

# **SIEMENS**

Helmut Gierse,  
President of the Siemens Automation and Drives Group (A&D),  
Nuremberg

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**Integrated Automation  
for tomorrow's markets**

- Check against delivery -

## **Business trend: 2005 was the second record year in a row**

The figures speak for themselves: For the second time in a row, Automation and Drives posted a record year. With sales of 9.84 billion Euro, we were able to increase our Group profit to 1.21 billion Euro in fiscal 2004/2005. At 12.2 per cent, our EBIT margin remains stable within the A&D goal of 11 to 13 per cent. With new orders of 10.19 billion EUR and a global staff of 60,812, we were able to reach out into new dimensions.

I am particularly happy to see that, alongside our acquisitions, all regions and business units have made major contributions to our strong growth. Demand was above average from both the process industry working with raw materials and the associated mechanical engineering industry. The leader in our regional performance is our Asia-Pacific business, which we grew in volume by approx. 31 per cent, thus again achieving an increase well above the overall level of market growth.

In the first quarter of the current fiscal year, A&D recorded a hefty 28 per cent rise in sales to 2.98 billion Euro; in the same quarter, new orders rose 42 per cent to 3.63 billion Euro. At 12.1 per cent, we reached a quarterly profit margin within our target for the seventh time in a row. This is a positive reflection of our sustained efforts to optimise the entire supply chain and to adjust our resources to economic developments and the requirements of our markets.

Our 654 million Euro investment in research and development is also a clear indication of how A&D is poised to push innovation in order to improve our performance for the benefit of our customers.

## **Market-orientated additions to the A&D portfolio**

Forecasts for our customers' industries indicate that real growth in production will be lower in 2006 than in 2005. At the same time, business in both production and process automation and in electrical systems for buildings is performing inconsistently in the large regions of the world. Whereas the Asian market can be expected to remain strong, America, the EU, and Central and Eastern Europe are showing less economic thrust.

Our goal continues to be to consolidate our number one position in the automation market and further extend our lead over our competitors. We are the undisputed

world market leader in the production industries; in electrical systems for buildings we hold the number 2 position and are further narrowing the gap between us and the market leader.

In 2005 we were able to further improve our position in process automation and once again make headway in closing in on the world's best. This is a market segment in which we are reaping the benefits of already having filled the gaps in our field device portfolio, and with Simatic PCS7 we have a process control system for which demand is constantly rising, especially in the chemical, pharmaceutical and food & beverage industries. We have now reached the point of having handled over 4,000 successful projects worldwide based on our PCS7 process control system.

These successes do not come as a surprise. We realised many years ago that business developments in the capital goods market and adjusting our product portfolio to the needs of that market would be decisive factors for our business success. This explains why A&D's portfolio policy has remained a core element of our Group's strategy as a means of generating growth and stabilising our target profit margins in the long term. Sensorics, process automation and electrical systems for buildings are our prime target sectors for making further acquisitions in order to enhance A&D's product portfolio.

The acquisition of Flender, Robicon, RVSI Acuity Cimatrix, Electronics Assembly Systems and Electrium during the last fiscal year clearly strengthened our portfolio and will increase our long-term performance across all our customers' industries. In addition, we have set up a new joint venture with Siemens Standard Motor Ltd. for low voltage motors in China in order to advance our growth in this focus market. We are keeping the door open for further acquisitions and cooperation ventures. How we will be integrating all these technological additions based on TIA (Totally Integrated Automation) and TIP (Totally Integrated Power) into our portfolio will be explained in the technology trends part of my presentation.

The Asia region, which represents almost one third of our global market, remains the number one growth driver in our business. There too we are spearheading the automation market, ahead of two European and a number of Japanese competitors.

## **India and China – systematic growth**

Let us have a look at A&D's activities in the country which is this year's partner country at Hanover Fair – namely, India – and at the systematic regionalisation we are pursuing in that country, and have, in fact, been pursuing for quite some time. At the end of 2005 Siemens could boast a 50-year history of production in India. We have been actively engaged in motor production there since the 1960s, and A&D now has four factories there producing electrical equipment, switchgear, motors, drives, and also generators and gears for wind power plants.

We have been growing at a double-digit rate in India for several years now and, in the last two years in particular, with growth rates of about 40 per cent, we have been able to further consolidate our lead position. Large-size projects such as the one to automate Asia's largest powdered milk plant, Mother Dairy in Gandhinagar, have allowed us to deploy our TIA range to the full.

At present, we employ a workforce of around 2,500 in India, we run 25 sales offices and have 232 dealers in over 100 cities. Such rapid growth is achievable only on the strength of many years of experience combined with a systematic regionalisation strategy. We were careful from the outset to integrate our activities in India into the international supply chain. Within this process, expanding local production and sales has been as much a priority as opening up new sourcing options.

