FUTURE HORIZONS
Presents

The Global Semiconductor Monthly Report

December 2008

Time To Start Planning For The Next Upturn Now

In This Issue:

plus … Exchange Rate Trends & FH Reports & Upcoming Events

Sign Up Now For The Annual Industry Forecast Seminar

January 27, 2009, London, England

(Visit Our Website www.futurehorizons.com or Further Details & Registration)

Future Horizons Ltd, 44 Bethel Road, Sevenoaks, Kent TN13 3UE, England

Tel: +44 1732 740440   Fax: +44 1732 740442

Wholly-Owned Subsidiary In Moscow, Russia. Affiliates In Tokyo, Japan & San Jose, California, USA

www.futurehorizons.com   • e-mail: mail@futurehorizons.com

The Global Semiconductor Monthly Report

December 2008

A **CEO favourite**, the **Global Semiconductor Monthly Report** provides **analysis** and **commentary** on the **global semiconductor industry** and its **impact** on Future Horizons' **semiconductor market forecast**, as published in the **Annual Semiconductor / Semiconductor Application Markets** (previously called Key Market Drivers) **Reports**. These three reports provide a comprehensive in-depth analysis of the worldwide semiconductor, electronics equipment and economic environment. Together they provide the latest information on developments in the semiconductor industry, the companies involved, the changes in the markets, and the impact of the global economic and political situation.

If you like this Report, by all means share it with your colleagues or post it on your company Intranet … but please respect international copyright laws. Site licence available for only £2,200 (€3,3700 / US$4,800) p/a. Please email Future Horizons on "reports@futurehorizons.com".

Future Horizons

www.futurehorizons.com ◊ mail@futurehorizons.com

In Russia Tel/Fax: East-West Electronics +7 (495) 151 4635; e-mail: sorlov@futurehorizons.com
(East-West Electronics is a Wholly-Owned Subsidiary of Future Horizons)

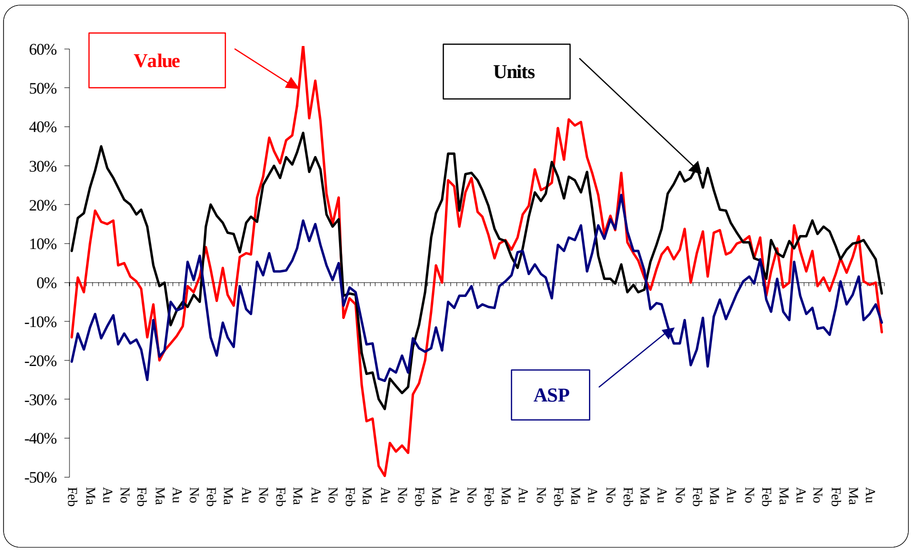
December 2008

Executive Overview

Figure E1 shows the 12/12 worldwide monthly growth rates for IC sales in dollars, units and ASP for January 1997 to October 2008 inclusive. They need to be looked at in conjunction with the other 12/12 and rolling 12-month charts provided in the **Market Summary** section of this report.

October's WSTS data confirmed the slump has hit the semiconductor market, with monthly sales down 10.9 percent versus September, 12.9 percent versus October 2007. We suspect November will be worse, meaning Q4 will now come in less than Q3 and 2008's growth will now too be negative. One cannot also now just blame the beleaguered memory market; the corresponding market growth numbers without memories was down 11.9 and 7.9 respectively. Clearly the market has turned ugly, but it is important to remember that this is a side effect of the worldwide financial problems, not the problem of the industry itself. How long this will last depends on the extent of the global recession, but it's bound to get worse before it gets better … now more than ever is the time to work smarter not give up; the market will rebound, better start planning for that now.

Figure E1 - 12/12 Worldwide IC Monthly Growth Rates



Total IC	Units	ASP	Value
Oct 2008 vs Oct 2007	**-2.8%**	**-10.4%**	**-12.9%**
Oct 2008 vs Sep 2008	**3.5%**	**-13.9%**	**-10.9%**

Source: WSTS/Future Horizons (Growth rates adjusted for 5-week months)

December 2008

The Stench Of 2008

Although warning bells had been chiming since late 2006, the start of the current economic meltdown can be attributed to July 17, 2007 when the New York investment bank Bear Stearns disclosed that two of its large hedge funds had lost nearly all of their value amidst a rapid decline in the market for subprime mortgages. This caused the eventual collapse of the firm and with it the market for so-called ‘debt instruments’ (Emperor’s new clothes or smoke and mirrors to you and I) backed by sub-prime mortgages (i.e. un-sound loans to bad credit risk people) to crack, starting a chain of reactions that have yet to run their course.

Bad as this financial bubble burst was – not just because of its magnitude but also because it laid bare the breathtaking underlying greed and naivety plus moral and political corruptness of people who ought to have known better – it took well over a year for this implosion to spill over into the non-financial markets, with the cost of borrowing barely higher than the pre-crisis levels.

The broader market collapse started on September 16, 2008 when the abrupt bankruptcy of Lehman Brothers investment bank sent shock waves around the world. With investors left reeling, the world’s biggest ever bankruptcy plunged stock markets into turmoil and sparking a cataclysmic shake-up on Wall Street and other world institutions.

Since then, according to Moody’s Investor Services, yields on BAA-rated investment grade bonds have risen by a third whilst yields on equivalent US Treasury bonds have dropped by a quarter. The net result was a 3.2 percentage point increase (from 2.7 to 5.9) in the last three months of 2008 in the extra yield investors needed before they could justify lending to investment-grade companies. The pain for lower grade credit was even worse.

As liquidity came to a standstill, even legitimate businesses struggled to say afloat, undermining global investor confidence still further, not helped by the clearly illegal shenanigans of Bernard Madoff and other charlatans and fraudsters. This triggered a period of slowing world economic growth, a painful but necessary phenomenon to correct the past world imbalances.

The net result is that cash has become more attractive than equity and that equities will not rally until investors buy credit again. These underlying problems are driven by emotion – a lack of belief (confidence) that ‘real markets’ actually have value.

Yet confidence as a measure is inherently unquantifiable, leading to the dangerous cliché in the financial world that ‘everything depends on it’. This in turn leads to a tendency to confuse the superficial – good manners, tailoring, wealth, breeding and appearance – with integrity and intelligence, the age-old conflict between perception versus reality.

While it is not unsurprising that greed and gullibility thrived in an era of cheap money – it is not the first time people and investors have lost huge sums of money chasing unrealistic returns, nor will it be the last – the calibre of investors suckered in this time around was. Never before have so many big financial institutions – the oxymoron of 'smart money' – been caught out so badly.

The net result is a period of slowing world economic growth that has still to run its course, the depth and length of which is impossible to predict, a painful but necessary phenomenon to correct the past world imbalances.

While the extent of the downturn might still be unknown, the process is clear. When the economy collapses, demand for goods slows down causing factory output to fall and expansion plans to be cut. Discretionary spending is also curtailed putting pressure on services as well as suppliers. Unsold stocks rise and selling prices come under pressure putting a real squeeze on corporate cash flow and profits.

If demand falls far enough, layoffs and closures are inevitable causing demand to fall even further. When an employee is laid off or feels their job insecure, the last thing they do is to buy a new car or state-of-the-art TV, putting even more pressure on factory output as consumers also stop spending.

Demand eventually bottoms out and a new equilibrium between supply and demand is established. Because inventory also has to adjust to the lower production levels, factory orders fare more badly than demand driven by the relationship units ordered equals units required minus inventory burn. Thus during the downward spiral, factory orders always understate real demand.

At the point of stabilisation, factory closures and layoffs abate causing a new level of comfort to return to the market. Factory orders eventually start to increase, to compensate for the fact the inventory adjustment is now zero, with a corresponding return in confidence to those still in employment who no longer now feel their jobs under threat.

Consumer spending starts to rise, increasing demand on the factories and so commencing the start of the new upward cycle. Factory orders now start to exceed real demand as inventory levels rise to accommodate the increase in demand, with units ordered now equal to units required plus inventory build. If demand increases enough, factories start to expand, hiring returns and eventually new factories are built. An ensuing positive expansion spiral so commences.

December 2008

Just as the news will always sound the most bullish at the top, it also appears the most hopeless at the bottom. This is what makes market bottoms more confusing. But they are always preceded by an 'accumulation phase', where the smart money is building positions and are typically marked by reactions, crosscurrents, shakeouts and false reversals. We are precisely at this juncture entering 2009.

With fear and suspicion having now displaced greed, every asset (and all companies) is now being treated with the same unilateral rejection. Clearly just as assets (and companies) were optimistically overvalued, this situation too is equally unrealistic; an upward correction is inevitable once the first few investors realise some companies are significantly undervalued. This will be driven in part by the record amount of money sitting in bonds and cash and the fact that investors have relatively short memories; at some point in time, greed will again overcome fear.

The current recession is especially unnerving given the length and scale of the good times that preceded it. This is further exasperated by the fact that much of the good times were 'living beyond our means', fuelled by debt, asset liquidation, unrealistically large profits and bonuses, especially in the financial community, not by real wealth and GDP creation.

Having clearly lived beyond our means, there is a powerful school of thought that counsels a recession is necessary to liquidate the malaise. On the face of it this seems to be the 'correct' free market solution with the added benefit of preaching good economic morality (as you sow so you shall reap), along with perhaps a few public hangings of feckless investment bankers. It is not. It is also not a sound formula for rebuilding prosperity.

In a crisis the so-called paradox of thrift means that demand will not simply fall back to the desired level of sustainability, assuming one even knew what this demand level actually was, but would tend to overshoot. Put simply, if all markets dry up simultaneously, economic activity would crumble and economies would slide into a low-employment, low-growth equilibrium, i.e. a slump.

This is precisely why governments are embarking on a strategy of supporting demand with loosened monetary and fiscal policy. The problem here is that these tactics are like slow working blunderbusses; they do not respond quickly nor allow for fine-tuning. The second problem is different governments have different detailed strategies, partly because one size does not fit all and partly because of different political (and social) objectives.

While no historic parallel can ever be perfect, the repercussions for the chip industry this time around are especially uncertain, although clearly IC unit demand will track the global economic slowdown

December 2008

Falling unit demand will also temporarily trigger excess capacity, which in turn will force prices down to variable cost levels as factories struggle to keep the fabs loaded, 'whatever the cost'. Under such circumstances:

- Business can, and should, fail, a lot of firms are quite simply badly run; those with sound strategies will survive, those without do not deserve to in a capitalist market
- Politicians should resist the temptation to subsidise existing players, their troubles are symptomatic of a failed business model, not the market crunch; although the political pressures to do so will prove irresistible
- Governments should work internationally together to sustain global demand, although our deep fear here is that longer-term agendas for global supremacy may again prove too irresistible

On this latter point, we have a serious nagging doubt that when tomorrow's history books eventually get written, they will reveal we are currently living through World War 3, this time being fought at the economic not munitions level.

Interestingly, while politicians seem clear on the threat to national security caused by an oil supply disruption, a surge in oil prices or when a gas supply line is deliberately turned off, they are currently oblivious to the potential long-term GDP threat caused by the loss of manufacturing to SE Asia or to the possible impact on the OEM supply chain by a politically-motivated interruption in the supply of leading-edge chips.

Opinions differ as to how long and deep the global slowdown will be; what is clear is that a battered banking system and shell-shocked consumers will play havoc with many businesses. This means it is currently impossible to predict when the green shoots of recovery will start, but start they eventually will and, given the extend and abruptness of the Q4 decline, an overshoot is inevitable and the recovery process faster coming, possibly even as early as the second half of 2009. In the meanwhile:

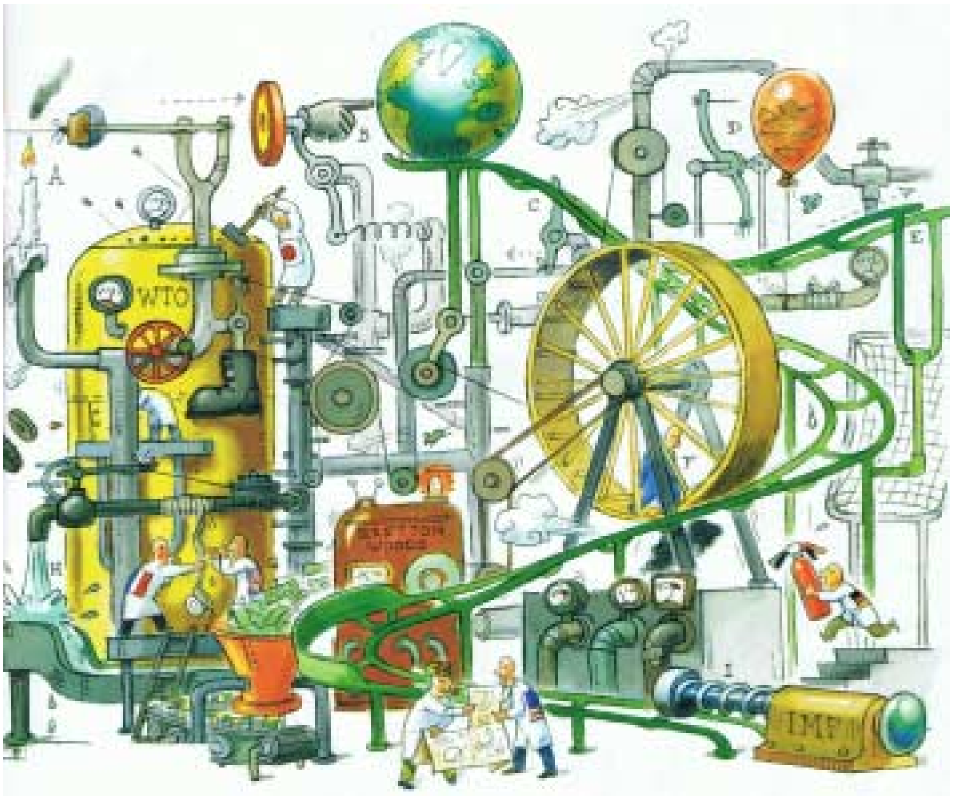
- It will still be some time before banks start to lend freely again, but lend again they will once the dust finally settles.
- Technology and innovation will again drive the recovery process, with demand stimulated by new feature-rich products and 'extras' given away for free.
- As for the economic fundamentals, 2009 will be a year of austerity as companies and consumers rein in their debts. Companies and countries would do well to focus on expanding GDP via real wealth creation and not via sleight of hand.

December 2008

In other words, the recovery cannot start until the credit crunch ends, banks start to lend money, borrowers start to borrow and the cash flow gains momentum. Consumers and business cannot buy goods and services if no-one will finance their needs.

With this factor in mind, the world's global finance system needs mending; these are the issues we would like to see addressed.

Figure E2 - Redesigning Global Finance



Source: Economist/Future Horizons

Dear Santa … please would you:

1. Repeal Sarbanes-Oxley (SOX) – it was an overkill to stop major corporate and financial accounting scandals such as those affecting Enron, Tyco International, Adelphia, Peregrine Systems and WorldCom, yet it completely failed to catch the most recent financial abuses. What it has done though is to make western management risk adverse, which in turn is stifling innovation in

the chip and IT business, severely disadvantaging them against their Asian competitors.

