It's one of the best-known names in PC circles but few of us know much about the company whose processors drive more computers than any other brand. Ursula Seymour visited its headquarters in California to get the inside scoop on Intel

Supplier profile: Intel

Intel is one of the biggest names in the IT industry, ranking alongside Microsoft as one of the most famous technology brands. With its Intel Inside advertising campaign, featuring shiny suited bunny men and superfast computers, it has become a household name in a way that most component manufacturers can only dream of.

But what lies behind the brand? Where did Intel come from and where does it see the future of its business in these testing times for technology companies?

Intel is in transition at the moment as it updates its manufacturing process in its key business of semiconductors and begins to see the fruition of a long-term policy of diversification.

In its 35-year history, the company has weathered many such transitions, such as fighting off competition from the Japanese conglomerates in the late 70s and ditching its core Dram memory business in the mid-80s. In the mid-90s it coped with a publicity nightmare when a flaw was found in its Pentium processor.

History 101

Intel was the brainchild of Bob Noyce, the late chief of semiconductor consortium Sematech, and Gordon Moore, proponent of Moore's Law, which states that the number of transistors per square inch on an integrated circuit will double every year. They met while working for Nobel prizewinner William Shockley, but left in 1957 with six others to form Fairchild Semiconductor.

Strategic communications manager Howard High believes these early days of working together in a lab set the scene for Intel's management technique. "The Silicon Valley management style started at Fairchild. You had eight senior scientists who were peers and they operated Fairchild in that lab structure, which permeated down to the management structure," says High.

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When, in 1968, Noyce and Moore left Fairchild to form Intel (a name derived from integrated electronics) they used their unique management style to successfully blend the strengths of newcomers and more experienced managers.

As High points out, "In a lab setting, whether you are a junior or a senior person, everybody has to contribute. Everybody has an opinion and that allows you to find out who are the really smart people [and let them] move up in your company quickly."

To ensure that these management methods endure, Intel drums six key values into all its staff: risk taking, discipline, great place to work, results, quality and customer orientation. These rule how the company operates and High believes Intel's support of calculated risks helps keep it ahead of the game.

Another of Intel's benefits is that, while it has been headed by some of the most famous names in IT, it has never been overshadowed by a single personality. This is perhaps because of power sharing at the top level – the company was started by Noyce and Moore, who were joined by Andy Grove. Noyce left, leaving Grove and Moore at the helm, then the current CEO, Craig Barrett, made up the triumvirate.

Barrett is now backed up by chief operations officers Paul Otellini, who is widely tipped to step into his shoes when
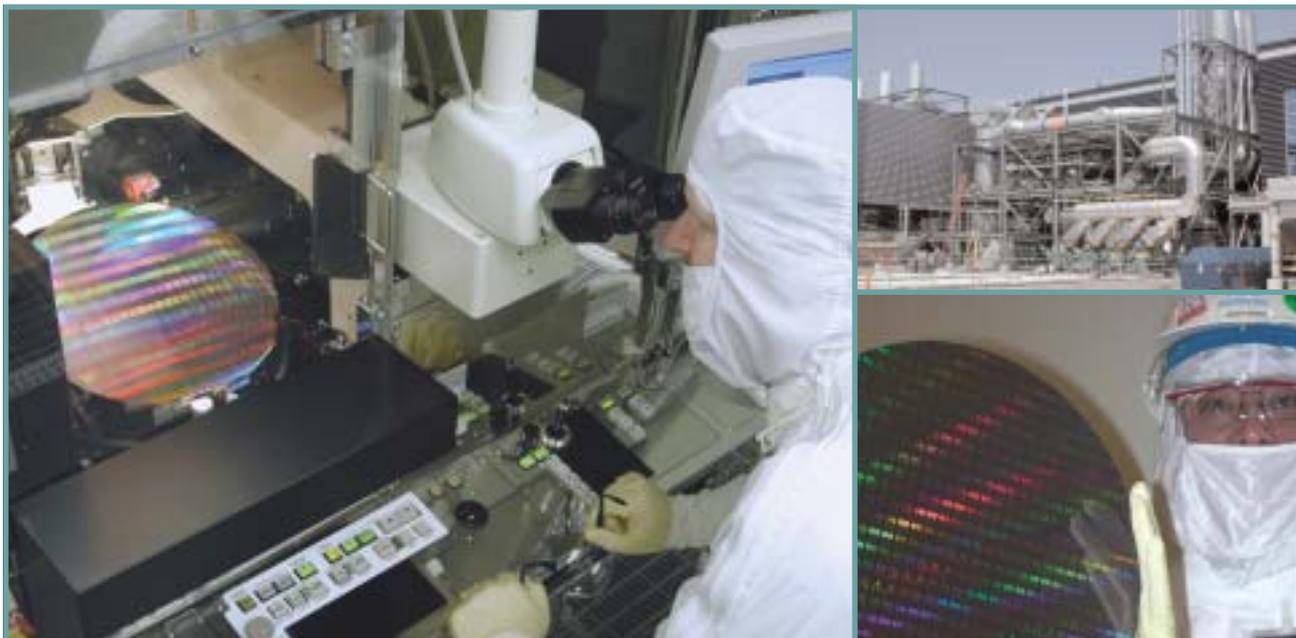
he takes compulsory retirement in the next few years. Under the stewardship of these men, Intel has grown from a startup to a company worth $25-30bn a year. But the company has faced many challenges to reach its current worth.