Our chances of continued growth in India are good. Industrial production is growing at an average of over 10 per cent per annum; and at 18 per cent, the capital goods industry is currently almost twice as strong. The government has recognised how important the development of an industrial infrastructure is for the country's growth and its export business. Accordingly, it is promoting investment in industrial production: The metalworking, textiles and food and beverage industries are now growing at a rate of over 30 per cent per annum, followed by automotive, cement and the chemical industry. Given this backdrop, we are confident that in India we will continue to grow twice as fast as the automation market overall.

In China too, a record of powerful economic development has enabled us to achieve double-digit sales growth in recent years. Including our new joint venture with Siemens Standard Motor Ltd., we are now partners in eleven such joint ventures in China. Our activities there involve a workforce of 4,200, five development sites, nine production facilities and 60 sales offices.

The international value chain is also a top priority in China. We are integrating not only China's low cost structure but also its talent pool into our global network. This, in the longer term, is the key to managing the rapid growth evident in fields such as drive systems and mechanical engineering. For that reason we have always attached high priority to providing appropriate training for our Chinese employees. We have now reached the point where every second executive post is held by a Chinese national.

### **Global megatrends as future markets**

India and China are textbook examples of social megatrends which we at Siemens see as global challenges for the coming decades and as indicators of future markets. Here, demographic change, population growth, urbanisation, mobility, and water and energy supply are not abstract concepts but real and palpable social processes generating rapidly growing infrastructure markets.

By 2025, the world's population will be eight billion. Today's developing and newly industrialised countries will continue to battle to catch up on the economic front. Quite justifiably, they are working on creating conditions like those in the western world where people can buy, and afford, quality of life in the form of industrially produced goods.

According to forecasts published by the World Energy Council, this trend will have an enormous impact; global power consumption alone will nearly double between now and then to over 30,000 terrawatt hours per annum, a figure which must be seen in relation to limited natural resources and correspondingly rising prices. Let me put this into the right perspective: This corresponds to the annual output of roughly 4,000 large power plants in the 1,000 MW league.

### **Automation creates quality of life**

In view of all these developments, industrial production will have a decisive role to play. It will be the task of the producing industries and industry suppliers to design the industrial supply chain in such a way that limited resources can be transformed into affordable and customised goods for as many people as possible: Clean water, food, drugs, computers, cars, newspapers, plant fertilizers, and everything across the

range to sophisticated cosmetics and soft drinks to the consumer's liking ... . But the infrastructure needed to manufacture and transport these goods first has to be put in place and fine-tuned to meet market needs. Mankind needs factories, airports, ships, refineries, power plants and refrigeration chains to satisfy their diverse needs and interests.

However different goods, plants and producing industries may be, they always obey the same general principles and trends of industrial production.

Throughout the world, the premium prices today commanded by energy and raw materials are underscoring the need for more efficient technologies in power generation, water treatment, mining, manufacturing and transportation. The corresponding plants should consume as little power as possible, in other words, there is a need for energy-efficient design, integrated energy management and energy-optimised devices such as drives. In addition, producers are trying to make best use of their productive and logistic resources by networking all their plants and systems. Smart and networked sensors and actuators play a key role in this effort. Modern information technologies provide the entrepreneur with clear and readily accessible data on production and material flows.

Other trends such as the rising standard of living, more stringent consumer demands and increasing individualisation are also having an enormous influence on our production systems. These must be powerful, work reliably and flexibly so as to get a whole range of product variations to the market in large quantities, in top quality and in the shortest period of time. On the technological front, this calls for more than "just" highly productive plants and smooth communication at field level. Producers in future will attach more importance than ever to having a globally linked material flow, a product traceability facility and being able to synchronise their merchandise management systems with their production systems.

Moreover, the production systems of the future will need to take into account right from the design phase any product variant the consumer or buyer will require. Smart and modular mechatronic systems are needed to make it possible to change and adjust production swiftly and flexibly. It will be the early engineering phase, establishing a digital link between development and production, that will ensure that all this will work perfectly.

As the world market leader in automation we are heavily involved in advancing production methods and systems. Our track record of competence in automation products and systems offers what is needed for efficiently producing industrial goods in a wide range of industries. In socio-political terms, therefore, our activities are nothing other than the very basis on which quality of life is produced under market conditions for an ever larger number of people.

### **Successful transfer of expertise between A&D and our customers' industries**

How is the relevant industry expertise incorporated into our systems?

One element of our innovation strategy is to foster a systematic and ongoing dialogue with our customers. To date we have set up ten Competence Centers (CC): Automotive, Chemicals/Cement/Glass, Semiconductors, Electrical Wholesale, Micro-automation, Food & Beverage, Oil & Gas, Pharmaceuticals, Water and Waste Water as well as a cross-sector CC for PC-based solutions. Some of these have been in existence for more than ten years and now employ several hundred people.