2. Set up a tax and political environment that encourages risk and reward sharing in the disaggregated supply chain to replace the current adversarial and selfish ‘squeeze the relationship’ regime.
3. Strengthen the role of the Chairman and non-execs to make sure long-term plans are not penalised for short-term gains.
4. Set up an investment environment that penalises the current quarterly reporting fervour in favour of an investment and corporate reporting structure that rewards long-term planning, not short-term opportunism.
5. Mandate companies report quarterly on their 1-year operational, 2 to 3-year tactical and 5-year strategic plans and force Wall Street and other financial markets to make buy/sell/hold recommendations based on the balance of these objectives, not just the next quarter’s financial results.
6. Set up a tax system that discourages the stock market gambling culture by penalising profits made on short-term positions.
7. Set up a tax system that allows firm to set profits aside for a future rainy day rather than tax everything immediately.
8. By all means have bonuses but set up a system that rewards those linked to losses as well as profits such that failures and feckless risk taking caries a direct personal risk not just simply reward.
9. Set up a system that encourages counter-cyclical investment in R&D, capital expansion and new business development.
10. Set up a system that encourages a long term manufacturing strategy rather than favouring near-term offshore outsourcing.

And for industry, please get back to business basics; build quality products that people can afford, ergonomically designed with a positive user experience. What you can get away with in an easy-come, easy-go world is no longer acceptable in today’s frugal environment. Customers will buy new products, but they want quality not tat. Let 2009 be the year of industrial design.

December 2008

Market Summary

Figures M1 and M2 show the worldwide and European 12/12 industry growth rates for ICs, Opto, and Discrete Devices from January 1998 to date. These show the current month as compared with the same period 12 months ago, and are a useful industry momentum indicator. Figures M3a-M3h show 15-month rolling worldwide and European sales by major product category. Figure M4a-M4h show the comparable worldwide unit and ASP trends.

Figure M1 - World Sales By Product Category 12/12 Growth Rate

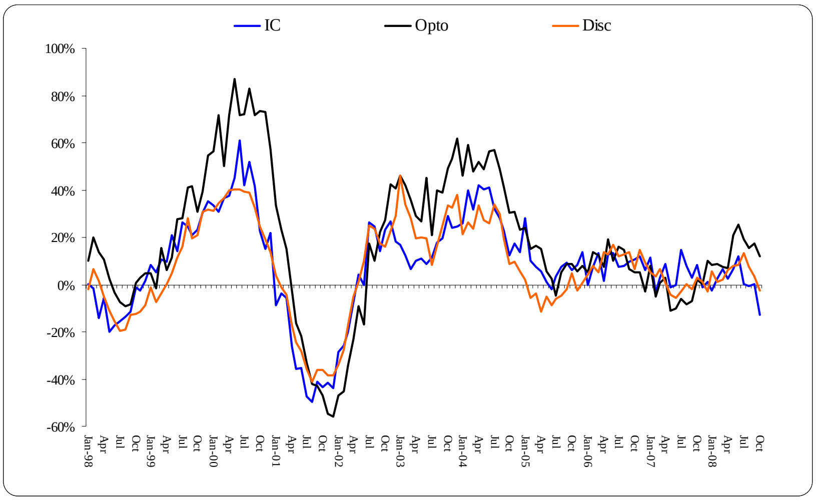
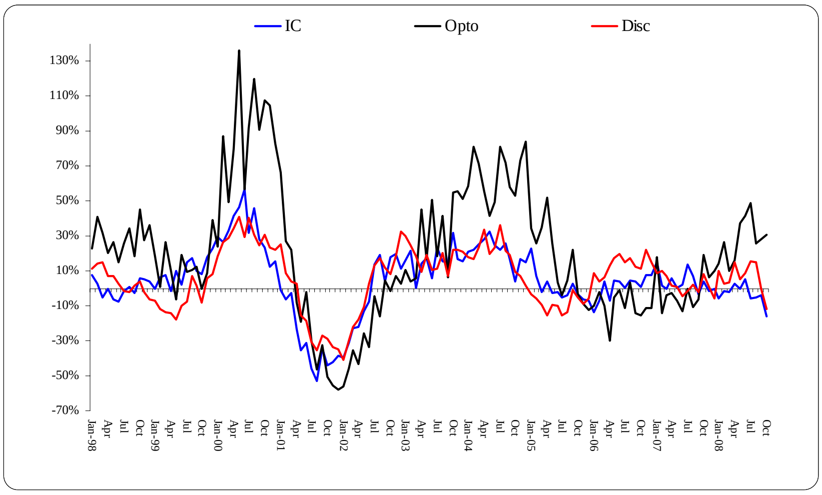


Figure M2 - Europe Sales By Product Category 12/12 Growth Rate



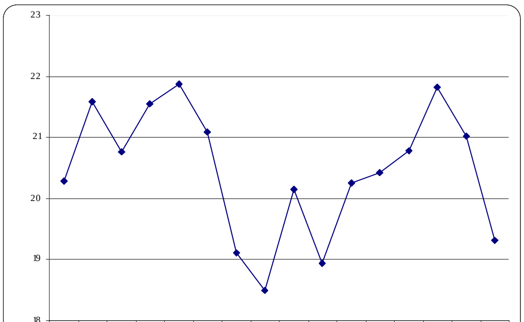
Source: WSTS/Future Horizons

December 2008

Figure M3 - 12 Month Rolling Worldwide & Europe Sales By Product

(Billions Of US$)

M3a - Total WW Semiconductor

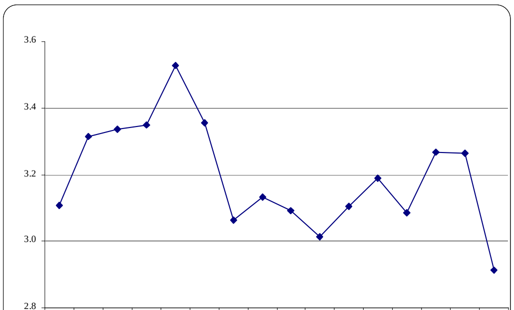


	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct
Total SC	20.281	21.583	20.758	21.546	21.871	21.084	19.111	18.499	20.157	18.932	20.250	20.416	20.785	21.827	21.023	19.309

Oct 2008 vs Oct 2007 **-10.4%**

Oct 2008 vs Sep 2008 **-8.2%**

M3b - Total Europe Semiconductor

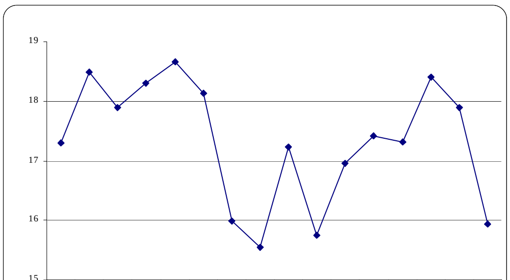


	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct
Total SC	3.107	3.313	3.335	3.348	3.527	3.354	3.063	3.132	3.091	3.013	3.106	3.190	3.086	3.267	3.264	2.913

Oct 2008 vs Oct 2007 **-13.0%**

Oct 2008 vs Sep 2008 **-10.7%**

M3c - Total WW IC

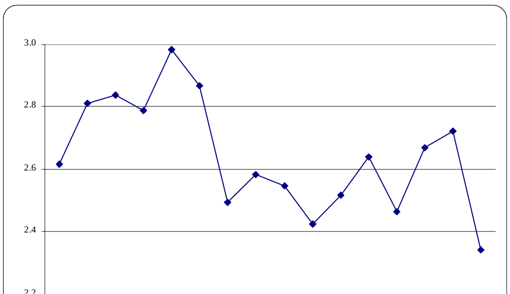


	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct
Total IC	17.290	18.486	17.887	18.308	18.663	18.126	15.991	15.542	17.226	15.743	16.963	17.419	17.322	18.397	17.895	15.944

Oct 2008 vs Oct 2007 **-12.9%**

Oct 2008 vs Sep 2008 **-10.9%**

M3d - Total Europe IC



	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct
Total IC	2.617	2.811	2.838	2.788	2.983	2.866	2.495	2.585	2.548	2.423	2.516	2.640	2.466	2.671	2.723	2.343

Oct 2008 vs Oct 2007 **-16.0%**

Oct 2008 vs Sep 2008 **-14.0%**

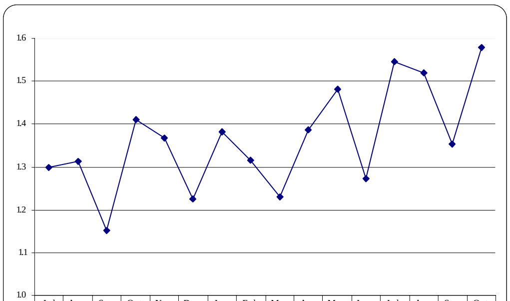
Source: WSTS/Future Horizons (Growth rates adjusted for 5-week months)

December 2008

Figure M3 - 12 Month Rolling Worldwide & Europe Sales By Product (Cont)

(Billions Of US$)

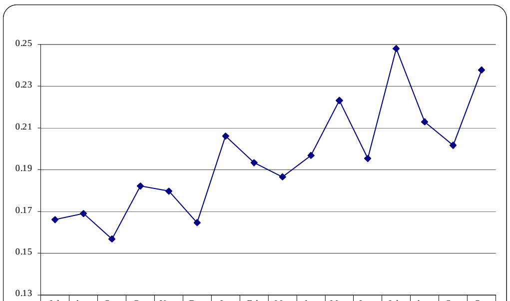
M3e – Total WW Optoelectronics



	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct
Opto	1.298	1.314	1.152	1.409	1.367	1.224	1.383	1.315	1.230	1.387	1.481	1.273	1.546	1.518	1.353	1.579

Oct 2008 vs Oct 2007 12.1%
Oct 2008 vs Sep 2008 16.7%

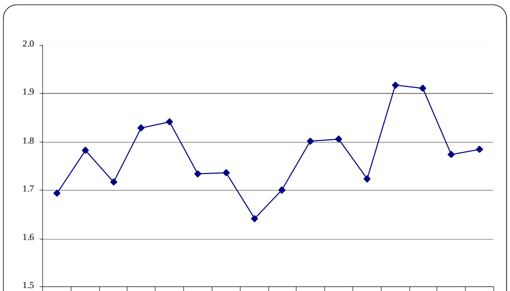
M3f – Total Europe Optoelectronics



	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct
Opto	0.166	0.169	0.157	0.182	0.180	0.164	0.206	0.193	0.187	0.197	0.223	0.195	0.248	0.213	0.202	0.238

Oct 2008 vs Oct 2007 30.6%
Oct 2008 vs Sep 2008 17.9%

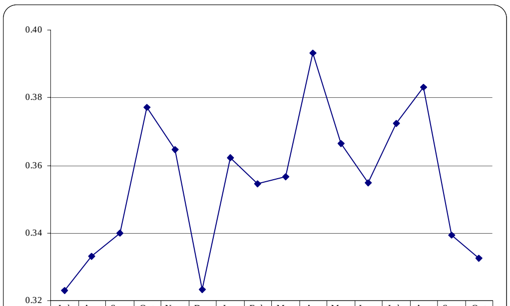
M3g – Total WW Discretes



	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct
Discrete	1.694	1.783	1.718	1.829	1.841	1.733	1.737	1.642	1.701	1.802	1.806	1.724	1.917	1.912	1.774	1.785

Oct 2008 vs Oct 2007 -2.4%
Oct 2008 vs Sep 2008 0.6%

M3h – Total Europe Discretes



	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct
Discrete	0.323	0.333	0.340	0.377	0.365	0.323	0.362	0.354	0.357	0.393	0.366	0.355	0.372	0.383	0.339	0.333

Oct 2008 vs Oct 2007 -11.8%
Oct 2008 vs Sep 2008 -2.0%

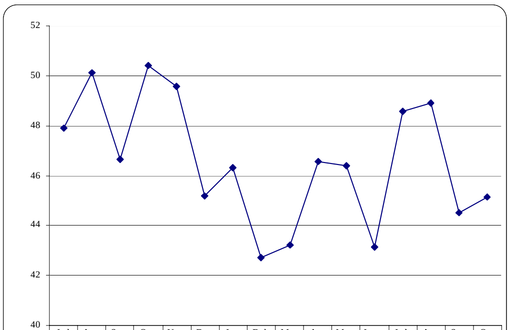
Source: WSTS/Future Horizons (Growth rates adjusted for 5-week months)

December 2008

Figure M4 - 12 Month Rolling Worldwide Unit Sales & ASPs By Product

(Units In Billions & ASP In US$ Dollars)

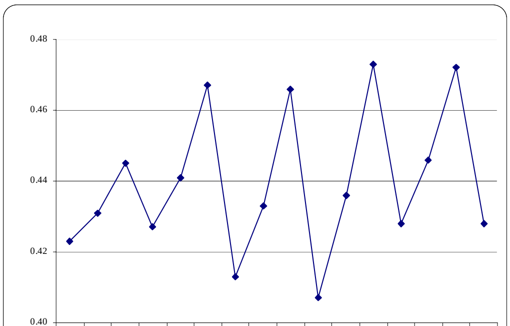
M4a – Total Semiconductor Units



	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct
Total SC	47.921	50.132	46.644	50.402	49.581	45.192	46.323	42.718	43.223	46.549	46.410	43.128	48.561	48.918	44.522	45.132

Oct 2008 vs Oct 2007	**-10.5%**
Oct 2008 vs Sep 2008	**1.4%**

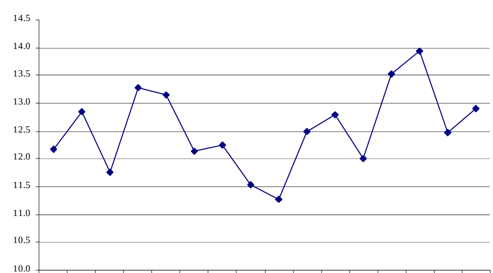
M4b – Total Semiconductor ASP



	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct
Total SC	0.423	0.431	0.445	0.427	0.441	0.467	0.413	0.433	0.466	0.407	0.436	0.473	0.428	0.446	0.472	0.428

Oct 2008 vs Oct 2007	**0.2%**
Oct 2008 vs Sep 2008	**-9.3%**

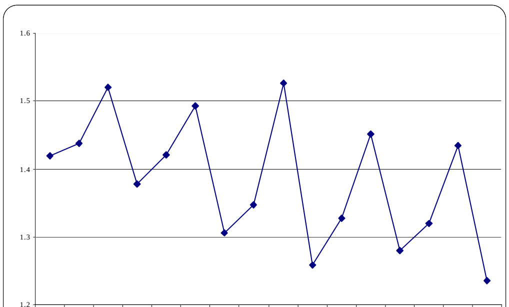
M4c – Total IC Units



	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct
Total IC	12.183	12.856	11.761	13.282	13.147	12.146	12.256	11.539	11.278	12.502	12.786	12.004	13.530	13.945	12.477	12.913

Oct 2008 vs Oct 2007	**-2.8%**
Oct 2008 vs Sep 2008	**3.5%**

M4d – Total IC ASP



	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct
Total IC	1.419	1.438	1.521	1.378	1.420	1.492	1.305	1.347	1.527	1.259	1.327	1.451	1.280	1.319	1.434	1.235

