun 735 Jun	27.00	-0.27	80	30.75		31.50		32.25	80	43.34	43.40
	111.50				0.72	125.00	Jun 740 Jun	28.00	-0.28	80	32.00		33.00		33.75	80	43.07	43.17
	108.00				0.71	121.75	Jun 745 Jun	29.50	-0.29	80	33.50		34.50		35.00	80	42.77	42.94
	104.50				0.70	117.75	Jun 750 Jun	30.75	-0.30	80	35.00		36.00		36.75	80	42.61	42.70
	101.00				0.69	114.50	Jun 755 Jun	32.25	-0.31	80	36.50		37.50		38.25	80	42.32	42.47
	97.75				0.68	110.50	Jun 760 Jun	33.50	-0.32	80	38.25		39.25		39.75	80	42.09	42.23
3.00	94.25	95.50	1		0.67	107.25	Jun 765 Jun	35.00	-0.33	80	39.75		40.75		41.50	80	41.82	41.99
9.75	91.00	92.25	1		0.66	103.50	Jun 770 Jun	36.50	-0.34	80	41.50		42.50		43.25	80	41.61	41.75
6.50	87.75	89.00	80		0.64	100.00	Jun 775 Jun	38.00	-0.35	80	43.25		44.25		45.00	80	41.35	41.50
3.25	84.75	86.00	80		0.63	96.75	Jun 780 Jun	39.75	-0.37	80	45.00		46.25		47.00	80	41.15	41.26
0.25	81.50	82.75	80		0.62	93.75	Jun 785 Jun	41.75	-0.38	80	47.00		48.00		48.75	80	40.90	41.01
7.25	78.50	79.75	80		0.61	90.50	Jun 790 Jun	43.25	-0.39	80	48.75		50.00		50.75	80	40.62	40.76
4.25	75.50	76.75	80		0.60	87.25	Jun 795 Jun	45.25	-0.40	80	50.75		52.00		52.75	80	40.38	40.51
1.25	72.50	73.75	80		0.58	84.00	Jun 800 Jun	46.75	-0.41	80	53.00		54.00		55.00	80	40.27	40.25
8.50	69.75	71.00	80		0.57	81.00	Jun 805 Jun	49.00	-0.43	80	55.00		56.00		57.00	80	39.96	40.00
5.75	66.75	68.25	80		0.56	78.00	Jun 810 Jun	50.75	-0.44	80	57.25		58.25		59.25	80	39.77	39.74
3.00	64.00	65.50	80		0.55	75.00	Jun 815 Jun	53.00	-0.45	80	59.50		60.50		61.50	80	39.54	39.47
0.50	61.25	62.75	80		0.53	72.00	Jun 820 Jun	54.75	-0.46	80	61.75		62.75		64.00	80	39.35	39.24
7.75	58.75	60.25	80		0.52	69.25	Jun 825 Jun	57.00	-0.48	80	64.00		65.00		66.25	80	39.05	39.03
5.25	56.25	57.50	80		0.51	66.25	Jun 830 Jun	59.00	-0.49	80	66.50		67.50		68.75	80	38.86	38.82
2.75	53.75	55.25	80		0.49	63.75	Jun 835 Jun	61.50	-0.50	80	69.00		70.00		71.25	80	38.64	38.61
0.50	51.25	52.75	80		0.48	60.75	Jun 840 Jun	63.50	-0.52	80	71.50		72.75		74.00	80	38.45	38.40
8.00	49.00	50.50	80		0.47	58.50	Jun 845 Jun	66.25	-0.53	80	74.25		75.25		76.75	80	38.30	38.19
5.75	46.75	48.00	80		0.45	55.50	Jun 850 Jun	68.25	-0.54	80	77.00		78.00		79.50	80	38.12	37.98
3.75	44.50	45.75	80		0.44	53.75	Jun 855 Jun	71.50	-0.56	80	79.75		80.75		82.25	80	37.89	37.77
1.50	42.50	43.75	80		0.43	50.75	Jun 860 Jun	73.50	-0.57	80	82.50		83.75		85.00	80	37.62	37.57
9.50	40.25	41.75	80		0.41	49.00	Jun 865 Jun	76.75	-0.58	80	85.50		86.50		88.00	80	37.48	37.37
7.50	38.25	39.50	80		0.40	46.25	Jun 870 Jun	79.00	-0.60	1	88.25		89.50		91.00	1	37.21	37.17
5.50	36.50	37.75	80		0.39	44.00	Jun 875 Jun	81.75	-0.61	1	91.50		92.50		94.00	1	37.06	36.97
3.75	34.50	35.75	80		0.38	42.00	Jun 880 Jun	84.75	-0.62	1	94.50		95.75		97.25	1	36.88	36.78

Orc Trading window with June E-Mini S&P Options

The key issue for the GCC is both the accuracy of their models in determining the width of the price bands as well as the time it takes to analyze a trade and return a decision. Timing is important both from the trader's perspective, who needs to know exactly where they stand on a trade in order to continue participating in a market, as well as for the GCC, where error trade resolution productivity is important to be able to handle the large trading volumes generated on CME Globex.

Observing CME Group's options markets by the GCC requires a pricing model that is both flexible and robust. This pricing model needs the ability to adapt to changing market conditions in real time. Based on these real-time, trans-

parent, actionable markets, the GCC can derive a volatility skew which is then used to determine fair market option values. CME Group had undertaken this critical challenge in the past using in-house systems. However, with growing trading volumes and the expansion of its markets, the GCC implemented various other tools, including Orc Trading, to help improve their team's productivity in deriving daily settlements with the same accuracy, but with less overall time required. Also, with CME Group customer firms using increasing sophisticated tools for pricing, CME Group needed similar sophistication in their pricing to serve their trading community.



Orc Trading volatility manager with June E-Mini S&P Options

RESULTS

The addition of Orc Trading as one of the tools used within the GCC gave the exchange both time savings for the team as well as the ability to handle the tremendous trading volumes generated. Orc Trading has proven itself capable of handling thousands of instruments simultaneously with real-time, and most importantly, accurate pricing. As CME

Group continues to expand, it can effortlessly scale and add more instruments quickly, easily, and accurately.

CONCLUSION

CME Group's addition of Orc Trading provided numerous benefits to the exchange and its customers. Amid CME Group's continued growth, the need for fast and accurate pricing information can only be expected to grow. With Orc Trading, the exchange has adopted an additional solution that gives them the ability to quickly price the growing numbers of instruments accurately and in real-time. Meeting the needs of their customers is critical and Orc Trading is helping them achieve this goal.



Orc Trading delivers powerful and reliable trading tools for the global financial industry, with strong analytics, automated trading functionality, unmatched liquidity access on 100+ markets, high performance cross-asset trading capabilities, ultra-low latency and risk management for electronically traded derivatives.



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