They work very closely with Corporate Account Managers studying our customers' industries, trends and specific needs. In so doing, we tap the inside knowledge of these industries which is essential for further enhancing our products and systems. Once this knowledge has been incorporated into our products, systems and services, we offer our customers cross-sector industry suites and online industry portals which cover, in modular and specifically integrated form, the entire life cycle of their activities.

This strong customer focus gives us a competitive edge no other automation supplier can claim. The second significant lead we enjoy over our competitors is our enormously wide technological coverage, an incomparable portfolio of standardised products which we are continuing to integrate. This enables us not only to spot trends in production but also to help shape them at a global level.

### **The advantage of integrated automation**

On a worldwide level, production companies aim at greater productivity through integrated automation solutions. Given this backdrop, automation suppliers can provide their customers with maximum benefit in the form of a complete and

integrated product and system portfolio which also includes industrial information technology (Management Execution Systems, MES). Through TIA and TIP, we are setting the trends in technology by providing our customers with a horizontally and vertically fully integrated automation environment across our entire product portfolio.

Whilst other suppliers are only just starting to integrate their product portfolio, we have been aiming for more than ten years to increase the benefit of our technology to our customers by the use of standardization and platform strategies. We are systematically advancing this automation environment and are capable of integrating all technologies relevant to the market into our overall architecture at low cost.

This explains how we can offer our customers innovations today which allow for full use of their previous investments. Our efficient and finely tuned automation technology packages enable customers to constantly bring their plant up to date in technologically and financially meaningful stages, thus enjoying state-of-the-art technology. They have access to our technological portfolio which covers both primary and secondary processes and ranges from the field level to the ERP level – a decisive competitive advantage, particularly in hybrid automation.

### **Energy efficiency as a competitive advantage**

Let me now move on to the technological trends in the light of globally rising energy prices. Limited natural resources and undersized power plant capacities are also resulting in continuously rising electricity prices. According to the German association of energy buyers, medium-sized industrial customers in Germany are paying roughly 17 per cent more for electricity in 2006 than in 2005. Such price increases are affecting the cost of production, mainly in the key user industries such as automotive or aluminium, where the cost of energy accounts for about 40 per cent of overall costs.

Given this background, energy efficiency is becoming increasingly important as a competitive factor central to our industrial activities. Let me give you an example from the packaging industry:

A customer invested 2 million EUR in a 410 kW high-speed stretch blow-moulding machine for PET bottles. This machine runs six days a week in three shifts. With a write-down period of ten years, the cost of electricity (roughly 2.7 million EUR)

exceeded the purchase price by 38 per cent! So there is indeed considerable scope for cost cutting here. Our approach to improving the situation is integrated electrical power distribution as part of TIP, covering all stages from planning, installation, and operation to maintenance and service. TIP obtains leverage here from the broad product range and the full expertise of several Siemens Groups, including A&D, PTD (Power Transmission and Distribution) and SBT (Siemens Building Technologies).

Over and above the hardware capabilities for integration and communication, software modules are also playing an increasingly important role. We give investors the right tools to increase their return on investment whilst making commercial buildings more attractive to the tenant or leaseholder. Right at the beginning of a building project, electrical planning engineers can use our Simaris design software to create a simple, safe and quick power distribution diagram for the building on their computer. This tool uses real products and systems and complies with all applicable standards and installation regulations. In this way, we avoid overdimensioning the power distribution facilities, reduce procurement cost and lower the space requirement.

During operations, our Simatic power control software enables full power management from feed to distribution and load. This tool monitors and measures power flows and consumption in industrial plants and commercial buildings. Power can thereby be used more effectively and potential energy savings identified. Moreover, these tools make diagnosis and maintenance a target-driven job.

### **Energy efficiency in drive products**

The search for potential energy savings is especially fruitful in the field of electrical drive systems. In production plant, these systems account for the lion's share of up to 70 per cent of total power consumption. ZVEI, the German central association of the electrical industry, reckons that improvements in electrical drive systems in Germany alone could save roughly 20 million megawatt-hours of electricity or 1.5 billion EUR per annum. Siemens A&D has therefore systematically developed solutions for reducing consumption, including at the product level. These include both reduced power consumption for motors and the recovery of braking energy using converters.

At Hanover Fair, we will be showing both energy-efficient motors and regenerative inverters. Our new motor range, which we launched for the US market in February, fea-

tures a newly developed copper die-cast rotor. This helps to significantly increase efficiency whilst keeping the unit volume low. The motor ratings by far exceed the requirements of the Premium Efficiency Standards of the National Electrical Manufacturers Association (NEMA).

For our Sinamics drive series we will be showcasing several infeed and feedback variations for inverters designed to meet a range of requirements, such as feeding back power into the mains without impairing the quality of the power system. A rapid vector control ensures a sinusoidal mains current, and the integrated clean power filter eliminates almost entirely any low frequency mains pollution.