Oct 2008 vs Oct 2007	**-10.4%**
Oct 2008 vs Sep 2008	**-13.9%**

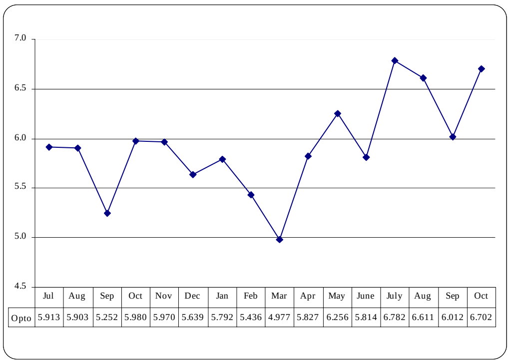
Source: WSTS/Future Horizons (Growth rates adjusted for 5-week months)

December 2008

Figure M4 - 12 Month Rolling Worldwide Unit Sales & ASPs By Product (Cont)

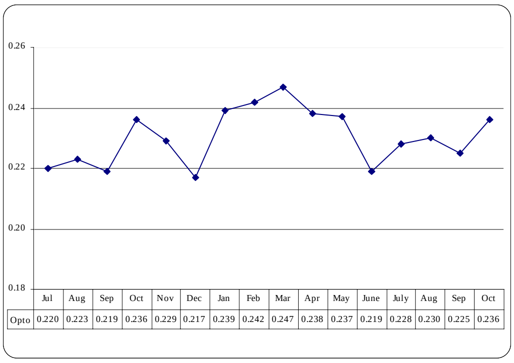
(Units In Billions & ASP In US$ Dollars)

M4e - Total Optoelectronics Units



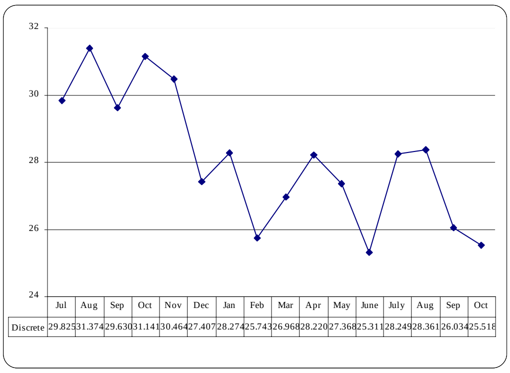
Oct 2008 vs Oct 2007 12.1%
Oct 2008 vs Sep 2008 11.5%

M4f - Total Optoelectronics ASP



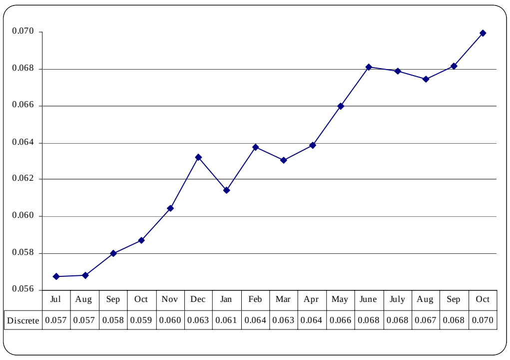
Oct 2008 vs Oct 2007 0.0%
Oct 2008 vs Sep 2008 4.9%

M4g - Total Discretes Units



Oct 2008 vs Oct 2007 -18.1%
Oct 2008 vs Sep 2008 -2.0%

M4h - Total Discretes ASP



Oct 2008 vs Oct 2007 19.1%
Oct 2008 vs Sep 2008 2.7%

Source: WSTS/Future Horizons (Growth rates adjusted for 5-week months)

December 2008

Cowan LRA Report

Created by Mike Cowan, the Cowan Linear Regression Analysis (LRA) model naturally compliments Future Horizons' more interpretive methodology, and the two forecast approaches provide readers with a unique and balanced perspective. The latest run, based on October's 2008 WSTS global semiconductor sales of $19.309 billion, has produced a forecast for global sales for 4Q08 through 4Q09 plus a forecast for November 2008, Table L1. Newly calculated growth forecasts for 4Q08 (and 2008), plus 1Q-4Q09 (and 2009) are shown in Table L2. Also included in this table is an actual and 3-month moving average (3MMA).

Table L1 – Global Semiconductor Sales Forecast Estimates

Time Period	Prev Month's Estimate ($b)	This Month's Estimate ($b)	% Change
Oct08 Est.	21.962	19.309	-12.1%
Oct08 3MMA Est.	23.359	22.471	-3.8%
Nov08 Est.	NA	22.863	NA
Nov08 3MMA Est.	NA	22.817	NA
3Q08 Est.	68.900	68.891	0.0%
4Q08 Est.	70.400	67.111	-4.7%
2H08 Est.	**140.650**	**139.300**	**-1.0%**
2008 Est.	**266.809**	**263.510**	**-1.2%**
1Q09 Est.	67.351	66.473	-1.3%
2Q09 Est.	67.681	66.785	-1.3%
1H09 Est	135.032	133.259	-1.3%
3Q09 Est.	73.676	72.689	-1.3%
4Q09 Est.	77.596	76.719	-1.1%
2009 Est.	**286.306**	**282.667**	**-1.3%**

Table L2 - Sequential & Annual Revenue Growth Rates

Qtr - To - Qtr Period	Sep Est SRG (%)	Oct Est SRG (%)
3Q08 Est => 4Q08 Est	2.2%	-2.6%
4Q08 Est => 1Q09 Est	-4.3%	-0.9%
1Q09 Est => 2Q09 Est	0.5%	5.0%
2Q09 Est => 3Q09 Est	8.9%	8.8%
3Q09 Est => 4Q09 Est	5.3%	5.5%

Yr - To - Yr Period	Sep Est YoY (%)	Oct Est YoY (%)
4Q07 Act => 4Q08 Est	5.3%	0.4%
2H07 Act => 2H08 Est	3.4%	1.0%
2007 Act => 2008 Est	**4.4%**	**3.1%**
1Q08 Act => 1Q09 Est	7.2%	5.8%
2Q08 Est => 2Q09 Est	4.6%	3.2%
1H08 Est => 1H09 Est	5.9%	4.5%
3Q08 Act => 3Q09 Est	6.9%	5.5%
1Q-3Q08 Act => 1Q-3Q09 Est	6.3%	49.0%
4Q08 Act => 4Q09 Est	10.2%	14.3%
2008 Act => 2009 Est	**7.3%**	**7.3%**

Source: WSTS/Cowan LRA/Future Horizons

December 2008

Figure L1 – Market Momentum Indicator

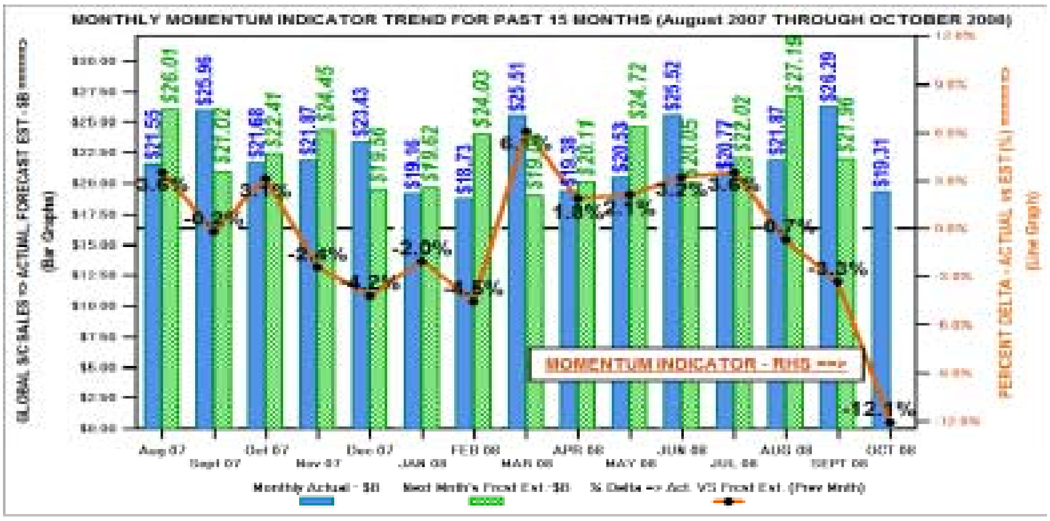
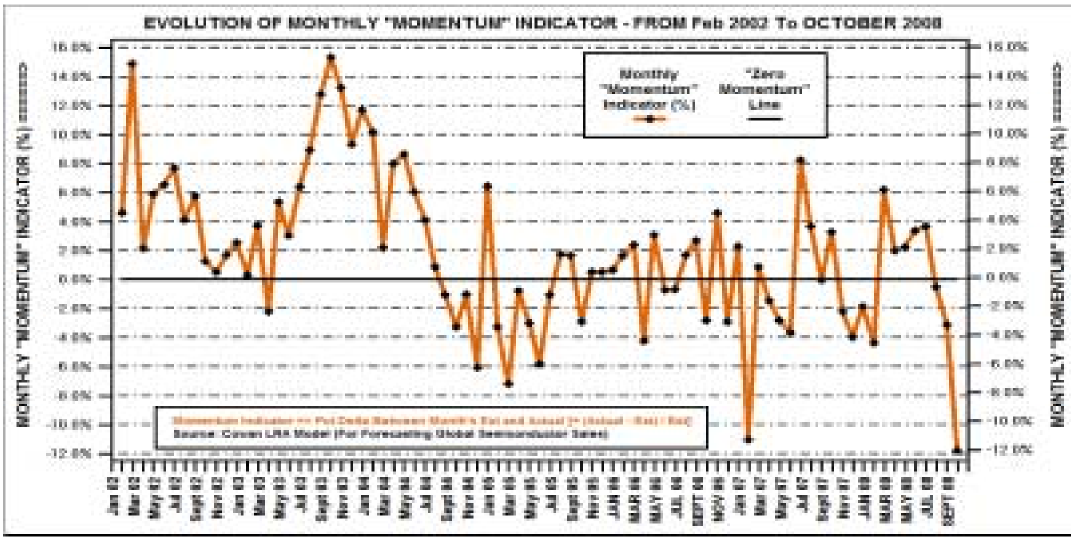


Figure L2 - Monthly Momentum Indicator, 2002-2008 YTD



Source: WSTS/Cowan LRA/Future Horizons

December 2008

This month's momentum indicator decreased substantially to minus 12.1 percent from last month figure of minus 3.3 percent, as can be seen from Figure L1 above.

As a result, as shown in Table L2 above, the updated global semiconductor sales forecast estimates changed from last month's calculated forecast estimates to:

- 4Q08 now minus 2.6% (down 4.8 points from plus 2.2 percent)
- 1Q09 now minus 0.9% (up 3.4 points from minus 4.3 percent)
- 2Q09 now plus 0.5% (no change from plus 0.5 percent)
- 3Q09 now plus 8.8% (down 1.1 points from plus 9.9 percent)
- 4Q09 now plus 5.5% (up 0.2 points from plus 5.3%)

October's decrease in the momentum indicator – the most negative value seen over the past six years – is an indication that the sales growth rate trend over the near-term will continue to fall.

Next month's global semiconductor sales forecast estimate, namely for November 2008, is projected to be $22.863 billion. This yields a November 2008 3MMA (three Month Moving Average) sales forecast estimate of $22.817 billion, which is normally reported by the SIA in its monthly press release.

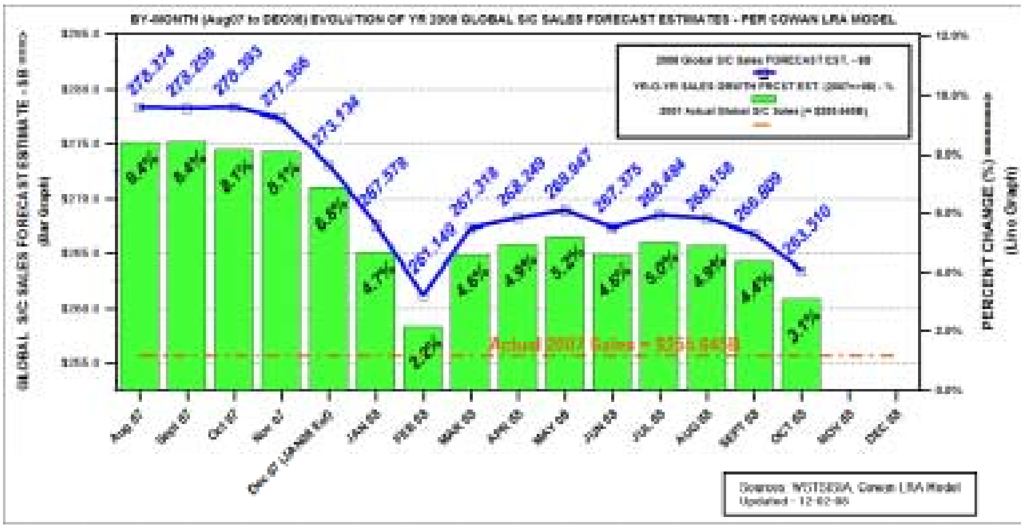
This month's updated year-over-year sales growth forecast estimate for 2008 - compared to 2007's final global semiconductor sales of $255.645 billion – comes in slightly lower at plus 3.1 percent, compared with last month's estimate of 4.4 percent.

Figure L1 shows the rolling 15-month momentum indicator trend, whereas Figure L2 shows the year-to-date monthly indicator trend since January 2002. The momentum indicator is defined as the percent difference between the actual sales number for a given month and the forecasted sales estimate calculated the previous month. This indicator can be either positive or negative and is a measure of the deviation of the actual monthly sales number from the model's prediction based upon 23 years of past historical results. When the momentum indicator is positive, it indicates that the growth vector is increasing.

Finally, Figure L3 below shows the evolution of the past sales forecast estimates for 2008 over the previous seven months starting from the model's first prediction for 2008, namely with the August 2007 sales number which was released back in the beginning of October 2007. Typically July through September's forecast results are reasonably good proxies for the entire year's sales number, with the prediction improving with each subsequent month's forecasts.

December 2008

Figure L3 - 2008 Forecast Evolution



Source: WSTS/Cowan LRA/Future Horizons

Whilst the monthly global sales number published by the WSTS is a "lagging indicator", since it is published a full month after the fact, each month the Cowan LRA Model "turns" this lagging sales number into a "leading indicator" since its forecast horizon covers the next five quarters. It is this unique feature that makes the model dynamic, since it is updated each month with the latest sales data, allowing forecast revisions over the course of the year, Table L3.

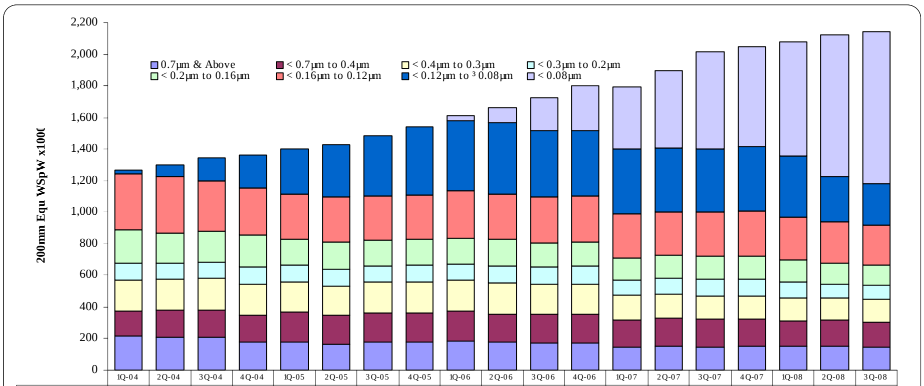
The Cowan LRA Model for forecasting global semiconductor sales is a statistically based model exploiting linear regression analysis of the past 24 years of historical monthly revenue results as published by the SIA. It is a mathematically-pure view of forecasted worldwide semiconductor sales looking out over the next five quarters. Linear regression techniques are utilized on the "appropriately transformed" monthly sales numbers thereby rendering the sales data highly linear and, therefore, very amenable to linear regression analysis. The numerical transformation (of the 24 years of monthly sales data -- from 1984 to 2007) that is invoked is not a complicated numerical manipulation but is quite straight forward and "makes sense physically" thereby yielding extremely high correlation coefficients approaching 0.98 and higher. In exercising the model each month a total of 6 distinct sets of linear regression parameters (y = **m***x + b) are employed in order to determine the sales forecast predictions for each of the next five quarters as well as a sales forecast estimate for the following month. Mike Cowan, the LRA inventor, is a 45-year semiconductor industry veteran, most recently retired (Jan 2002) from IBM Microelectronics where he was engaged in both technical and management assignments including strategy development and competitor/competitive analysis. For more details, please contact Mike at:* mikedcowan@verizon.com.

