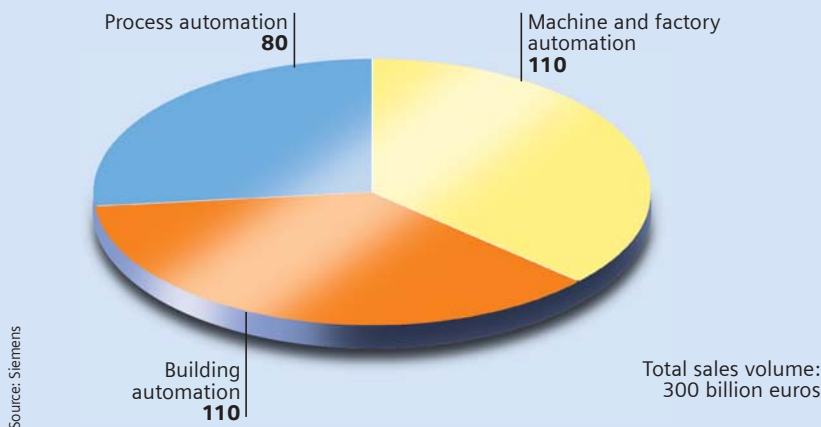


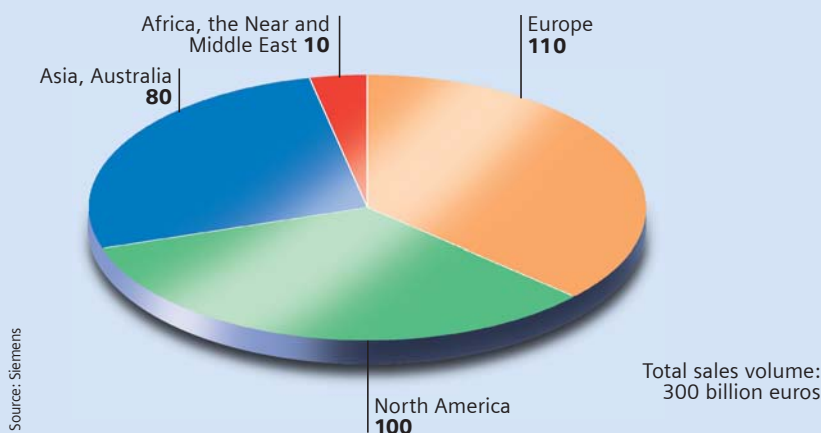
Industry: Facts...

Robots, intelligent sensors, the Internet and virtual planning are the driving forces behind the automation industry.

World Market for Automation Technology by Sector



World Market for Automation Technology by Region



↑ Last year the size of the global market for automation technology was approximately 300 billion euros, with the market being divided into three roughly equal sectors (top). As far as market share goes, Europe is slightly ahead of North America and Asia, while Africa lags behind. The annual growth rate for automation worldwide is 3% to 4%. Whereas Europe and the U.S. expect only 3% growth, the market in South America is likely to grow by 5% per year.

Information technologies are transforming the world of industry. Thanks to growing Web-based interconnectedness, processes within companies are moving faster and becoming increasingly automated. Advances in these areas are revolutionizing everything from online ordering and product tracking in the logistics chain to the digitalization of all the processes in development and production. Ultimately, we're talking about the "convergence of office and production activities," says Edgar Schüber, a Member of the Managing Board of the Software section of the German engineering industry association (VDMA).

Today, it is possible to simulate many design steps realistically on screen using powerful computers — without having to build elaborate and costly models or expensive test rigs. "Virtual simulations are now indispensable in automotive development," says Human Ramezani, who heads the Virtual Reality Center at the BMW Group.

"In the past, it was necessary to make several prototypes. But that has changed. Today, planners, designers and test engineers work on the same digital model, which they optimize on screen using data communication. If necessary, they can even simultaneously modify the model from locations throughout the world," adds Ramezani. That reduces the costs and, above all, the development time. At BMW, this was one of the technical advances that made it possible to shorten the development time for a new model from six years to 30 months.

Robots on the March. In the future, more and more robots will be used in assembly, handling and packaging. The VDMA predicts that, on average, robotics and automation will experience double-digit growth rates in →

...and Forecasts

the next ten years. Intelligent sensor and image-processing technologies are making the robot a universal automation tool. Robots that give off-site service personnel a status report via their own homepage have already progressed from utopian dream to reality.