This has two effects: On the one hand, our converter range meets the strict specifications of many power companies in terms of reverse power flow. On the other, any losses caused by harmonic currents are eliminated in low voltage distribution, in the distribution transformer and in the power system infeed. An optimised fail-safe system ensures the constant controlled link voltage required to isolate the motor from the line voltage. This makes the drive system insensitive to load variations and short-term system voltage dips. Energy recovery concepts not only reduce power consumption but also the investment cost of additional cooling equipment.

### **Integrated drive systems for the process and production industries**

For machine manufacturers and users alike, productivity and efficiency considerations demand integrated solutions. Fewer interfaces, reliable standards and integrated concepts are key components in this context. Here we took decisive steps in 2005. With the acquisition of Robicon and Flender we not only broadened our technical portfolio across the entire drive train but also obtained important benefits in terms of technology and market access which further strengthen our range, especially in process automation.

With our Robicon acquisition, we have enhanced our market leadership in the US drive system market. A leading manufacturer of medium-voltage converters for AC motors, this acquisition not only adds to our converter portfolio but also improves our access to major growth industries in North America, such as the key industries of oil&gas, water and waste water, as well as power. Through Robicon's leading "Perfect Harmony" converter line, A&D has gained market access for other of its own products. Immediately after the legal transfer to Siemens, our order book reflected

the fact that this new combination of technological strength, industry access and financial soundness is very highly appreciated by customers in North America.

At the mechanical end of the drive train we have made an equally suitable acquisition, namely Flender. Our portfolio thus now includes all mechanical and electronic components; in other words, we are able to supply all our customers with tailor-made automation solutions that fit their own specific application requirements.

Flender's mechanical drive systems are used in a whole range of industries, ranging from classical raw materials, transport and process industries and wind power plants to special applications in ship propulsion systems, chemical plants and mining. It is mainly in the process industries that the Flender extension of our drive portfolio will bring the most benefit. It represents another building block broadening our authority in the process field. We are poised to penetrate the markets with Loher's converters and explosion-protected motors that come with the required certification for use in the petrochemical industry. They are available in all voltage classes common in the chemical industry and also meet the industry's specific requirements including NAMUR, PELV, and du/dt output filters. They are thus the ideal complement to our Sinamics drive family and the Micromaster range.

The integration of this operation is well on schedule. Siemens A&D's and Flender's organisational structures and production facilities are merging step by step. We are confident that the legal aspects of the company merger will also be completed before the end of the year. We are currently coordinating matters relating to product development, production and marketing. The overall aim is to use integrated development and more compact and powerful, lighter and longer-lived drive system designs to help industrial customers in all industries increase their productivity and competitiveness.

### **Stronger drives portfolio in China**

With a workforce of roughly 1,500, our new joint venture, Siemens Standard Motor Ltd. (SSML), represents another major step forward in the drive sector and has added a comprehensive motor range to our product portfolio in China. We are now in a position to supply products and systems across the entire drive train from local production in China. This means shorter response times and closer contact with our customers in the Asian markets. Besides strengthening local production, our new

SSML joint venture is also strengthening research and development in China. Our aim is to reach a leading market position for low voltage motors in the middle price range.

I would now like to illustrate our holistic approach and our matching of products to the specific needs of each market and industry with a few examples. They all come under the heading of increasing our customers' and users' productivity.

### **New motors**

Early this year we launched an electrical combination drive. This motor combines both rotational and linear motion in a single housing. The rotor of the synchronous motor is moved axially by a linear motor. This motor was originally developed for offset printing presses, and in particular for driving ink distributor rollers. However, this drive can be used in all other applications where rotational drive needs to be combined with short linear motions.

I referred earlier to the new range of NEMA motors when examining energy efficiency. This new range of three-phase induction motors is available both in an aluminium and grey cast iron housing. In the Severe Duty (SD) version, motors in full grey cast iron design meet the requirements for use in such rough environments as the paper industry. Another version boasts efficiency rates which even outperform the IEEEE841 standards for use in the oil and chemical industry.

### **Inverter innovations**

When a drive is in generator operation, its braking energy can either be converted through heat resistors or fed back into the grid via suitable devices.

Such feedback saves the cost of additional cooling or heat dissipation and also reduces power consumption. Our Sinamics family of drives features two types of feedback. The standard solution is Sinamics with Smart Infeed, i.e. unregulated infeed and feedback units using IGBTs. The other is called Active Infeed, has a controlled IGBT system and is suitable for use wherever the requirement is not only for feedback capability but also for correcting system voltage dips for drives.