December 2008

Industry Capacity

Overall MOS wafer fab capacity increased 0.9 percent in Q3-08 versus Q2-08, from 2,121k 200mm equivalent wafer starts per week to 2,140k, Figure C1. The net increase by wafer size, Table C1, was in line with expectations, with growth centred on 300mm and sub-0.12 micron technology, Figures C2 and C3. Q3-08's capacity growth was well below the 6.5 percent experienced this time last year, reflecting the slowdown in capital expenditure that began mid-2007. Given the continuing – and increasing level of – slowdown in 2008 cap ex, low levels of capacity expansion will continue well into 2009.

Figure C1 - MOS Wafer Fab Capacity By Feature Size
(200mm Equ Wafer Starts/Week x000)



	1Q-04	2Q-04	3Q-04	4Q-04	1Q-05	2Q-05	3Q-05	4Q-05	1Q-06
< 0.08µm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	35.0
< 0.12µm to ³0.08µm	25.0	75.0	150.0	210.0	288.5	328.8	379.7	426.2	443.1
< 0.16µm to 0.12µm	350.7	353.3	315.0	295.6	285.9	286.0	277.9	284.6	297.8
< 0.2µm to 0.16µm	209.3	187.2	192.9	207.1	165.6	172.2	165.2	162.5	163.6
< 0.3µm to 0.2µm	109.6	105.3	106.1	104.4	105.9	105.1	101.7	106.6	102.3
< 0.4µm to 0.3µm	193.5	196.8	200.8	196.2	187.5	185.4	194.8	194.7	194.3
< 0.7µm to 0.4µm	164.0	169.0	172.4	171.5	195.9	187.2	188.2	188.7	189.0
0.7µm & Above	213.2	210.4	208.1	178.6	174.6	162.9	175.4	174.9	185.9

	2Q-06	3Q-06	4Q-06	1Q-07	2Q-07	3Q-07	4Q-07	1Q-08	2Q-08	3Q-08
< 0.08µm	95.0	205.0	285.0	395.0	490.0	616.9	633.4	722.1	894.6	963.1
< 0.12µm to ³0.08µm	447.0	422.6	412.9	409.5	405.5	403.1	404.1	385.8	290.1	258.8
< 0.16µm to 0.12µm	290.4	288.8	292.9	276.7	270.4	274.0	286.7	272.4	256.6	252.7
< 0.2µm to 0.16µm	168.4	152.9	149.2	142.5	143.4	147.0	145.3	138.4	133.7	128.2
< 0.3µm to 0.2µm	106.8	110.4	111.5	95.2	106.7	105.9	104.1	102.6	87.0	84.8
< 0.4µm to 0.3µm	194.8	189.2	193.2	156.7	152.7	149.5	150.5	146.2	144.9	146.5
< 0.7µm to 0.4µm	179.0	183.5	183.3	170.0	175.5	173.8	170.9	159.1	163.4	161.0
0.7µm & Above	179.0	170.9	171.8	148.8	151.2	148.9	149.8	152.2	150.5	145.2

Source: SICAS/Future Horizons

Table C1 – Q3-08 vs Q2-08 Wafer Fab Capacity Increase By Wafer Size

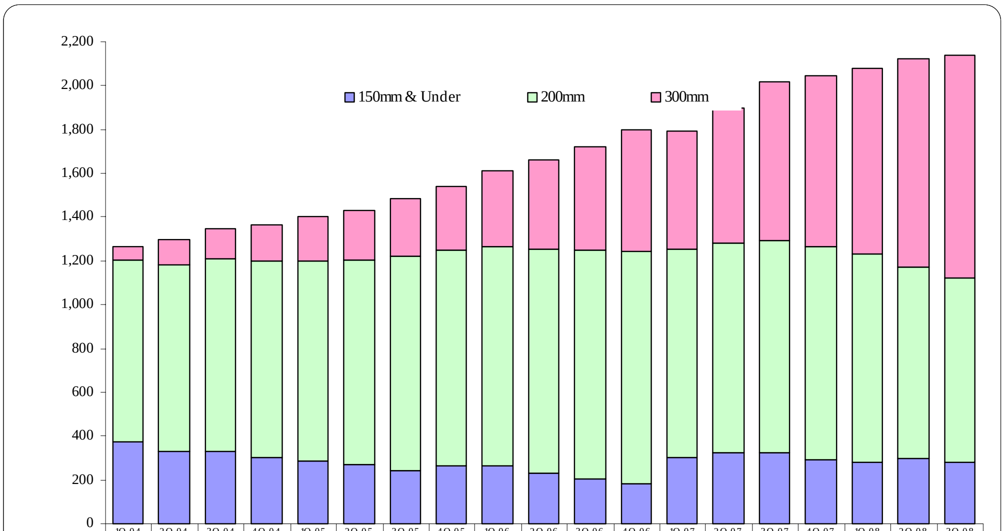
Wafer Technology	wsw (k)	Q3 vs Q2
Total MOS	**19.5**	**0.9%**
200mm Wafers in MOS Total	-33.3	-3.8%
300mm Wafers In MOS Total	69.3	7.3%
150mm & Below Wafers in MOS Total	-16.5	-5.6%
BIPOLAR (5 inch equivalents)	-7.9	-4.0%
TOTAL IC's (8 inch equivalents)	**16.4**	**0.7%**

Source: SICAS/Future Horizons

December 2008

Figure C2 - MOS Wafer Fab Capacity By Wafer Size

(200mm Equ Wafer Starts/Week x000)

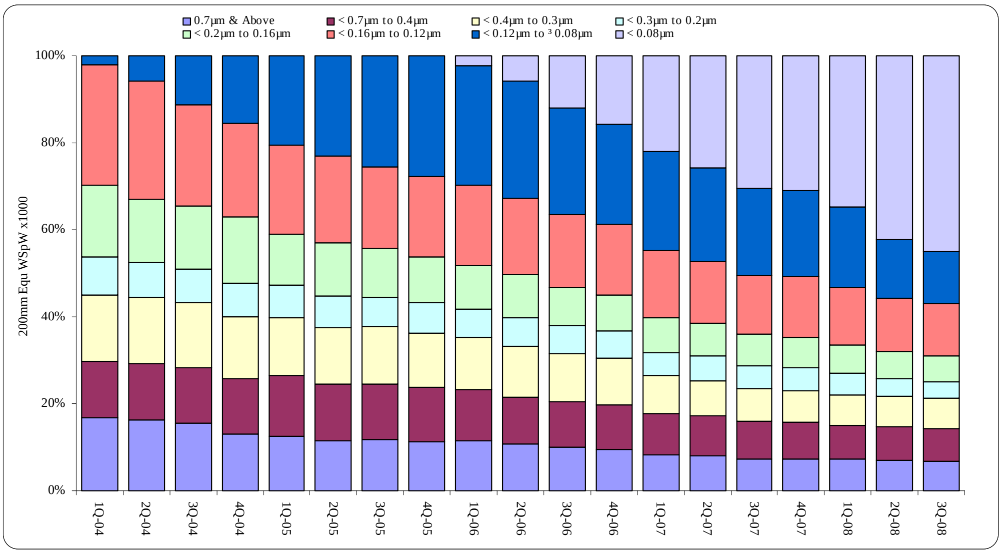


	1Q-04	2Q-04	3Q-04	4Q-04	1Q-05	2Q-05	3Q-05	4Q-05	1Q-06	2Q-06	3Q-06	4Q-06	1Q-07	2Q-07	3Q-07	4Q-07	1Q-08	2Q-08	3Q-08
300mm	59.9	115.2	135.7	163.6	203.6	225.5	259.4	288.7	348.5	408.2	477.0	554.4	540.0	613.8	726.1	781.9	847.1	950.0	1019.3
200mm	829.5	850.8	877.1	895.3	912.9	934.9	980.9	984.5	998.1	1021.6	1041.8	1062.7	951.1	955.4	966.2	968.7	950.5	875.2	841.9
150mm & Under	375.9	331.0	332.5	304.5	287.4	267.2	242.6	265.0	264.4	230.6	204.5	182.7	303.3	326.2	326.8	294.2	281.2	295.6	279.1

Source: SICAS/Future Horizons

Figure C3 - MOS Wafer Fab Mix By Feature Size

(200mm Equ Wafer Starts/Week x000)



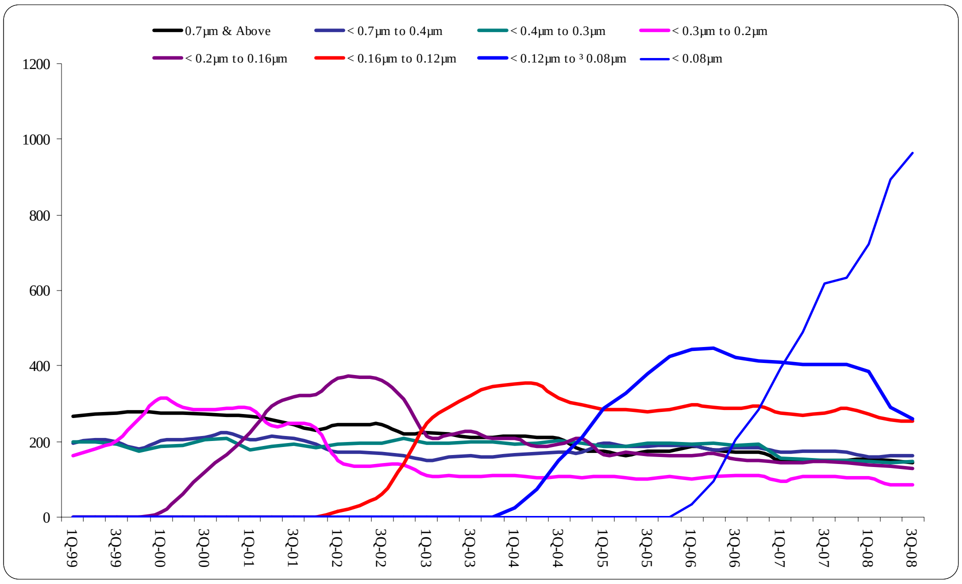
Source: SICAS/Future Horizons

December 2008

300mm wafers now account for 47.6 percent of the total MOS capacity, up from 44.8 percent in Q2-08 and 36.0 percent from the same period last year. 300mm wafers now make up the bulk of capacity with 200mm in second place at 39.3 percent, down from 41.3 percent in Q2-08 and 47.9 percent in Q3-07.

Q3-08 also saw the actual size of the 200mm capacity decline by 3.8 percent versus Q2-08. We expected this sector continue its steady decline in overall market share and absolute size over the coming decade. The vast majority of new fab additions are now in 300mm wafers, following the well-trodden path of the prior 200mm and 150mm wafer transitions. Again, hardly surprisingly, capacity at 0.08 micron and below is still in its market build out phase, Figure C4.

Figure C4 - MOS Wafer Fab Life Cycle By Feature Size
(200mm Equ Wafer Starts/Week x000)



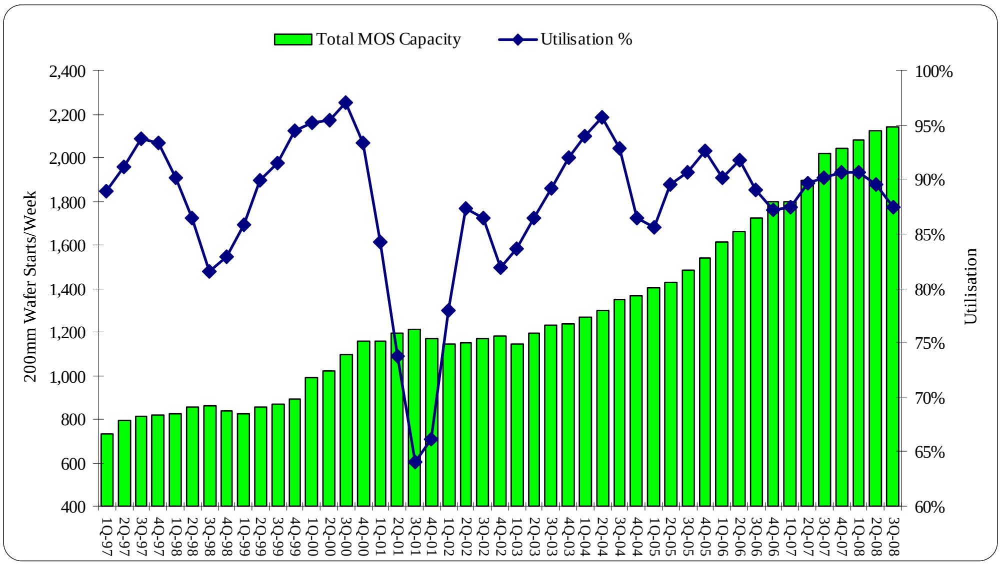
Source: SICAS/Future Horizons

Despite the very low level of Q3 capacity increase, utilisation rates decreased slightly to 87.5 percent in Q3-08 from 89.5 percent in Q2-08, Figure C5. The comparable utilisation figure for Q3-07 was 90.2 percent.

Advanced IC capacity, i.e. 0.08 micron and below, was flat at 95.2 percent, Figure C6, whilst 300mm and 200mm wafers checked in at 96.5 percent (Q2 = 94.8 percent) and 84.3 percent (Q2 = 88.4 percent) respectively, Figure C7.