Weathering the storm

Intel is no stranger to industry downturns, but one of its major challenges came in the late 70s when the Japanese conglomerates decided to take on the US in the Dram memory market.

They used their strength as diversified companies to dump low-cost products on to the US market, pushing out all but three of the dozen or so US companies – Intel included. The company closed down a third of its factories and lost a third of its workforce in the process, deciding to concentrate on microprocessors instead.

The next major hiccup came with the launch of the Pentium processor in 1994. The chip had a minor mathematical flaw and, after failing to reassure customers that errors would only occur once every 27,000 years, Intel had to take the decision to replace all the faulty Pentiums at a cost of $460m. "We as a company had to recognise that this was now a consumer not a technical brand," explains High.

But the Pentium also had a more positive influence: its introduction paved the way for PC market newcomers such as Dell and Gateway. While traditional companies were happy to stick with the tried-and-trusted 486 processor, the new companies saw the Pentium as a way to compete with the established players,

pushing their PCs as offering maximum power at a lower cost using the same trusted Intel Inside technology.

The latest test of Intel's mettle is Craig Barratt's strategy of diversification. This sees the company dipping a toe into uncharted waters such as the enterprise arena, with server processors like Itanium; PDAs with the XScale; mobile phones with Manitoba; and, ultimately, communications infrastructure technology.

Future perfect

Barratt's scheme began in the heady days of the dotcom boom, and ever since the market hit the floor soothsayers have foretold the failure of his grand plans for Intel. But company figures point to success in at least two of these areas.

In the server market, Intel has gone from zero market share in the mid-90s to an 80-90 percent share today, albeit in the less lucrative part. But it plans to aggressively push Itanium to the greater profit, high-end enterprise customers so watch this space.

Equally, with PDAs Intel has gone from nowhere to a position where almost all new devices on the market are powered by its XScale chip. The company has yet to crack the mobile phone market, although it is already the world's leading supplier of flash memory and it's just starting to get the processing side off the ground.

In the communications infrastructure market its goals are more long term. But High believes that the current depressed state of the industry could work in Intel's favour. "When things were going really well

in that business we were the newcomer and [no one] wanted to take a risk on a newcomer. Now [the business isn't doing as well] people are at least willing to listen to what we have to offer", states High.

Intel: at a glance

- Founded **1968. Intel stands for integrated electronics**
- First microprocessor **1971.**
Intel is now the number-one microprocessor manufacturer in the world with approximately 80 percent market share
- Employees **78,000 worldwide**
- Worldwide production

12 fab factories, 12 assembly and test facilities worldwide
- Key executives
Gordon Moore, founder; Andy Grove, chairman of the board, was CEO from 1987-98; Craig Barratt, chief executive officer; Paul Otellini, chief operating officer; Pat Gelsinger, chief technology officer
- UK office address
Pipers Way, Swindon, Wiltshire SN3 1RJ
- Website **www.intel.co.uk**
- Telephone **01793 403 000**