Our concept of modular design ensures that the specific needs of user applications can be individually met. The new Sinamics G120 frequency converter is designed for

voltages between 380 and 480 V and boasts a modular design that adjusts to the specific requirements of each application. Both the power module and the control unit of the Sinamics G120 are designed as separate exchangeable functional units and can be combined ad lib. In combination with a safety control unit, the drive is turned into a safety integrated drive.

The SINAMICS S120 AC drives designed for single axle applications perform reliably in single axle positioning tasks. The modular design, however, also allows for their use in multiple axle applications for demanding synchronous operation and motion control tasks.

### **Transparent production – more management knowledge**

The following trend section is circumscribed by the term “transparent production”. It denotes a requirement common to all our customers, irrespective of the industry in which they operate, namely to improve the level and availability of data on products, production, and the entire supply chain within their own company.

One of the reasons is the scarcity of resources which I mentioned earlier: Our customers want to make their production process as efficient as possible. Another is that they want to be able to track their material flows, i.e. ensure the traceability of their goods from the inbound raw material to the finished product reaching the consumer. This allows them not only to gain information about consumer behaviour but also be better equipped for complying with statutory inspection rules and regulations, e.g. for food or pharmaceuticals.

In this area where we are playing an active part in making the expertise and processes developed in one industry available to others. Examples here include the communication technologies from car production or the highly developed technologies used for tracing goods. The latter were largely initiated by the pharmaceutical industry, and we are now applying them increasingly in the food and beverage industry.

Knowing more about products, production and logistics has much to do with a variety of automation technologies and automation levels. It starts with individual sensors used in production and continues with industrial communications to send the information obtained to any other place; it involves RFID (Radio Frequency

Identification) systems, mainly in logistic processes, and also includes MES (Manufacturing Execution Systems); all these technologies help the customer gain information about and subsequently optimise their entire production process and logistics.

### **Sensorics as a key technology**

Sensors, the detectives in a production process, are among the key elements in our portfolio, a portfolio which we are extending with in-house developments and acquisitions. Hot topics in sensorics currently under discussion include I/O Link, which is a new communication standard for actuators and sensors, and image processing systems which can efficiently safeguard or raise the quality of production.

Major German sensor and automation suppliers have got together to form a working group called IO Link, which is housed under the same roof as the Profibus user organisation (PNO). The aim of the group is to work out a consistent standard for sensors and actuators whilst maintaining the low-cost end-to-end connection from the sensor to the I/O module. This is intended to give the user a technological lead, thereby creating more scope for cost savings – in commissioning and maintenance, but also through plant availability.

The principal idea behind this I/O Link takes account of the rapid development of sensor performance in recent years and sets out to link these sensors with the automation level on a standardised basis. Siemens is providing since years sensors capable of communication with IQ Sense Interface. They offer all of the mentioned customer benefits and are fully integrated into the TIA spectrum. We have introduced the IQ Sense Technology into the PNO working party, thus we are heavily involved in standardising the I/O Link.

Late last year we strengthened our business in sensors for process automation by taking over Acuity CiMatrix. This company is headquartered in Nashua, New Hampshire, USA, has a workforce of roughly 100, and is a leader in industrial image processing in factory automation. Nashua is to become our global Competence Center for visual sensors as part of our effort to expand our position in the key segment of discrete automation. Acuity CiMatrix supplies products and solutions mainly for customers in the automotive industry, in electronics, pharmaceuticals and packaging, and comes to us bringing not only detailed development expertise in the

fields of data matrix code readers, image processing products, and luminaires, but also extensive expertise in solution application.

### **New sensorics products**

It goes without saying that we will also be showing new sensorics products at the Hanover Fair, including an explosion-protected type of ultrasonic proximity switch suitable for paint shops, wood-working and food processing, and also an optical proximity switch for colour recognition fitted with new incandescent light LED technology. This technology makes it possible to build very small, long-life sensors presenting a constant switching performance.

As batch sizes are becoming ever smaller, clock speeds ever faster and quality demands ever more stringent, production processes need to be highly flexible. Here, image processing systems help our customers to ensure efficient quality assurance and optimise quality. We provide a wide range of image processing systems for all applications – from simple sensors for detecting coloured objects and vision sensors for specific image processing applications, through to smart cameras for universal use and PC-based image processing for high-speed applications. A showcase example of our power of innovation is the Simatic MV220 colour area sensor, a compelling synthesis of modern image processing technology and simple sensorics. At 30 inspections per second, this compact colour area sensor is ultra-fast and hence suitable for applications in manufacturing and also in packaging and the food and beverage industry. This new system is “trained” rather than programmed, so even non-experts have no difficulty in handling it instantly.

### **Customised industrial communication**

Industrial communication has long been a highly innovative sector of technology and closely linked with transparency in production. Industrial Ethernet has become a well established integrated bus system in automation and Profinet is continuing to be successful on the market whenever system options are under consideration.