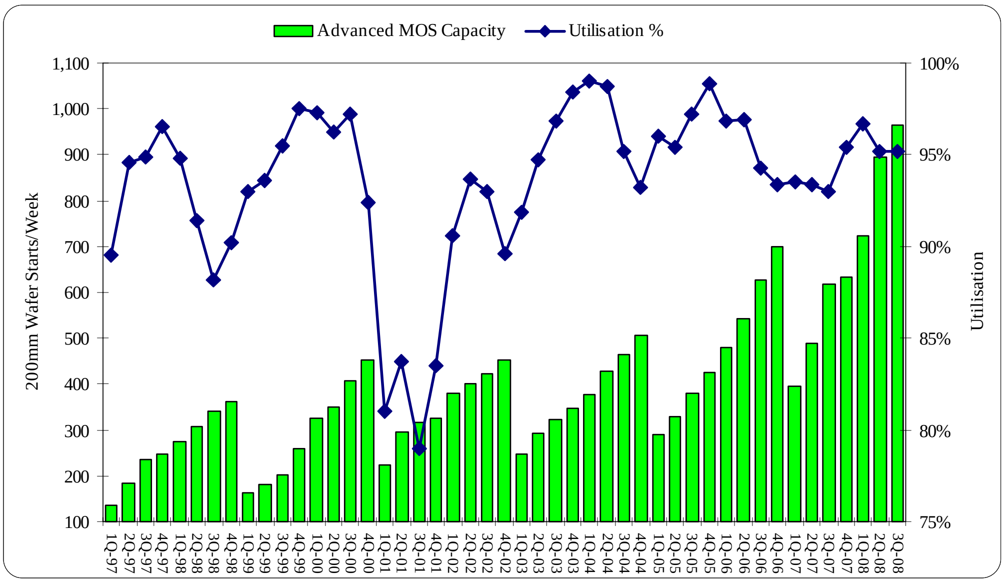
December 2008

Figure C5 - MOS Wafer Fab Capacity Utilisation
(Percent Of Total)



Source: SICAS/Future Horizons

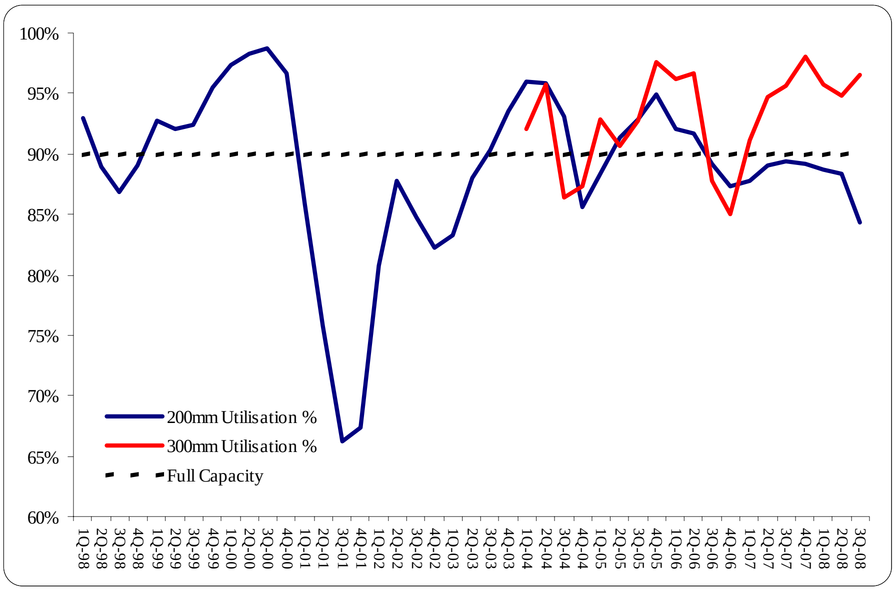
Figure C6 - Advanced MOS Wafer Fab Capacity Utilisation
(Percent Of Total)



Source: SICAS/Future Horizons

December 2008

Figure C7 - MOS 200mm & 300mmWafer Fab Capacity Utilisation
(Percent Of Total)



Source: SICAS/Future Horizons

It takes a while, but the cutbacks in cap ex that started mid-2007 are now clearly impacting net new capacity additions. Interestingly these cutbacks were instigated against a backdrop of high levels of capacity utilisation, not excess capacity, which clearly differentiates the capacity situation now from previous situations.

When these cutbacks occurred, there was no sign of an economic recession on the horizon. In short, by good fortune, the industry is entering a major economic downturn with Cap Ex curtailed and negligible new capacity in the pipeline.

Given the abrupt reduction in demand, near-term excess capacity is inevitable and utilisation rates will trend downwards for a while, as reflected by Q3-08 (Q4-08's unit sales) rates. This makes this recession much different from previous ones, especially 2000-01 when Cap Ex was $60 billion and on a steep ramp curve just as demand fell 20.8 percent.

With Cap Ex to sales running around 16.5 percent in 2008, we expect to see this level hold during 2009, despite an anticipated significantly negative IC unit growth. From a capacity point of view, the industry is in good shape to weather the ensuing storm.

December 2008

World Economic Round Up

World Economy

The language being used in the news this month is heavy – gone is inflation, carry trade, sovereign wealth funds and liquidity and the most popular words in use are recession and deflation. Economic news around the world is almost uniformly bad as policy makers and central bankers try to find new ways of kick-starting economies that are sliding towards or have reached recession. As each new piece of data is reported, it points more clearly to a deeper and longer lasting recession than previously thought. The only good news is that inflation, which plagued the world in the summer, is now retreating. Countries are tightening their belts, exports are down, and consumers are hanging on to their cash.

Oil prices experienced a spectacular fall during the month, at some points reaching below US$40 dollars per barrel, a US$100 drop in the past five months. These is good news for consumers but not for the oil companies who, just a few months ago, did not have to choose whether to pay down debt, raise stock dividends, increase cash balances or expand capital budgets. One worrying aspect is that if oil prices do not rise soon then capital expenditure for future projects could be at risk.

North America

It is now official that the US has been in recession since December 2007, making it the longest recession in at least a quarter of a century. Falling prices, combined with a loss of real estate and stock market wealth are prompting concerns about potential deflation. In response the Federal Reserve is already engaged in unorthodox methods of 'quantitative easing' and is preparing for more extreme measures although they feel that the risks of deflation are small.

In addition, the central bank is planning to extend its lending even further by pumping US$800 billion into markets and purchasing mortgage securities and debt with close ties to the US government such as those from Fannie Mae and Freddie Mac. The moves are aimed at increasing the availability of lending to consumers and homebuyers. The feeling by policy makers that banks are not lending is actually inaccurate as commercial and industrial loans rose year-on-year by 15 percent from November 2007. It would seem that the problem is not the lending but whom the money is being lent to.

With the President-elect, Barack Obama, introducing his economic team to the nation in November, the question was raised as to whether Federal Chief Ben Bernanke will be replaced when his term ends in 2010.

December 2008

Europe

Italy joined Germany and Ireland in reporting that it was in technical recession as the Eurozone slipped into its first recession. Gross domestic recession contracted by 0.2 percent in the second quarter for the region following a similar drop in the first quarter of 2008. Manufacturing has been affected by slower exports as well as declining domestic market.

The European Bank for Reconstruction and Development (EBRD) warned that the ex-communist countries of central and Eastern Europe face a rapid economic slowdown, especially those countries dependent on international financial cash flows. The European Union urged member nations to earmark US$260 billion to stimulate the regions foundering economy but some of that money includes economic stimulus funds already announced by many EU nations.

Despite criticism from other leaders, German chancellor Angela Merkel is viewed in Germany as handling the financial crisis well, which bodes well for her in the elections to be held in 2009.

Eurozone unemployment soared by 225,000 in October to a two-year high at 7.7 percent. Inflation, meanwhile, fell from 3.2 percent in October to 2.1 percent in November.

The European Central Bank (ECB) made its biggest ever cut to interest rates, lowering benchmark credit costs by 75 basis points. The third cut in less than two months took the main interest rate to a 2.5-year low of 2.5 percent.

UK

The Confederation of British Industry has warned that the economy will contract by around 1.7 percent in 2009 with unemployment reaching 9 percent in 2010, leaving almost 3 million people out of work. Consumer confidence is also going to be dampened with household spending contracting by 1.8 percent in 2009.

Service sector output contracted by 0.4 percent quarter-on-quarter in the third quarter with expectations that the slowdown in the sector will continue resulting in further job losses in the coming months. The price of goods leaving UK factories fell by 0.7 percent in November, taking the annual rate to just 5.1 percent - half the level in July. Manufacturing has been predicted as contracting by 5 percent in 2009, with a further cut of 1 percent in 2010. Some industry experts are blaming banks for the problems citing that despite being given £500 billion to help them recapitalise they are still not lending.

The annual inflation rate fell to an annualised rate of 4.5 percent in October from 5.2 percent in September.

December 2008

For the second consecutive month, the Bank of England (BoE) cut its interest rates – this time by just 1 percent bringing the level to 2 percent. That is equal to the all-time low in the UK. Some lenders were planning to pass on the full 1 percent, while others continued to keep their rates under review.

Japan

Second quarter data showed that the Japanese GDP contracted for the second consecutive quarter - by 0.4 percent - that put the country into recession. Consumer demand has failed to lift the economy battered by lower exports. The Bank of Japan predicted that industrial production and exports would continue to decrease quite rapidly in the near future. Concerns are now that the recession could be prolonged and that the world’s second-largest economy could slip back into deflation.

The government will not decide upon a stimulus package until 2009 and has decided to endure higher unemployment and a possible return to deflation. A planned stimulus package from the prime minister aimed at individuals, children and pensioners is unlikely to stimulate consumer spending and is regarded as only a temporary boost as the sums are too small. The economic and fiscal minister feels that ordinary Japanese are unlikely to spend more in these uncertain times and the relatively wealthy already lack little in material goods.

The country’s fiscal debts are so large and the bank’s interest rates so low that there is little room for movement on policy to improve the situation.

China

The economic stimulus programme announced by the government that was planned to exceed US$586 billion is not looking as rosy as it did initially. It now transpires that the government will spend US$172 billion over the next two years, with the remainder of the sum being provided by local governments, state-owned banks and companies. Some industry experts believe that the announcement was aimed at overshadowing weak data that was published the following week.

As the global credit crisis bites, China’s export market is slowing and its domestic market has never been strong. The steel industry that has become the largest in the world is declining as output plunged by 17 percent in October, affecting world suppliers of iron ore. Likewise, fuel demand has reduced but the stimulus package is prompting local governments to start spending on power-hungry projects that could boost demand. Unemployment has risen and is forecast to remain high into the first quarter of 2009.

December 2008

China's GDP growth was 9 percent in the third quarter of 2008 but World Bank predictions are that it will slow to 7.5 percent for the year. China's central bank slashed borrowing costs by the largest margin in a decade bringing the one-year lending rate down by 1.08 percentage points to 5.58 percent. The benchmark one-year deposit rate was cut by the same amount to 2.52 percent.

India

Results of a series of state elections are due in early December, which should reveal the political mood of an India reeling from the Mumbai attacks and hit by the economic slowdown. Winning parties will need to secure coalitions to govern the country.

India's central bank cut its two key interest rates by 100 basis points each to stimulate the economy. The Reserve Bank of India reduced its repo rate - the rate at which it lends to commercial banks to 6.5 percent and its reverse repo rate to 5.0 percent. The rate cuts - the third by the bank in less than two months - are part of a wider stimulus package expected to bolster India's trillion-dollar economy.

As corporate credit dries up, two companies have placed adverts seeking deposits from the public to help refinance their debts. Industry experts predict that further companies would seek similar deposits. Tata Motors is accepting fixed-term deposits for the first time in 13 years. It is offering one, two and three-year deposits carrying interest rates between 10 percent and 11 percent in a bid to raise a possible US$541.4 million. Similar bank deposits fetch 9.5 percent to 10.5 percent.

India's property and IT sectors have predicted a severe slowdown, with the IT sector already experiencing a slowdown worse than that after the dotcom bubble.

Asia Pacific

Political conflict in Thailand where protestors seized two of the country's main airports threatens Thailand's tourism that accounts for 6 percent of the country's GDP. Removal of the Prime Minister and his party from government has left the country without a functioning parliament that will also cause havoc with the economy.

South Korea's exports topped US$400 billion at the beginning of December and the country has set an export target of US$500 billion for 2009, determined to expand their export market by taking advantage of the worldwide economic crisis as an opportunity.

The Prime minister of Singapore has forecast a one-year recession, followed by several years of slow growth as the global downturn undermines demand for exports. Gross domestic product began contracting in the second quarter as demand dried up from the US and Europe for Singaporean products.

Russia/CIS – Poland At A Cross Roads

Poland enjoyed its fastest growth for a decade in 2007 and even in the third quarter of 2008 growth is estimated at around 4.8 percent year on year. However, the world's economic crisis is beginning to bite and the economy faces a sharp slowdown in 2009. So why has the country apparently lost direction?

Years of ineffectual and badly-focussed leadership has left the country with poor infrastructure that threatens to strangle the progress that has been made. Some opinions are that the current government is also weak, with the Prime Minister Donald Tusk more concerned with the Presidential elections in 2010 and making small changes that President Lech Kaczynski won't veto. When times are booming this could be a good strategy but the state of Poland's infrastructure and the looming economic slowdown make this an unadvisable course at present. Poland has far more potential than it has achieved to date.

Nevertheless, this slightly pessimistic view should not cloud the achievements made by Poland since 1990 when the trade union, turned political force, 'Solidarity', led by Lech Walesa, triumphed in parliamentary elections and the Presidency, ousting communism. Current GDP is about 20 percent higher in real terms than in 1980 with growth being well balanced between consumption, investment and exports.

In 1990, inflation stood at a massive 600 percent, falling to just 10 percent in 2000. The years 2006 and 2007 recorded inflation at 1.0 percent and 2.5 percent respectively although it has been revising upwards in 2008, standing at 4.8 percent in August 2008. In 2007, Poland attracted three times more foreign capital than the Czech Republic or Hungary, at US$16.3 billion after surging 85 percent during 2005 and 2006.

In October 2007, Mr Tusk's Civic Platform party defeated its rival, Law and Justice. The outgoing Prime Minister, Jaroslaw Kaczynski, twin of the current President, led a government that was often considered as incompetent and badly focussed. Its efforts to fight corruption and reform the judicial system led to abuses of power, rather than a cleaner government, and it failed to reform public services or address the ageing infrastructure.

Under Prime Minister Kaczynski, foreign policy suffered and relations with Germany were poor. Mr Tusk's new government has managed to build good relations with Germany and Russia, which is no mean feat, in addition to forging a strong alliance with Sweden. The present government is also addressing problems such as too much bureaucracy but is often hampered by Law and Justice's Lech Kacsynski. The opposition has enough votes to deprive the government of the majority it needs to override a presidential veto.

The government is not planning to spend its way out of the financial difficulties in the style of the US and UK but has announced an economic stabilisation and development package totalling around US$30 billion. The package has three objectives: to maintain financial stability, provide effective protection for the poorest, and maintain economic development to catch up with Europe's richest countries.

The government wishes to join the Eurozone but needs to reduce the country's budget deficit in order to do so. They are aiming to slim it down to US$6 billion compared with a 2008 estimate of US$8.9 billion - 3.2 percent of GDP). If they were to increase the budget deficit as part of their economic package it would damage their credibility and reduce their chances of joining the Eurozone by their target date of 2012.

A number of problems beset Poland and are still not being addressed effectively, resulting in a slower improvement in trade and industry. The business climate in Poland is improving although obstacles remain. Difficulties, which foreign companies in Poland have encountered, include bureaucracy, lack of clarity and transparency in tax administration, the tax burden, corruption and the slowness of the Polish judicial system.

Many experts cite the transport infrastructure as the biggest hindrance to Poland's development and competitiveness. The country is heavily reliant on road transport but is lacking an efficient high-speed road network. It also needs important renovation investment in both the rolling stock and infrastructure of the railway sector. Likewise, maritime and air transport also need extending and updating to cope with increasing traffic to Poland.

In the 2007-2013 budget cycle, Poland will receive about US$85 billion of EU funding with a third of that expected to be spent on infrastructure. Currently, investors have chosen to set up factories in south-western Poland, where the A4 highway from the German border to Krakow allows for easy communication with Western Europe. Many obstacles remain and hinder the implementation of investment plans and thus need to be resolved rapidly, partly because in 2012 Poland is to co-host the European soccer championship with Ukraine.

December 2008

Privatisation stalled under the previous government, which was reluctant to allow foreign ownership in key sectors. However, it is expected to speed up under the new government. Particularly in need of foreign investment are the coal-powered power stations that are fast becoming obsolete. The country's four consolidated power companies are state owned and thus have a limited ability to attract the investment required.

Although, new stations are being built, this is not fast enough to support the ever-growing demand on the 60 percent of power generation assets that have been in operation for more than 30 years. Poland is currently a net exporter of electricity but the country's spare capacity fell from 46 percent in 2002 to just 32 percent in 2006. Additionally, the electricity is generated from coal and the EU has a target of producing 20 percent of energy from renewable sources by 2020, which will not be easy or cheap.

Increasing disparities in rural and city employment data, wasteful public spending, pressure from the EU and the problems stated make the way forward for Poland challenging. The government needs to be more decisive and act faster if it is to reach its potential and close the gap with its Western neighbours.

Economic Case Study – Vietnam's Road To Recovery

The road to economic recovery has been hard for Vietnam since the war that started in the 1960's, but significant progress has been made. The country is on the brink of a leap forward with further foreign investment being encouraged by the communist regime but there are still plenty of potholes to negotiate.