Gordon Moore

Andy Grove

Craig Barratt

Intel: at a glance

- 1968 **Bob Noyce and Gordon Moore incorporate a new venture called NM Electronics and buy the rights to the Intel for $15,000**
- 1969 **Intel reaches 100 employees**
- 1970 **Buys first land – 26 acres in Santa Clara, California**
- 1971 **First $1m month. Intel goes public at $23.50 per share**
- 1972 **First 8bit processor. Beginning of transition from 2in to 3in wafers**
- 1974 **Intel's 8080 processor is used in IBM's Altair 8800, the first personal computer**
- 1980 **Intel joins with Xerox and Digital Equipment Corporation to define ethernet standard**
- 1981 **Intel 8088 chip used in IBM PC**
- 1982 **Intel 286 processor launched; it has three times the power of any other 16bit processor. It is used in IBM-clone PCs. By 1988 PC makers have sold over 15million 286-based systems worldwide**
- 1985 **Intel 386 launched. Falling prices and a glut in the market leads Intel to pull out of the Dram memory market and to focus on semiconductors**
- 1989 **Intel 486 processor launched**
- 1990 **Bob Noyce dies of heart attack. First $1bn quarter**
- 1991 **Intel Inside campaign starts**
- 1993 **Intel becomes world's largest semiconductor manufacturer; Pentium processor launched**
- 1994 **Pentium chip used in notebooks**
- 1997 **Intel adds MMX technology**
- 1998 **Celeron and Xeon launched**
- 1999 **Pentium III launched**
- 2000 **XScale and Pentium 4 launched**
- 2001 **Itanium launched**
- 2003 **Centrino and Manitoba launched**

Business breakdown

While Intel is busy shifting its eggs into a variety of baskets, its core business remains in the architecture industry of processors and chipsets for desktop PCs, notebooks and servers. This accounts for around 80 percent of its revenue, with its new businesses of PDAs, phones, flash memory and communications making up the remaining 20 percent. But the former has only just started to break even and the latter is currently losing the company a "manageable" $100m per year, says High.

But the core business is in its own state of flux as the company moves from 200mm to 300mm wafers, allowing it to cut costs by fitting more chips on to a silicon wafer. This is being carried out in tandem with a move to shrink the size of the chips themselves from 0.18 micron down to 0.13 micron and, eventually, a 90-nanometre process. So the chips get smaller as the wafers get bigger, which equals even more profit – or savings for the customer depending who you talk to.

To be fair, making microprocessors is a costly business. Just building and equipping a wafer fabrication factory (or 'fab') costs about $2.5bn because of the technological sophistication involved. Intel has even had to build its own microscopes just to see the transistors, which are now smaller than a biological virus.

Each wafer has hundreds of millions of transistors on it and Intel makes in the region of 150 million microprocessors each year and over a billion different devices in total. To create these vast numbers of products it employs 78,000 people and has 12 fabs and 12 test facilities worldwide.

Every two years Intel shifts to a new process generation and typically it will ramp up the new process in five or six factories around the world. Its current move to new 300mm wafers is being rolled out at five factories in Oregon, New Mexico, Ireland and Arizona – all of which should be online by 2005.

The cost of upgrading factories varies. To shift from a new process – for example, from 0.18 to 0.13 micron – costs around $500m. Equipping a fab totals around $1.6bn, though 70 to 80 percent of equipment can be reused within its three-year shelf life.

Moving to a different wafer size is a lot more costly as virtually no equipment can be reused. Only the bricks and mortar of the factory can be recycled, so the need to turn a tidy profit is essential.

The magic number

Intel anticipates that its nearest competitors will have just one or two factories equipped for 300mm wafer production by 2005. These rivals include the foundries, or factories for hire, in the Far East and giant companies such as Samsung, the world's largest Dram maker.

> The chips get smaller as the wafers get bigger, which equals even more profit – or savings for the customer depending who you talk to

Desktop processor rival AMD doesn't even get a look in according to High, as its deal to build a 300mm factory with Taiwanese foundry, UMC, looks likely to fall through. Intel believes it has the edge over its true competitors as it can move swiftly to meet demand.

"A company that uses [a foundry] relies upon a separate organisation to make the best call for them in order to maximise their profitability," explains High.

He believes that while Intel can provide state-of-the-art products from start to finish in three months, thanks to in-house manufacturing, competitors that rely on third parties will be held up for nine to 12 months. Intel is banking on this swift response bringing in big bucks come the eagerly awaited upturn in the IT market. "The key thing is to retain the focus and the edge, so when the recovery comes we can jump on it," says High.

Up, up and away

While Intel is ready and waiting for the upturn to arrive, it is unwilling to add any predictions of when this might come to those already on the table from analysts and industry watchers. But it is confident it can ride the storm for quite some time to come. Throughout this recession the company has remained profitable and High says it "can keep at this pace for quite a long time". ∎