A large number of Profinet systems are in operation in automated factories in all types of industry, and Industrial Ethernet has also demonstrated its practical viability in the transfer of time-critical data. For extremely time-critical data exchange, such as

that required in motion control systems for coordinating numerous individual drives, special modules have been developed to provide a system-consistent, standard-compatible solution. Profinet makes consistent deterministic real-time communication available down to the field level. It is a powerful bus system which is available for both useful data and real-time-critical machine data. It thus also provides the basis for modular machine concepts with seamless Ethernet communication.

The first devices are being successfully piloted and the necessary technology is commercially available in the form of Profinet ASICs and development packages. Aiming to achieve a high degree of market availability for this technology, we have decided to cooperate with NEC Electronics. The Ertec (Enhanced Real Time Ethernet Controller) family of controllers, developed by us and produced by NEC, is available from the worldwide distribution channels of both companies. The powerful Ertec400 with an integrated 4-port switch is already commercially available, and from May 2006 on this product range will be complemented by the low-cost Ethernet controller Ertec 200 for developing Profinet devices.

Industrial Ethernet is also becoming an increasingly attractive proposition for process automation, where actuators and sensors are usually spread across a large plant and need to be centrally monitored, controlled and maintained. Industrial Ethernet lends itself particularly well here as an efficient network covering the entire plant and all devices within it. Anticipating growth in this field of application, we are currently working hard to push the integration of Profibus PA (Process Automation).

### **Wireless and safe**

In the future, Wireless Ethernet will replace the existing communication paths using contact wire conductors or drag chains and open up new applications. To work in industry, wireless LAN for mobile data communication must be secure, robust and reliable. Special antennas can make connections reliable even in difficult reception areas. Wireless LAN is of particular advantage in areas which are difficult to access and wherever conventional installations would be too costly and disruptive. Examples for application include automatic guided vehicles, stacker cranes or areas presenting obstacles such as rivers, roads or railway lines.

Practical applications of industrial wireless LAN have demonstrated that even time-critical and cyclical communication is possible. This is illustrated in the case of HG

International, where the valves in a bottling plant for cleaning agents are controlled – fast and nearly maintenance-free – by Profinet IO via an IWLAN path. The previously used contact wire conductors had often failed in the plant's heavily soiled operating conditions, resulting in frequent breakdowns. The plant is now working without major disruptions. Volkswagen AG in Emden has also replaced maintenance-prone contact wire solutions by IWLAN and RCoax technology. This has significantly increased the availability of its bolting stations there. Another benefit is that with a higher data rate than before, it is now additionally possible to transfer and store production data for quality assurance purposes.

In the near future, our customers will expect us to provide wireless corporate networks which exploit their respective strengths in both their office and shop floor environments. In addition, these networks will be expected to provide integrated IT services such as Voice over IP telephony and seamless roaming. We are already working on the technologies needed to meet these requirements.

There are more facets to industrial communication, one being security. Whereas special bus systems in industry have traditionally served as a natural protective wall because of the difficulty of accessing them from public and corporate networks, this automatic protection no longer exists with integrated Ethernet use. Major user organisations are addressing this issue by developing security concepts; we are already supplying security solutions designed specifically for industry.

### **New in Hanover**

A new industrial communication product which we will be launching at the fair is Sinema E (Simatic Network Manager Engineering), a software tool for efficient planning, simulating, configuring and engineering industrial WLAN applications in accordance with standard 802.11 a/b/g. Sinema E makes it possible to design and simulate complete IWLAN networks on screen. This new software for industrial and office networks, including outdoor installations, is a helpful tool for both planners and network engineers on the shop floor.

We have also made some new additions to our range of optical Profinet structures using all-plastic optical fibre. Optical fibre is used in industrial communication networks wherever the environment is EMC polluted or EMC radiation is undesired. The advantage of plastics over glass in optical fibre lies in the fact that in situ

connector assembly is considerably simpler. Hanover Fair will be the venue for us to launch a wide range of passive and active network components and distributed field devices with integrated all-plastic optical fibre interfaces.

### **RFID and MES – real-time production coming true**

RFID (Radio Frequency Identification) and MES (Manufacturing Execution Systems) are higher up in the knowledge hierarchy than sensors and industrial communication: More software-related knowledge is required here – in the sense of real-time production. Both technologies, currently being hyped, have to be inextricably interlinked for customers wanting a holistic optimisation of their production and logistics across the entire supply chain.

Consumers are demanding more and more personalised goods which must be produced and supplied at reasonable cost. This means that tasks such as one-off production, small production lots, production on demand, flexible production lines and product planning need to be managed in 'real time'. For the producer therefore, the challenge is as follows: from uniform towards flexible mass production. RFID and MES are key to this task.