Colonized by the French in the mid-19th century, it was not until 1945 that the French were forced out leaving a nation divided into the communist North and anti-communist South. After many years of war involving the United States supporting South Vietnam, the US military were withdrawn in 1973. Just two years later, North Vietnamese overran the South, reuniting the country under Communist rule.

With much of the economy having been destroyed during the war, the new government created a planned economy that was plagued with inefficiency and corruption. The country also suffered from the trade embargo from the United States and most of Europe. Subsequently, support from Russia and the trade partners of the Communist blocs began to erode leaving the country in poverty.

It was not until 1986, with the enactment of Vietnam's 'doi moi' (renovation) policy, that the communist government committed to increased economic liberalisation and implemented structural reforms needed to modernise the economy producing more competitive, export-driven industries. The results of economic liberalisation took time to realise but from 1997 to 2004, growth averaged 6.8 percent per year, even against the background of the Asian financial crisis and a global recession.

In 1995, Vietnam joined the Association of Southeast Nations (ASEAN) and restored diplomatic relations with the US. Their membership in the ASEAN Free Trade Area (AFTA) and the US-Vietnam Bilateral Trade Agreement in December 2001 led to even more rapid changes in Vietnam’s trade and economic regime, with exports to the US increasing by 900 percent between 2001 and 2007.

January 2007 saw Vietnam join the World Trade Organisation providing the country with an anchor in the global market and reinforcing the domestic economic reform process. Apart from the aforementioned trade with the US, Vietnam’s main trading partners include Japan, Australia, ASEAN countries and Western European countries.

With two-way trade at around 160 percent of GDP, Vietnam has become one of the world’s most open economies and the ratio is twice that of China and over four times that of India. Prime exports are in agriculture, clothes, shoes and furniture with manufacturing, information technology and high-tech industries forming a fast-growing part of the national economy. Relatively new to the oil business, the country is also managing to produce 400,000 barrels of oil per day and is the third-largest oil producer in Southeast Asia.

Historically, Vietnam was an agricultural civilisation based on wet rice cultivating but following the war, it was barely able to feed its 85 million inhabitants. Several land reform measures have turned Vietnam into the largest producer of cashew nuts and the second largest rice exporter in the world, after Thailand, with a percentage of 6.93 land use being for permanent crops. Other main export crops are coffee, tea and fishery products.

Growth in gross domestic product has averaged 7.5 percent for the past 10 years and reached 8.5 percent in 2007. Understandably, forecasts for 2008 have been down graded to around 6.5 percent due to the global financial recession. The growth has brought with it greater wealth for the populace and although the economic divide is opening, the number of those living under the extreme poverty level has declined. The proportion of households with electricity has doubled since the early 1990s, to 95 percent and almost all children now attend primary school and benefit from at least basic literacy.

December 2008

The Socialist Republic of Vietnam is a single party state with the Communist Party at its head. This is unlikely to change in the foreseeable future, with all areas of the government being controlled by the Party and only organisations affiliated with or endorsed by the Party being able to contest elections. However, the official party creed of socialism has diminished since the 1990’s and efforts are under way to make local government more accountable and transparent.

It was not until 2000, that Vietnam created its stock market and legally recognised private enterprises and the privatisation programme has moved in fits and starts. The number of state firms has plunged from around 12,000 in the early 1990’s to an estimated 2,000 that are still currently fully owned by the state. By 2010, there will likely be around 500 left, mainly in sensitive areas such as defence.

Vietnamese-owned private firms have burgeoned as the natural entrepreneurial spirit has been revived. The country, until recently, has been one of the most popular destinations for foreign investment in the Asia Pacific area with low cost, quality labour and an attractive market in itself. In October, the State Bank of Vietnam (SVB) granted licenses to foreign banks to set up banks, increase funds to their branches and open representative offices in Vietnam as part of the country’s commitment to international economic integration.

However, the road to recovery is still mired with problems. One of the most critical is the endemic corruption that reaches from the highest levels down throughout the system. The government is apparently taking steps to improve the situation but needs to do a lot more in order to build more confidence with investors. Just recently, Japan has withdrawn any new aid and withheld US$0.7 billion in already pledged funds following a recent corruption scandal.

Another huge problem in the country is the slowness of legislative and bureaucratic processes. Once again, the government is trying to improve the situation but again progress is very slow. The bureaucratic snags in the meantime are preventing essential public works, such as building roads and power stations needed to maintain the country’s growth rate. For instance, the country’s electricity-generating capacity needs to double by 2010 in order to maintain growth.

The country has been battling against escalating inflation during 2008, which reached a peak of around 28 percent in August, primarily due to rising food and fuel costs, although this is forecast to drop quite dramatically in 2009. Combined with the global financial recession, Vietnam will probably have to endure a rocky road for a while but optimists feel that the diversification of the economy will hold up well in the long term. Vietnam’s road to recovery is definitely rocky but not impassable.

December 2008

Market Trends – Solid State Drives for Computing

Introduction

There has been a lot of speculation amongst vendors and users about solid-state drives (SSDs) as a replacement for magnetic hard disk drives. This has come amongst a flurry of press releases including a recent Samsung announcement on a new 256MB drive for enterprise use. The main component for most SSDs is a NAND flash semiconductor device.

Semiconductor and some storage manufacturers plan to expand from NAND use in consumer products to the mainstream PC by replacing magnetic drives by SSDs. SSDs are not new but reductions in flash memory pricing will result in cheaper SSDs and make it potentially more viable for server and PC applications.

Currently SSDs can be found in military, aerospace or specialised industrial applications. These drives are more resistant to shock and high temperatures than their magnetic hard disk drive (HDD) counterparts. They also have low seek time and low latency compared with conventional HDDs and are designed to have high reliability or low mean time before failure.

On the negative side, however, they have the disadvantage of high pricing and lower capacity than their magnetic alternatives at the moment. This short report analyses these developments to help put these SSD innovations in perspective.

Analysis

Current Applications

SSDs have been around for some time and they include rugged computers for military and industrial uses. Other military applications include mission data recorders and unmanned vehicle control systems.

Industrial applications take in test and measurement systems and robotics. Most of these systems and the SSDs have high performance but semiconductor based drives have been too expensive for mainstream applications.

NAND and NOR flash storage can be found in many consumer devices including mobile phones as well as digital audio-MP3 and video players. NAND can also be found in PC storage applications including:

- High performance high priced ruggedized drives for military, aerospace and industrial computers in a niche market.

- USB sticks or 'thumb drives' These are formatted as hard disk drives with read and write access but are only used for storing data and not normally subject to high numbers of read and write cycles.
- Customized SSDs are also found in the new generation of ultra-mobile PCs such as the Asus Eee PC and the Lenovo X300 but at relatively low capacities. These are currently 20GB or below with a high price premium for higher capacities.

'Consumer grade' storage is not normally configured as a conventional HDD. Consumer uses of flash usually involve only a few hundred read/write cycles of the NAND cells and this is primarily for storage and playback of media.

By contrast, NAND in SSD applications may require many hundreds of thousands of read write cycles, as programs and operating systems need to cache data regularly to and from the disk.

NAND Technology

Flash memory is non-volatile semiconductor memory that can be electrically erased and reprogrammed. It is primarily used in memory cards, USB flash drives for general storage and transfer of data between computers and other digital products. It is also embedded as storage in portable digital and audio players.

Flash belongs to the EEPROM (Electrically Erasable Programmable Read-Only Memory) family and is erased and programmed in large blocks. It is non-volatile; offers fast read access times and does and not need power to keep its stored information.

The oldest flash technology is NOR, which has some advantages for smaller elements of storage as it does not require a complex memory controller. NAND technology is now routinely used for greater storage capacity as it has a smaller cell size than NOR, has relatively fast erase and write times, and costs less. It does, however, require a more complex memory controller but this overhead is cost effective at higher memory densities.

The newest type of NAND technology is the multi level cell (MLC) which can store twice as much as its predecessor, the single level cell (SLC), by using different voltage levels within the cell. It is this MLC technology that is enabling higher density storage at lower costs. It has the disadvantage of requiring even more complex control and error correction and currently offers fewer read/write cycles than SLC.

Different Types of SSD

December 2008

High Reliability – Industrial & Military

The military and industrial SSD is designed for the highest reliability applications, uses SLC NAND and has a complex controller interface that maximizes reliability for a high amount of read write cycles. This type of drive is very expensive and will not be appearing in consumer applications any time soon. Price reductions in SLC or MLC NAND may make a high reliability SSD a candidate for use in server farms for storage where power consumption and high performance can command a premium price.

Medium Reliability – Normal Computing

MLC NAND can offer GB of storage more cost effectively than SLC. Additional developments in the basic MLC cell and process technology as well as controller technology could extend the use of NAND based SSDs into the PC environment - other than those used currently in low end ultra portable notebooks. At the moment, low end PCs like the Ausus Eee have a special controller on board to manage the MLC NAND but the capacity of these built-in SSDs is limited by cost and is now, typically, less than 20GB.

The next development of an MLC type SSD is the addition of a Serial Advanced Technology Attachment (SATA) controller interface. Samsung have recently announced the release of a 256GB drive with a SATA II controller with high I/O speeds and reliability comparable with an SLC based device. This has been achieved, according to Samsung, because of advanced memory controller technology.

The pricing of a 256GB SDD would need to be less than USD300 for an OEM to consider including it in top-end laptop. The lack of pricing information from Samsung suggests that it will sell for much higher and its likely application is in servers rather than PCs. MLC SATA drives of 64GB are currently being advertised in the UK around USD180

Consumer Reliability – Media and Data Storage

These devices are currently found in USB drives or memory cards and can offer up to 64GB of capacity in 2008. The controllers used for the NAND flash are simple and do not offer or require the reliability needed in a compute application. However, they are widely used for reliable storage.

Data is written occasionally and reading of the media is the most common operation as would be found in portable digital music players. Excessive write cycles will cause failures in the NAND cells as some PC enthusiasts have discovered when using it as a regular HDD. This rules out this category of device as a candidate for magnetic HDD replacement.

NAND SSD Adoption Drivers

Pricing

If NAND SSD drives are to be a disruptive technology and replace the current magnetic HDD, then it will need to meet or improve on the selling price of the component it will displace. Most semiconductor devices used in consumer applications – including PCs - are sold on price provided they can meet an acceptable specification.

It is sometimes possible to achieve a small price premium for an improved specification and parameters like data access time, size and power consumption are typical. This premium might be as low as 10 percent adder unless there are compelling reasons otherwise. The consumer market, is very sensitive to price and unless a component shows a visible benefit to the end user, it is unlikely to gain widespread acceptance if it costs more.

NAND prices have been falling during the last five years at an average about 50 percent per year per byte. Assuming this trend continues over the next five years this may make mid-capacity SSDs of 128GB to 256GB more affordable for small notebook type applications.

Multilevel cell (MLC) NAND is currently about $2.50 per Gigabit and single cell NAND which is used in higher reliability SSDs is approximately $7.50 per Gigabit. Given these prices, only a handful of companies offer large (128 GB or larger) SSD drives with write speeds and reliability adequate for replacing traditional drives. These drives are available in limited quantities and are still very expensive.

At the same time, the price of magnetic HDD storage is still going down. This means that NAND pricing will need to decline faster and controller development will need to continue if SSDs are to compete for higher storage capacity slots.

Despite these arguments it is likely that NAND SSDs will take a share of lower capacity disk drives in compute applications but this is not likely until late 2010 or beyond.

Technology Development

Regardless of the hype, there is still work to be done in NAND and SSD technology to keep on reducing the price of storage and improving its intrinsic reliability. It is possible to improve reliability by using advanced controller design to maximize the lifetime of an MLC cell by using ‘wear levelling’ algorithms and to correct errors but this may mean building in some sort of redundancy.

There is a lot of motivation in the NAND suppliers to extend the applications base so there is likely to be continued development in process (as with DRAMS) and also to improve the efficiency of controllers. Controller development will be essential to the competitiveness of NAND flash vendors for compute applications as they are the key to improve the performance and reliability of MLC NAND.

The advantages of SSDs vs magnetic HDDs are compared in Table A1. This is not designed to be a complete list but itemises the major factors that are likely to be considered in decisions to use, or not use, SSDs in any given application.

Table A1 SSD Advantages & Disadvantages vs, Magnetic HDDs

Advantages	Disadvantages
Faster access	Cost per bit of storage
Faster write for large files	Total capacity less than HDD per disk
No noise or reduced noise	Questions on reliability for commercial product
Environmental reliability (temp shock etc)	Operating systems currently optimised for magnetic HDDs
Lighter for low capacities	
Lower power for some drives in smaller capacities	

Source: Future Horizons

Acceptance by Computer OEMS

OEMs will need to become more familiar with the technology of SSDs to have the confidence to build it in to compute platforms. Standards are also very important and at the moment standards are still being set. Server vendors will need to be particularly convinced on the long term reliability of the devices as data loss in this environment can have more serious consequences than in a domestic PC setting.

The lower power consumption will be valued in a server farm and this will be factored in to the overall cost of ownership of a fast SSD. The remaining issues for SSDs are the price and capacity of SSDs. Meanwhile, magnetic hard disk drives are not standing still and the price per bit is going down and the capacity is going up year on year. Because of this it is likely that both types of drive - magnetic drives and SSDs - will co-exist for some time in the OEM portfolio.

Another potential application is the replacement of magnetic disk drives in laptops. The first concern for OEMs here is the price of these devices as the overall cost of a laptop is the over-riding factor for most consumers in the choice of PC. Performance will command a small premium especially in the top end but SSD pricing in multiples of an equivalent magnetic HDD equivalent will prevent widespread penetration of the PC market.

A hybrid drive is another use of NAND where NAND, magnetic drives and DRAM memory cache are used together. It may be possible to balance the performance and price equation more easily in one of these hybrid devices rather than in a ‘pure’ SDD or magnetic HDD.

Market Players

The main suppliers to the SSD market in 2006 and 2007 included Adtron, Bitmicro, SanDisk, Silicon Systems, Simpletech and other niche players. Sandisk and Samsung are prominent vendors in supplying storage to ultra mobile notebooks.

Other suppliers that have announced their intention to enter the SSD market include Intel, Seagate/Micron and Toshiba. Also, the agreement between EMC and STEC sparked new interest in enterprise class SSDs in January 2008 with the use STEC flash modules in EMC’s storage system. The supplier list is continually growing and newer entrants such as PNY technologies, Ritek Corporation must be added. Not all of these companies will survive in the longer term as competition and scale of manufacture will take their toll.

Conclusions

- The SSD market is new and hype abounds with unrealistic expectations that the demise of the magnetic HDD is imminent.
- Expensive and high performance SSDs are currently used in the niche markets of military industrial and aerospace
- Flash prices must come down significantly to make it attractive for wider compute applications. This may happen by late 2010 or during 2011.
- SSDs can currently be found in the new generation of ultra portable PCs but the storage is usually low <20GB and these devices are designed for low cost. The storage provided is not based on need but cost at the moment.

December 2008

- OEMs need to be convinced that SSDs offer competitive pricing, agreed standards and performance benefits before they will adopt.
- Lower cost SSDs are likely to be, initially, found in servers, particularly the data centre where performance, lower power consumption and reliability are needed and can be set against higher disk pricing.
- Competition and available products from Seagate, Intel and others will be needed to spur development and bring prices down.
- SSD technology is available in various form factors and can feature several interfaces that are compatible with standard HDD interfaces.
- Faster boot up of PCs by using flash SSDs may speed adoption.
- Cost effective NAND memory controller technology developments are essential to ensure the success of the SSD in wider applications.
- Flash memory for SSDs will be used where performance and low power is needed but the magnetic HDD will still be around for some time after 2011

Semiconductor Spotlight – 450mm Wafer Transition

Despite the current industry downturn, the recent International Sematech Manufacturing Initiative (ISMI) Symposium on Manufacturing Effectiveness reported that the 450mm wafer programme is still on track for a process demonstration line in 2010 aimed at 32nm half-pitch technology.