Industrial image-processing, familiar from surface inspection techniques and mea-

surement technology, will find completely new fields of application. So far, only 15 to 20 percent of potential applications have been tapped. Germany's West LB Bank estimates that sales in Europe will rise from 678 million euros in 2000 to 2.5 billion euros in 2006. Europe, which has a 25-percent share of the world market, can therefore still catch

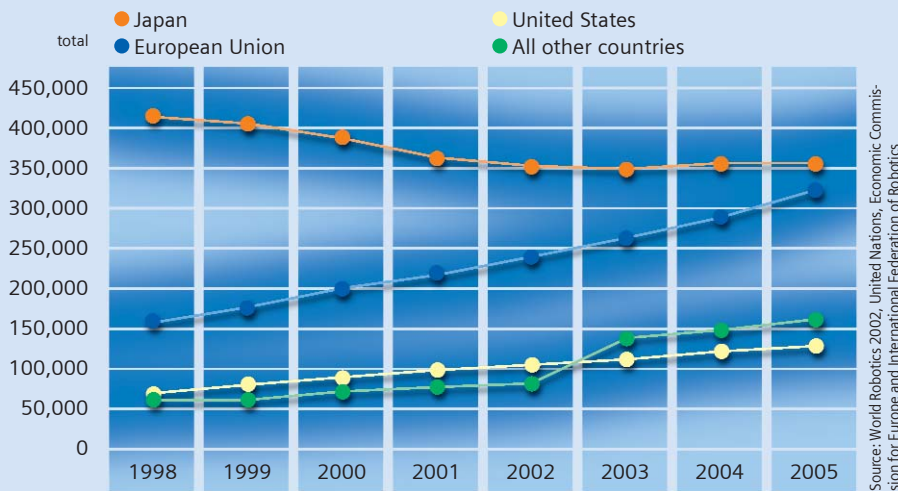
up with the U.S. (33 percent) and Japan (30 percent).

E-business as a New Opportunity. In their search for savings, companies are turning to the Internet. For instance, a study concerning cost reductions through e-business in the auto industry, conducted by Deutsche Bank and management consultants Roland Berger & Partner found that manufacturers could save up to five percent of total costs per vehicle through e-business. Purchasing via the Internet harbors enormous opportunities when combined with new business models such as desktop buying and marketplaces.

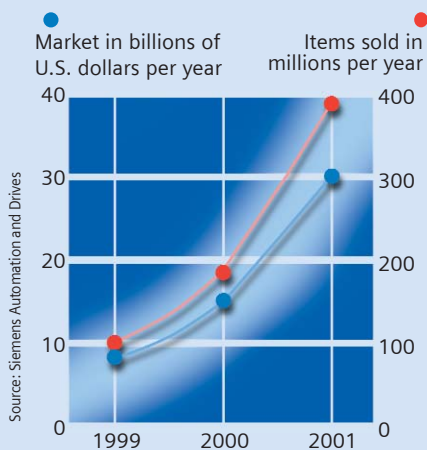
DaimlerChrysler procured a total purchase volume of approximately 10 billion euros worth of goods in 510 online bidding processes in 2001. At DaimlerChrysler, 43 percent of the total value of the parts in a planned production series was negotiated electronically. "The economic gains resulting from e-procurement in the first year of implementation have already covered past investments in e-business," says Dr. Rüdiger Grube, Deputy Member of the Board of Management responsible for corporate development at DaimlerChrysler. "Moreover," he adds, "this form of purchasing also has great potential for the future."

Data concerning the global market volume of B2B e-commerce — electronic commerce among companies — is, however, subject to large variations because of the different definitions and recording methods in use. Estimates range from \$200 billion (Morgan Stanley) to \$604 billion (Forrester Research). Forrester predicts that, by 2006, \$7 trillion worth of transactions will be conducted online in the U.S. alone. Furthermore, says Forrester, 27 percent of the goods and services in the U.S. will be sold via B2B e-commerce by 2006. *Sylvia Trage*

Number of Industrial Robots Worldwide (Estimated from 2002)



World Sensor Market Growth



↑ *In 2005 there will probably be around 965,000 industrial robots in use worldwide. Europe will catch up with Japan — where the number of robots in use has been falling since 1997. U.S. market growth will remain moderate.*

← *The global market for sensors has tripled in size in a short time. Whereas sales were slightly less than \$10 billion in 1999, they had already reached \$30 billion by 2001. The number of sensors sold increased to 400 million.*