RFID technology has already been used successfully for several years in the automotive industry, where cars built to different feature specifications are economically assembled on the same line. A transponder is allocated to each car to handle production data such as model number, type of engine or special equipment, work instructions, test schedules and quality data. But RFID is also suitable for flexible mass production. One such example is the RFID-based production of Sirius contactors at our Amberg plant. On a fully automated assembly line, several hundred different types of contactors can be produced in variable batch sizes without the need for retooling. The RFID transponder remains in the contactor's workpiece carrier for its entire stay on the assembly line. The main benefits include faster throughput and continuous quality assurance.

### **Optimising the value-added chain**

Closed loops in production will in future become ever more closely linked with other process steps in the value-added chain. The possibilities here include cutting ware-

housing costs and making the supply chain more transparent in all its stages, from production all the way to the consumer. Therefore it is vital to have an RFID technology which can be integrated into the existing infrastructure, be it in the closed loops that exist in the production environment or in open supply chain applications. For this purpose RFID systems need to be efficiently integrated in automation and IT systems so that RFID data can be linked with the data in the higher-level business management software.

The trade in particular is driving the use of RFID in the UHF (ultra-high frequency) range. The EPCglobal (Electronic Product Code) standard is intended to optimise the value-added chain in logistics and distribution. We started supplying a number of components relevant in this field over a year ago. Static and mobile readers and also smart labels are already available under the name of Simatic RF600.

### **RFID innovations**

At the fair, we are expanding our range by launching a new software tool to integrate RFID systems into business processes. The Simatic RF Manager administers read/write devices, collects and compresses RFID data and makes that data available to the merchandise management system – in accordance with the EPCglobal standard. For vertically integrated solutions, the Simatic RF Manager is linked to the Simatic IT Manufacturing Execution System. Both MES and RFID can make large volumes of data available in real-time, but they can also receive and administer data. RFID data can therefore be translated into business information which is relevant to managing the business process. Siemens already has a unique selling proposition here with its genuinely end-to-end applications for RFID.

### **MES portfolio is growing**

And this leads us on to the topic of MES, a technology which we have also continued to work on over the past year.

In their bid to remain competitive and increase profitability worldwide, manufacturers are facing ever more complex challenges: Cost pressure, shorter product life cycles with increasing plant complexity, more stringent demands on product quality,

production networked across various markets, and the need to comply with local and global rules and regulations.

We regard Manufacturing Execution Systems as a major innovation for meeting these challenges in the coming years. With an expected annual global market growth of approx. 10 to 15 per cent, the currently rocketing number of MES implementations is indicative of the fact that many manufacturers have now recognised the advantages of MES. There is growing pressure to harmonise corporate IT environments, to integrate corporate processes horizontally and vertically and to synchronise and simplify production flows and make these more flexible. MES provides the key for leveraging significant optimisation potentialities and managing and improving the entire supply chain as a lean, real-time operation based on having the right information in the right place.

MES, as supplied by Siemens A&D in the form of its Simatic IT product suitable for all industries, allows for effective horizontal integration along the production chain and also a seamless transition to ERP (Enterprise Resource Planning) and the automation level – with assured optimum synchronisation of all production processes. The MES basic functions of Simatic IT comply with ISA 95, the international industrial standard for MES. Individual components include order management, material management, personnel management, reporting and messaging.

### **On-the-fly installation**

Our portfolio addresses both small and large globally operating companies which still have a multitude of software solutions installed. In many cases these come from different suppliers and are additionally combined with proprietary systems. When introducing new and more effective solutions with considerably fewer interfaces, most customers prefer to avoid a rough-and-ready approach. They do not want to see the new installation slow down all the process stages and decision-making flows during integration. Rather, the new software investment should be stable and not need to be replaced before it is written down.

For these reasons, Simatic IT has a modular design and individual components can be combined like the building blocks from a kit. This is a major advantage because it allows a wide-ranging overall MES solution to be put together in individual steps,

starting with the most urgent functionalities and without interrupting existing day-to-day business processes.

At the Hanover fair, we are showcasing additions to our Simatic IT MES portfolio, firstly, real-time scheduling functions that help to optimise order processing, anticipate and respond to exceptional situations, and continuously supply the ERP level with correct data.

Secondly, we are complementing Simatic IT with functions which ensure that contextualised information is sent across departments and countries as quickly as possible and is then displayed on the decision-maker's screen at the right point in time and in the right form so that he or she can then feed back his or her decisions into the process. Works managers and corporate executives can thus get a much clearer picture of their production and of the company's business situation.

Thirdly, Simatic IT is also embracing R&D, fully coordinating this with the production process. The solution is based on both existing and new Simatic IT functionalities which support managers and technology specialists in manufacturing companies in making capital out of their R&D, developing and producing new products faster and thus considerably cutting the time-to-market.