ISMI, which includes 17 device makers among its members, will build the a demonstration line by combining wafer handling equipment with the first 450mm processing tools. The plan then calls for Intel, Samsung and TSMC each to build a 22nm half-pitch pattern pilot line at their respective facilities in 2012, Figure S1.

The demonstration and pilot line technology targets represent a significant milestone for the project as it now enables the equipment vendors to target their R&D efforts.

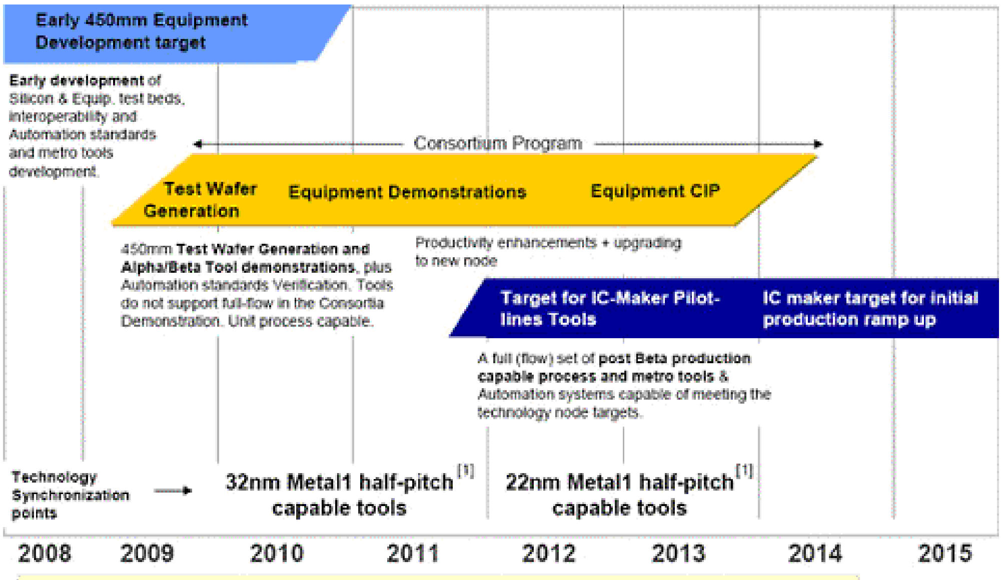
ISMI members have also funded the Factory Integration Interoperability Test Bed (ITB), aimed at developing standards for wafer handling, wafer carrier and metrology vendors. Participating firms include Asyst Technologies, Brooks Automation, Entegris, Fixeon, Genmark Automation, Gudeng Precision Industrial and H-Square.

To date the automation vendors have created prototype front-opening unified pod (FOUP) carriers for 450mm test wafers and have determined that the current

December 2008

10mm wafer pitch within the carriers can be maintained, simplifying the transition from the 300mm carriers and robots. Although the 450mm wafers have a 2.25× larger area than 300mm wafers, they are expected to be only slightly thicker at 925µm wafer thickness. A fully loaded 25-wafer carrier is expected to weigh 20.5kg.

Figure S1 - ISMI 450mm Wafer Road Map



Source: ISMI/Future Horizons

The group has also created a polycrystaline test wafer bank that has loaned out around 120 450mm test wafers to vendors for their 450mm R&D programs. One project has already determined that the level of sag expected in single crystal 450mm wafers would be nearly identical to that experienced with the polycrystalline test wafers. The test involved cutting out a 300mm portion of the 450mm sintered wafers and then comparing it to an existing 300mm single-crystal wafer.

In 2009, the ITB plans to create a single-crystal silicon wafer bank and work with metrology vendors to develop inspection tools for particle detection, geometry tools and others. The test bed expects to receive early blanket thin-film deposition equipment in the second half of the year to enable them to start basic oxide patterning in 2010.

The list of the priority tools sought for the early stages of the test bed are: oxide vertical furnace, PECVD dielectric, dielectric dry etch, dielectric CMP, PVD metal, LPCVD nitride, wet cleans, dry strip asher, particle detection metrology, film thickness metrology, and CD measurement. Early processing tools are likely to have “relaxed” processing capabilities during the test wafer phase.

For the alpha/beta demonstration lines planned for 2010, the priority tools are: 193nm dry scanner, lithography track, PECVD dielectric, dielectric CMP, dielectric dry etch, electrochemical copper plating, high-energy ion implant, LPCVD silicon nitride, wet cleans, and bare wafer particle detection.

In parallel, the ISMI 300mm Next Generation Fab (NGF) programme is focusing on using adaptive scheduling – small lot sizes and single-wafer processing – to reduce the current cycle time in fabs. Although several of the NGF productivity enhancement techniques could be introduced as upgrades into existing 300mm fabs, the long-term target is greenfield 300mm fabs with new automated material handling systems. The plan is for such NGF fabs to have a 50 percent cycle time and 30 percent cost improvementd.

The NGF program seeks to develop the ability to apply a different process recipe to each wafer in a 25-wafer lot, a goal that was attempted by IBM and other companies a decade ago but that was largely abandoned because of complexity issues. By 2010, the NGF programme seeks to develop detailed standards for processing 12-wafer lots.

The NGF program has been spearheaded by chip firms with the support of the equipment vendors and others that prefer to concentrate on improving the productivity of 300mm fabs rather than crossing over into the 450mm wafer size.

That being said, clearly the NGF goals of improving cycle time, predictive preventive maintenance (PPM) and other productivity enhancement techniques, whilst first applied to 300mm wafers, could just as easily be applied to 450mm wafer fabs as well.

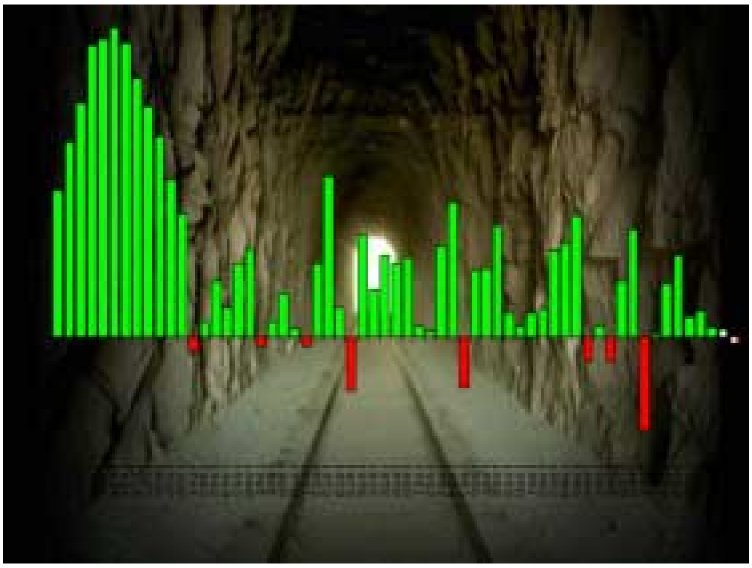
So the great 450mm debate continues. Technically it can happen, of that there is no doubt … the business and commercial issues however remain unresolved.

With the equipment suppliers currently facing a third consecutive year of negative growth, in a market that is now half what it was in 2000, with a much narrower customer base and pressure to improve equipment productivity (at the expense of additional equipment sales), no-one is able to answer the biog question …. just who exactly is going to finance this transition?

December 2008

Sign Up Now For

Future Horizons Annual Industry Forecast Seminar



With the global economy now crashed, now more than ever you need insight into the future. We have lived through nine out of the past ten chip recessions … no other analyst has this breath of experience. Whilst the cause of each of the past recessions has been constant, the trigger and effect of each has been different … so too is this one. The solution to each has also been constant, now is the time to build for the future, getting the facts of the matter is the first step in this process.

Seminar Programme Includes:

- **2009 Market Forecast ... The Key Factors Analysed**
- **2010 Industry Outlook ... Blue Skys Or Stormy?**
- **Industry Application Drivers ... IC Content & Forecast**
- **Market Outlook ... 5-Year Regional & Product Forecasts**
- **Supply & Demand ... Wafer Fab Capacity Trends**

London, England – Jan 27, 2009

For more details and on-line registration visit: www.futurehorizons.com

December 2008

Exchange Rates

Figure R1 shows the weekly Euro exchange rate vs the US$ and UK£ for 2008. Figure R2 shows the historical trend since its 1st Jan 1999 launch.

Figure R1 - 2008 Exchange Rate Trend (Euro vs. US$/UK£)

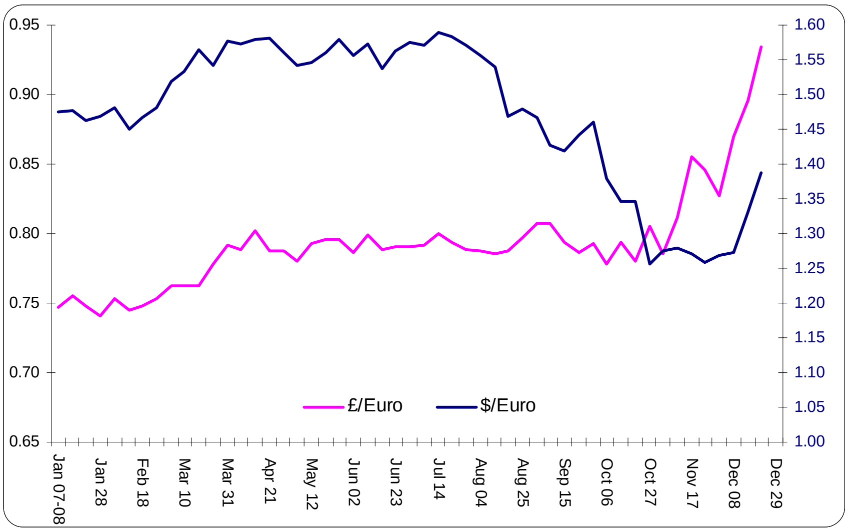
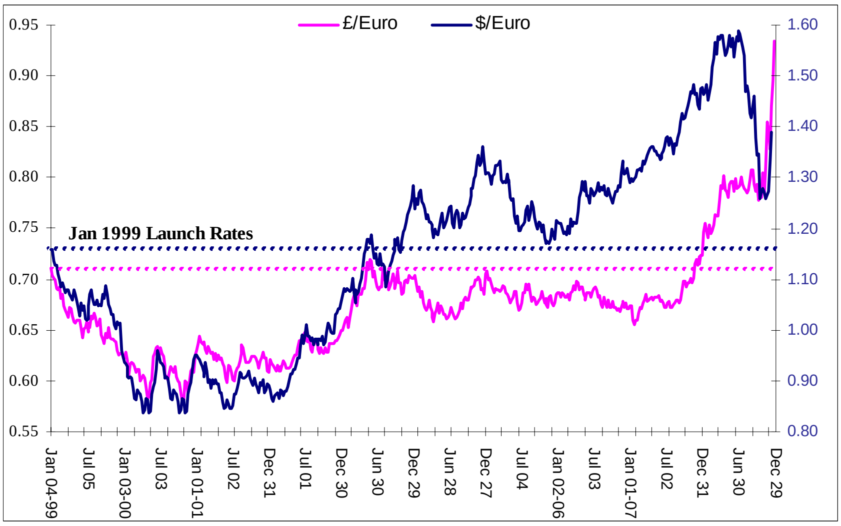


Figure R2 - Exchange Rate History, 1999-To Date (Euro vs. US$/UK£)



Source: Financial Times/Future Horizons

December 2008

Tired Of Over Paying For Market Research Reports Or Due Diligence?

We ARE the Global Semiconductor Industry Analysts. **We DO NOT** charge stratospheric prices for so-called 'information services', essentially a hyped-up name for ad hoc/multi-client reports. **NOR do we** hold our clients to ransom by the age-old technique of bundling up products to lock out competition. **We DO**, however, offer a **better value alternative**, with a **research efficiency** and **analysis** that is **second to none**.

We know old habits are hard to break, but with budgets tight and discretionary spending curtailed, the time for change is long overdue … **Future Horizons is proud to be at the forefront of this change**. This is no dream, just a win-win situation for us both. **You save** substantially on your valuable market research dollars, and the more you support us, **the more we can help you**.

- **Market Research Reports** - *Covering The Basic Industry Statistics*
- **Informed Analysis** - *From Industry-Experienced Experts*
- **Monthly Newsletters** - *For The Latest News & Information*
- **Dedicated Research** - *For Added Insight & Analysis*
- **Flexible Resource Support** - *From A Few Hours To A Custom Study*
- **Clearly Defined Objectives** - *You Get Exactly What You Want*
- **Predefined Budget** - *You Pay Only For What You Need*

Founded in 1989, Future Horizons offers the highest possible standards in all of its activities, be it industry reports, consulting assignments, engineering support services, or industry symposia. Our current range of research reports includes:

- Global Semiconductor Update Report (12 issues p/a)
- Penn On Paper Newsletter (12 issues p/a)
- East European Report Newsletter (12 issues p/a)
- Annual Semiconductor Report
- Semiconductor Application Markets Report
- European Fabless Semiconductor Report (Optional Database)
- European Semiconductor Wafer Fabrication Capacity (Optional Database)
- Russian Electronics Industry Report
- Russia & The Other Countries Of The Former USSR IC Manual
- East European Semiconductor Report

December 2008

Summary Of Key Reports

Brochure downloads are available from our website. Reports can be purchased online, by fax, or email and are supplied in A4-ring binder and CD-ROM format. Respect copyright laws, multi-user/site licenses are required for additional users and/or posting on company Intranets.

Global Semiconductor Update Report

http://www.futurehorizons.com/new_web/westmkt/mureport/mureport.htm

A CEO favourite, this report is all a busy executive needs to keep in touch with industry trends. E-mailed monthly, the report provides a useful industry momentum indicator by compiling 12-monthly rolling charts for Units, Average Selling Prices (ASP) and Revenues broken down by total SC, IC, Optoelectronics and Discretes. Also included is a review of the world economy, broken out by region, plus a monthly feature on a key semiconductor market driver. The link between the economy and the semiconductor industry is not perfect but by measuring and understanding the impact of wafer fab capacity on lead-times and prices, and by monitoring the level of system OEM, distribution and semiconductor company inventory, more sense can be made of this fundamentally unstable industry. The report focus is on in-depth analysis and the underlying industry trends.

Annual Semiconductor Report

http://www.futurehorizons.com/new_web/westmkt/esreport/esreport.htm

This two-volume report provides market analyses and forecasts of the worldwide and European semiconductor market (Volume 1), as well as a detailed analysis of the 27 key semiconductor end-user applications and industry market drivers, collectively accounting for three quarters of the total IC market (Volume 2). This value-added bundle is a must-have for anyone interested in the global semiconductor market and European detail.

Semiconductor Application Markets Report

(Previously called the Key Market Drivers Report)

http://www.futurehorizons.com/new_web/westmkt/kmreport/kmreport.htm

Volume 2 of the Annual Semiconductor report is available separately as the Semiconductor Application Markets Report. Individual chapters describe how each application works, the technology used, the unit sales history and forecast, the semiconductor content and the associated semiconductor market size. This vital research resource volume is a proven industry favourite. Individual applications are also available as separate reports; please call for details.

European Fabless Semiconductor Report

(Previously called the European Chipless & Fabless IC Design House Report)

http://www.futurehorizons.com/new_web/westmkt/dhreport/dhreport.htm

This 300-page report covers the European and Israeli, chipless, fabless and independent IC design house community, and is essential for those planning the resources of subcontracting new product design, both in the semiconductor industry and the final system end product. It will also prove invaluable for authorities and government departments, planning and directing economic growth, as well as companies seeking investments, potential partners or acquisitions. As an added user benefit, the 280 strong chipless and fabless IC design house company database is available in Excel format as an optional CD extra (not available separately), with both pre-organised sorts (by country, design skill and application) and in raw data format allowing customised searches and analyses. This best-selling report has a proven track record as an invaluable research resource.

