

Intel Global Manufacturing Facts



“For Intel, manufacturing serves as the underpinning for our business and allows us to provide customers and consumers with leading-edge products in high volume. The unmatched scope and scale of our investments in manufacturing helps Intel maintain industry leadership and drive innovation.”

-- Intel Brian Krzanich, senior vice president and general manager, Manufacturing and Supply Chain.

- Operating 24 hours a day, seven days a week in plants around the world, Intel's factories are precision tuned to perform with maximum efficiency and quality to produce fast, smart, and more energy-efficient computer chips.
- With 9 wafer fabrication plants (fabs) in production and 7 assembly test facilities worldwide, Intel's manufacturing facilities employ exceptional flexibility on a global and virtual network. By design, these facilities are consistently sharing information to improve product performance while further fine tuning the manufacturing process.
- At the end of 2010, the majority of Intel's microprocessors were manufactured on 300mm wafers. In addition, by the second half of 2011 we expect to begin manufacturing microprocessors using our 22nm process technology.
- Our manufacturing processes advance according to Moore's law, delivering ever more functionality and performance, improved energy efficiency, and lower cost per transistor, with each generation.

Fab	Location	Products	Process Technology	Wafer Size	Year Opened	Comments
D1X	Hillsboro, OR	Microprocessors	14nm and beyond	300mm	2013 projected	Development Fab
D1D	Hillsboro, OR	Microprocessors	22nm*	300mm	2003	Development Fab
D1C	Hillsboro, OR	Microprocessors	32nm/22nm*	300mm	2001	Development Fab
Fab 68	Dalian, China	Chipsets	65nm	300mm	2010	
Fab 42	Chandler, AZ	Microprocessors	14nm and beyond	300mm	2013 projected	
Fab 32	Chandler, AZ	Microprocessors	32nm/22nm*	300mm	2007	
Fab 28	Qiryat Gat, Israel	Microprocessors	45nm/22nm*	300mm	2008	
Fab 24	Leixlip, Ireland	Microprocessors, Chipsets & Comm	90nm/65nm	300mm	2004	
Fab 17	Hudson, MA	Chipsets and other	130nm	200mm	1998	
Fab 12	Chandler, AZ	Microprocessors & Chipsets	65nm/22nm*	300mm	1996	
Fab 11X	Rio Rancho, NM	Microprocessors	45nm/32nm	300mm	2002	

*22nm upgrades projected to be completed 2011-12



This map shows the location of Intel's wafer fabrication facilities (fabs) and assembly and test facilities around the world.

Assembly Test Facility	Location	Year Opened
CD1	Chengdu, China	2005
CD6	Chengdu, China	2007
CRAT	San Jose, Costa Rica	1997
PG8	Penang, Malaysia	1977
KMO	Kulim, Malaysia	1996
KM5	Kulim, Malaysia	2009
VNAT	Ho-Chi Min City, Vietnam	2010

Recent manufacturing Announcements:

D1X - In Oct. 2010, Intel announced that it would build a new development fab - D1X - in Oregon, with expected completion in 2013.

Fab 42 - In Feb. 2011, Intel announced that it would build a new chip fab - fab 42 - in Arizona, with completion expected in 2013.

Fab 68 - Intel opened its first China chip fab - Fab 68 - in Oct. 2010.

Vietnam - Intel opened its newest assembly and test facility in Vietnam in Oct. 2010.

Manufacturing Tutorial

Wafer fabrication or manufacturing of Intel's microprocessors and chip sets is conducted in the U.S. (Arizona, New Mexico, Oregon and Massachusetts), China, Ireland and Israel. Following manufacturing the majority of our components are then assembled and tested at facilities in Malaysia, China, Costa Rica and Vietnam.

FABS

The process of making computer chips is called fabrication. The factories where chips are made are called fabrication facilities or fabs. Intel fabs are among the most technically advanced manufacturing facilities in the world. When Intel first started making chips, the company used 2-inch-diameter wafers. Now the company uses primarily 12-inch or 300-millimeter (mm) wafers; larger wafers are more difficult to process, but the result is lower cost per chip. Intel uses a photolithographic "printing" process to build a chip layer by layer. Many layers are deposited across the

wafer and then removed in small areas to create transistors and interconnects. Together, they will form the active ("on/off") part of the chip's circuitry plus the connections between them, in a three-dimensional structure. The process is performed dozens of times on each wafer, with hundreds or thousands of chips placed grid-like on a wafer and processed simultaneously.

After creating layers on the wafers, Intel performs wafer sort, and a computer completes a series of tests to ensure that chip circuits meet specifications to perform as designed.

ASSEMBLY TEST

Intel sends the finished wafers to an Intel assembly facility where the manufacturing process is completed. The wafer is cut with a diamond saw, separating the microprocessors. Each functioning die is assembled into a package that protects the die. This package delivers critical power and electrical connections when placed directly on a computer circuit board, or other devices such as cell phones or personal digital assistants (PDAs).