### **Swift market launch with digital engineering**

Another emerging trend which I would like to discuss in closing relates to a knowledge issue upstream of production and intended to shorten the time-to-market. I am referring here first to Digital Engineering, factory planning across the entire production life cycle which has various advantages, including accelerating the production start-up, and second to mechatronic support to get to the real machine much faster.

### **Mechatronic support – comprehensive machine simulation**

The success of mechanical engineering designs is increasingly governed by the time and cost to market. In spite of the growing complexity involved in linking mechanical and electronic items with software, there is a continuing need to further reduce development time, in particular the prototype phase. Simultaneously, and in parallel

to designing the machine, there is a need to simulate and optimise the machine's production run.

Siemens A&D is the only supplier on the market able to offer full simulation of the machine and the manufacturing process. Our portfolio includes Mechatronic Support for virtual prototyping, a Machine Simulator to simulate commissioning of the machine, Virtual Production to simulate the actual manufacturing flow, and simulation of the NC process chain including all non-productive time.

This shortens the time-to-market in development, reduces the cost of prototyping and minimises training costs during production start-up. At the end of the day, it takes less time to design a perfectly running machine which meets the special requirements of the production scenario it was made for. To the machine user this translates into high productivity right from the start, high quality output, and a machine that does exactly what is expected of it. It works at a productivity rate that had been exactly simulated in advance. It produces parts which are perfectly matched in terms of their processing time, accuracy and surface.

### **Mechatronics with customer focus**

Allow me at this point to make a few comments on mechatronics. The term is very much en vogue at the moment; and all automation suppliers are trying to position themselves as mechatronic companies. To my mind, mechatronics is mainly a mindset. Our approach at Siemens A&D has always been to supply our customers with complete and well-matching systems. The objective has always been to increase the customer's productivity in mechanical engineering and enhance the end-user's efficiency. And a large part of that can be achieved through what is today referred to as mechatronics, the integration of mechanical engineering, electrical engineering and software. To my mind, mechatronics means a holistic approach across separate disciplines of mechanical engineering, electronics, software and fluid actuator systems. The goal for A&D is to provide the customer with a well matched integrated automation system enabling the customer to build an optimum machine. This has been our aim right from the beginnings of TIA and TIP. We accompany the machine builder from the early idea of a machine, through simulation and project engineering to production and the ultimate integration of the plant into the user's process. Mechatronics is thus a decisive element in our automation

solutions for industry: Single-source solutions, integrated and matched – and not only since the term mechatronics was coined.

However, the current discussion on mechatronics is very important for us, mainly because it helps raise awareness of the issue among our customers building machines and plants. The debate is also important for encouraging engineering graduates to venture out beyond the confines of their own particular discipline. This is one of the reasons why some of our executives give lectures at universities on this young science.

### **Automation Designer – for greater planning certainty**

A topic which we have been working on very hard in recent years can be subsumed under the heading “factory of the future” or “digital factory”. Here we have the Simatic Automation Designer, launched at last year’s SPS/IPC/Drives in Nuremberg in November and again to be showcased at this year’s Hanover Fair.

The success of a producing company is largely a function of how quickly it responds to new market requirements is. New plants need to be set up rapidly and with utmost planning certainty. At the same time, cost pressure is rising and forcing everyone to increase productivity throughout the entire production life cycle. The idea of a digital factory is to virtually visualise and simulate, during the planning phase, a very detailed model of the real factory before the plans are translated into reality.

Designers and plant engineers initially design the virtual products on the screen, and any subsequent design modifications are incorporated automatically. Products are released only after having passed successfully through the digital factory and after having exhausted all optimization options for the product design and production process. The digital factory is effectively dovetailing product development and production planning.

As part of the digital factory, digital engineering will in future virtually support all production life cycle processes, ranging from planning, mechanical and electrical design, programming, commissioning of the plant to its operation. Irrespective of the software in use, all data will be read and merged into the digital engineering environment. The entire creation of a product will be holistically mapped in the digital engineering process.

Once virtual commissioning has been completed, the data is directly applicable to the real plant, and the automation solution is generated automatically. This includes PLC programming, visualisation - including diagnostic information - and the creation of the relevant plant documentation.

The Simatic Automation Designer is the first step into a different digital engineering world. Much is still a vision and still requires intensive work – but the foundations have been laid. Ultimately, Simatic Automation Designer will be applied throughout the entire engineering process, thus supporting the entire life cycle of a production plant: From absorbing the planning data through configuring the automation solution in line with user standards right up to its use during the operating phase.

Ladies and Gentlemen,

I trust I have been able to provide you with some insight into our strategy and development. As suppliers to industry, social megatrends hold enormous potential for us. Siemens Automation and Drives is well on the way to expanding its market leadership. We will continue to shape the automation market in close dialogue with our customers and together with our inside and outside partners. Hanover Fair gives us, the biggest exhibitor, a welcome opportunity to once again submit all the evidence supporting that claim.