December 2008

Annual Semiconductor Report

Updated Annually - 820 Pages - Despatched As Two Volumes:

Annual Analysis & Forecast Of The Worldwide & European SC Industry

Topics Include

- Semiconductor Market & Product Forecasts
- Semiconductor End-Use Markets
- Global Economic Environment
- Regional Market Analysis
- Key End Market Applications Reviewed
- 5 Year History Plus 5 Year Forecast

Vol 1 – Product & Geographical Markets (370 Pages / 350 Figures & Tables)
Vol 2 – Semiconductor Application Markets (450 Pages / 325 Figures & Tables)
(Vol 2 Available Separately As A Stand-Alone Report)

- There *IS* No Better Value-Added Package -

December 2008

Semiconductor Application Markets Report

Updated Annually - Over 450 Pages / 320 Figures & Tables

Annual Analysis & Forecast Of The Top Semiconductor Applications For The Worldwide Electronics & SC Industry

(Previously Called The Key Market Drivers Report)

Topics Include (30 Top Applications Analysed)

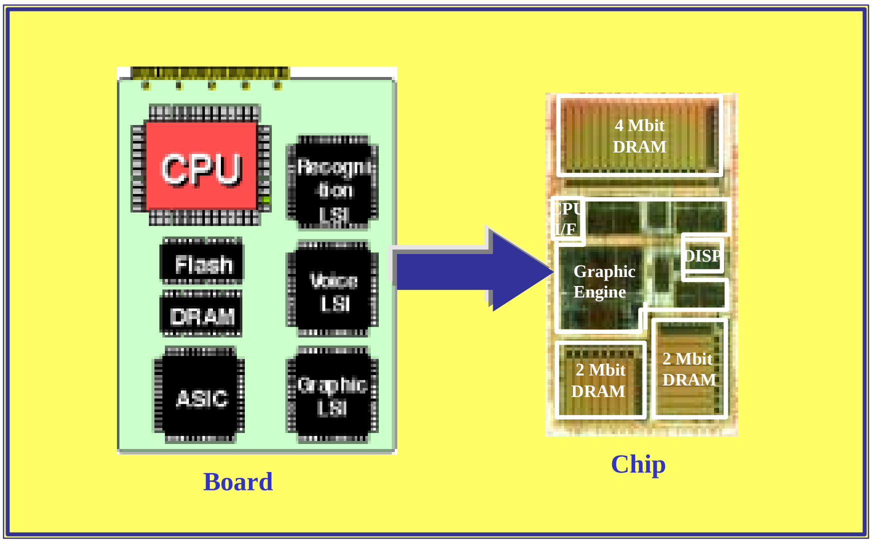
- Mobile Phone Handsets & GPS
- Personal Computers & PDAs
- Automotive Electronics & Robotics
- Smartcards & RF-ID Tags
- DVD Recorders & Players
- Bluetooth, Wireless LANs & Wi-Fi
- Digital STB & Still Cameras
- Video Games Consoles

- Report Covers Over 92 Percent Of The Worldwide IC Market -

December 2008

European Fabless Semiconductor Report

Updated Annually - Over 320 Companies Analysed



Annual Strategic Analysis & Reference Guide For The European Chipless & Fabless IC Design Industry

(Previously Called The European Chipless & Fabless IC Design House Report)

Topics Include

- **European IC Design House Phenomenon**
- **IC Design House Industry Drivers**
- **IP Market Development**
- **IC Design House Market Segmentation**
- **IP Portfolios & Design Skills Analysed**
- **Over 320 Design Companies Profiled (Europe & Israel)**

- Includes The Popular European Fabless SC Database Disk -

(Optional Extra, Available Exclusively To Report Purchasers Only)

December 2008

2009 Diary Dates

(Sign Up Now – Online @ www.futurehorizons.com)

Jan 2009	**27th - IFS2009, Semiconductor Industry Briefing, London** Annual analysis & forecast of the European & WW semiconductor market
Mar	**9th - Silicon Chip Industry Training Seminar, London** Presented in layman's terms, this seminar provides a complete overview of the integrated circuit industry, its background, technology, manufacture & markets
May	**6th-8th - International Electronics 2009 Forum, Bangalore, India** IEF2009 - 18th Annual International Electronics Industry Forum. An international forum to update market forecasts, develop new business opportunities, meet new contacts, share experiences, explore ideas, and refine strategic thinking
Jun	**18h - Silicon Chip Industry Training Seminar, London** Presented in layman's terms, this seminar provides a complete overview of the integrated circuit industry, its background, technology, manufacture & markets
Jul	**21st – IFS2009 Mid-Term Semiconductor Industry Briefing, London** Mid-year analysis & forecast of the European & WW semiconductor market
Sep	**7th - Silicon Chip Industry Training Seminar, London** Presented in layman's term, this seminar provides a complete overview of the integrated circuit industry, its background, technology, manufacture & markets
Oct	**7th-9th - International System & SoC Forum 2009, Venue TBA** IFF2009 - 7th Annual International System & SoC Forum. An international forum to discuss business issues within the international design & IP market, meet new contacts, share experiences, explore ideas and refine strategic thinking
Nov	**23rd - Silicon Chip Industry Training Seminar, London** Presented in layman's term, this seminar provides a complete overview of the integrated circuit industry, its background, technology, manufacture & markets

All seminars are available on an In-House basis
Custom presentations and seminars are also available
For more details, please call:
Tel: +44 (0)1732 740440 or e-mail seminars@futurehorizons.com

December 2008

The Complete B2B Solution

Market Research is not an expensive luxury but a key strategic tool, not just for established firms but also for start-ups and SMEs. It is never too timely to access industry intelligence … even the best-targeted products come unstuck due to unforeseen market or competitive developments. Likewise even the best-run companies benefit from a regular external health-check in order to make sure that their plans have not become sanitised and drifting from the real-world reality.

In the same vein, it is never too early to think about branding, even if still operating heavily in stealth mode. As such, coincident with the November 2008 launch of our new Website, **Future Horizons** has combined with **EML** and **Freshleaf Media** to provide a coherent range of B2B solutions; from industry intelligence to branding and messaging.

Future Horizons is a global semiconductor industry analyst with over 148 man-years of electronics industry experience, starting from 1962 and the first commercial IC. This experience covers the full industry spectrum, from chip design to application, IC production through to business development. **No other industry analyst has the breath and depth of experience**. Our research services span market data, industry analysis, due diligence and product positioning; our business support covers industry training through networking and contact support.

http://www.futurehorizons.com/ Tel: +44 1732 740440 Email: info@futurehorizons.com

EML is a technology PR agency specialising in national, regional and global campaigns that get results. They are equally at home working with the world's biggest technology brands and with early stage start-ups; targeting senior decision makers or highly informed technical experts.

http://www.eml.com/ Tel: +44 20 8408 8000 Email:info@eml.com

Freshleaf Media are experts in corporate website design services to the high-tech electronics and engineering industries. With 10 years experience and clients including Sentec, Innovision, CSR and Future Horizons, Freshleaf offers a full range of professional corporate design and development services to include; creating practical and usable B2B websites, content management systems, making updates easy, logo and brand design and the creation of intranets and extranets.

www.freshleafmedia.co.uk Tel:+44 1202 847160 Email:enquiries@freshleafmedia.co.uk

We are all semiconductor/IT industry specialists, able to walk the walk and talk the industry talk. **Together we offer a complete B2B development solution package, each adding a real value to your organisation.**

Future Horizons Order Form

Price List Effective Nov 01, 2007 (Prices Subject To Change Without Notice)

Order on-line @ www.futurehorizons.com. E-mail: mail@futurehorizons.com

Three Easy Ways To Order: Online: ◆ By Fax: ◆ By mail:

Please Enter Our Order For The Following Publications (Check Appropriate Boxes)

Report (Please note, all prices shown exclude UK VAT)	UK Pounds £	Euro €	US Dollars $
[ ] Semiconductor Applications Market Report - **Binder *plus* CD-ROM**	**£2,600.00**	**€ 3,975.00**	**$5,680.00**
[ ] Intranet/Site Licence	3,650.00	5,600.00	7,950.00
[ ] Annual Semiconductor Report (Includes 1 above) - **Binder *plus* CD-ROM**	**£3,000.00**	**€ 4,580.00**	**$6,500.00**
[ ] Intranet/Site Licence	4,200.00	6,500.00	9,130.00
[ ] Global Semiconductor Update Report - **By E-Mail (1 year, 12 Issues)**	**£1,500.00**	**€ 2,300.00**	**$3,250.00**
[ ] Intranet/Site Licence	2,200.00	3,370.00	4,800.00
[ ] European Semiconductor Wafer Fab Capacity - **Binder *plus* CD-ROM**	**£2,600.00**	**€ 3,975.00**	**$5,680.00**
[ ] Optional Database Disk (*only with Report/CD-ROM*)	400.00	615.00	870.00
[ ] Intranet/Site Licence (Excluding Database Disk)	3,650.00	5,600.00	7,950.00
[ ] Intranet/Site Licence (Including Database Disk)	4,050.00	6,200.00	8,820.00
[ ] European Fabless Semiconductor Report - ***Binder plus CD-ROM***	**£2,600.00**	**€ 3,975.00**	**$5,680.00**
[ ] Optional Database Disk (*only with Report/CD-ROM*)	400.00	615.00	870.00
[ ] Intranet/Site Licence (Excluding Database Disk)	3,650.00	5,600.00	7,950.00
[ ] Intranet/Site Licence (Including Database Disk)	4,050.00	6,200.00	8,820.00
[ ] Fabless Semiconductor Market Update Report - **Binder *plus* CD-ROM**	**£1,500.00**	**€ 2,300.00**	**$3,250.00**
[ ] Intranet/Site Licence	2,200.00	3,370.00	4,800.00
[ ] Power Semiconductor Report - **Binder *plus* CD-ROM**	**£2,600.00**	**€ 3,975.00**	**$5,680.00**
[ ] Intranet/Site Licence	3,650.00	5,600.00	7,950.00
[ ] Russian Electronics Report - **Binder *plus* CD-ROM**	**£3,000.00**	**€ 4,580.00**	**$6,500.00**
[ ] Intranet/Site Licence	4,200.00	6,500.00	9,130.00
[ ] East European Semiconductor Report - **Binder *plus* CD-ROM**	**£2,600.00**	**€ 3,975.00**	**$5,680.00**
[ ] Intranet/Site Licence	3,650.00	5,600.00	7,950.00
[ ] Penn On Paper Newsletter **(1 year, 12 Issues)**	**£500.00**	**€ 765.00**	**$1,100.00**
[ ] Intranet/Site Licence	1,100.00	1,700.00	2,400.00
[ ] East European Report Newsletter **(1 year, 12 Issues)**	**£500.00**	**€ 765.00**	**$1,100.00**
[ ] Intranet/Site Licence	1,100.00	1,700.00	2,400.00
[ ] International Electronics Forum Proceedings - **Includes Postage**	**£370.00**	**€ 620.00**	**$800.00**
[ ] International System & SoC Forum Proceedings - **Includes Postage**	**£370.00**	**€ 620.00**	**$800.00**
[ ] International Forecast Seminar Proceedings - **Includes Postage**	**£415.00**	**€ 690.00**	**$900.00**
[x] Shipping Costs (courier)	**£20.00**	**€ 80.00**	**$130.00**
Amount Due	£	€	$
UK VAT may be applicable on some items, please call/check invoice	£	€	$
Total Amount Due (Pre-payment or PO number required)	£	€	$
Bank Details (Please Use The Correct Account) BIC:	RBOS GB 2L	RBOS GB 2L	RBOS GB 2L
Royal Bank of Scotland, 3A Edinburgh Road, PO1 1DA, ENGLAND. IBAN:	GB02RBOS16282411686316	GB81RBOS16109010001457	GB86RBOS16630000079565

(Respect International Copyright Laws - Multi User/Internal/Intranet Distribution Needs A Site Licence)

Buyer Is Responsible For All Bank Transfer Charges

Full Name:____ **Job Title:** ____

Company: ____ **VAT/MWS/TVA/IVR No:** ___________________________

Tel:______________________________ **Fax:** ____________________________ **E-mail:** __________________________

Address: ____

City/ZIP/Post Code: ___________________________________ **Country:**____

[ ] Please Invoice, PO #:______________ [ ] Bank Transfer Authorised [ ] Cheque Enclosed (**drawn on a *UK bank* only**)

Signature: ____ **Date:**_______________________________________

US Affiliate: Pathfinder Research Inc	**Russian Affiliate: Electronintorg SP**	**Far East Affiliate: Semicon Research Ltd**
1620 Old Oakfield Road, Suite D202	20 Usievicha Street	Kagami Ishi Bldg., 1-11-7, Bunkyo-Ku
San Jose, California 95131, USA	125190 Moscow, Russia	Yushima, Tokyo 113, Japan
Tel: + 1 408 437 1905 • Fax: + 1 408 437 8929	Tel/Fax: +7 495 155 4635	Tel: + 81 3 5684 3941 • Fax: + 81 3 5684 3943
Email: hfeeny@pathfinder-research.com	Email: elers@redline.ru	Email: o_ohtake@semiconresearch.com

Future Horizons

Future Horizons Ltd, 44 Bethel Road, Sevenoaks, Kent TN13 3UE, England

Tel: +44 (0)1732 740440 • Fax: +44 (0)1732 740442 • e-mail: mail@futurehorizons.com • www.futurehorizons.com

The Global Semiconductor Industry Analysts

Research Reports

Consulting Projects

Seminars & Forums

Design Services

Due Diligence

1989-2008
19 Years Of Service

Established in April 1989, Future Horizons provides global semiconductor market research, technology and design evaluation, training and other business support services for use in opportunity analysis, business planning and new market development. Emphasis is placed on the worldwide semiconductor and microelectronics industry, plus European market detail. Its industry information seminars and forums are widely considered to be the best of their kind.

Malcolm Penn is the founder and CEO of Future Horizons, with over 45 years experience in the electronics and semiconductor industry. He has worked extensively throughout Europe as well as in the United States, the former USSR, Japan and Korea, and was an early pioneer of pan-European research and product development collaboration in the 1970s during his tenure with ITT Europe. His industrial experience has involved him with all aspects of the management, manufacturing, marketing and use of electronic components, particularly semiconductor devices.

Four Decades Of Semiconductor Experience

100+ Man-Years Of Research Resource

With more than 100 man-years experience in the semiconductor and related industries, Future Horizons' research reports and consulting services offer a high quality, cost-effective, flexible alternative to expensive subscription-style, market research. Our IC experience commenced with the industry in 1961, *from the first commercial IC to SOC integration*. For all of your semiconductor business development needs **...**

Let Future Horizons Save YOU Time & Money

US Affiliate: Pathfinder Research Inc	**Russian Affiliate: Electronintorg Ltd**	**Far East Affiliate: Semicon Research Ltd**
1620 Old Oakfield Road, Suite D202 San Jose, California 95131, USA Tel: + 1 408 437 1905 Fax: + 1 408 437 8929 E-Mail: hfeeney@pathfinder-research.com	24/2 Usievicha Street 125315 Moscow, Russia Tel/Fax: +7 495 151 1639 E-mail: elers@redline.ru	Kagami Ishi Bldg., 1-11-7, Bunkyo-Ku Yushima, Tokyo 113, Japan Tel: + 81 3 5684 3941 • Fax: + 81 3 5684 3943 E-Mail: o_ohtake@semiconresearch.co.jp