

# SIEMENS

Prof. Dr. Ing. Klaus Wucherer,  
Member of the Corporate Executive Committee of Siemens AG

on the occasion of the international press conference held on  
April 11, 2005 in Hanover

- Check against delivery -

Ladies and Gentlemen,

It gives me great pleasure to meet you here in Hanover for the third time, after 2001 and 2003, to discuss the subject of automation. After all, industry and automation have always been the main focus of my activities at Siemens, alongside my responsibility for the Asia/Pacific region. As you will be aware, Siemens has always regarded the Hanover Fair as one of the most important forums at which to talk with our established and prospective clients, as well as partners from industry, universities and the media.

'Continuity and Change' – automation is an excellent example of how Siemens combines the two. Let us attempt to build a bridge between the past and the future of automation during the next one-and-a-half hours. Where does industrial automation stand in its development? What are the conditions and the challenges it has to face? And what action is Siemens taking in accordance with its status as the trendsetter in this technology?

As mentioned in the invitation, we have invited two great authorities on the subject this year: Prof. Dr. Klaus Bender and Dr. Heinz Dürr. After my brief

introductory speech, they will join me on the discussion panel. The participation of scientific expertise and this versatile client has two main advantages: Firstly, it allows us to approach the issues mentioned from different angles and secondly, I'm not left to do all the work on my own.

I will be starting straight away with my look ahead. You may remember our meeting two years ago and my speech on the 'future of automation' which I ended with the following scenario:

### **Factory of the future**

Production will be planned in a digital factory where it is virtually displayed and simulated in full before being translated into reality. Products will be released only after having passed successfully through the digital factory and after having exhausted all optimization options for the product design and production process. Designers and plant engineers will initially design the virtual products on the screen, with any design modifications being incorporated automatically.

Suppliers, certifying authorities, agencies and users will coordinate their requirements as early as the factory design phase. Speed and flexibility will determine the scene: Thanks to the automatic setup of control programs, product launch and start-up will take only a fraction of the time it takes today. Powerful microsensors, integrated communication capabilities and modular design will serve to demonstrate the significant progress made on present-day technologies. Plug-and-produce will accelerate the commissioning of a production plant and/or the change to a new product.

Maintenance and service also stand to benefit in full from this technological advance. Predictive and status-oriented maintenance will be the rule, and will be included in the construction and conversion of plants on a virtual basis. Specialized service providers will operate from geographically independent headquarters and be available around the clock.

I still maintain that this is a realistic scenario. However, I also stated two years ago that we will achieve this vision only through hard development work and close

collaboration with researchers from all disciplines, manufacturers and users alike. Where then do we stand today in our joint effort to drive innovation in automation?

### **Market-oriented innovation from Siemens**

As you are aware, innovation is high on Siemens' list of priorities. Inventions to serve our clients have always been part and parcel of our corporate culture. Let me illustrate this by way of an issue which is currently receiving extensive media coverage: RFID – a good example of how ground-breaking innovations can be derived from established basic technologies.

RFID is not a new concept in automation. For over 20 years, Siemens A&D has supplied RFID systems for various applications in production, logistics and distribution. We have installed over a quarter of a million read and write devices for a wide range of applications worldwide, from automotive and other production facilities via luggage conveyors at airports all the way to shipping and logistics companies.

And yet we are now facing entirely new challenges with this technology since the realization by industry and trade that RFID can make a substantial contribution towards accelerating and streamlining logistics and data administration. Three Siemens Groups, Automation and Drives (A&D), Logistics and Assembly Systems (L&A) and Siemens Business Services (SBS), are collaborating very closely on integrated RFID solutions for the entire value chain of our customers, from suppliers via those involved in production, shipment and warehousing all the way to the retailers and end-customers themselves.

Siemens is feeling an enormous market pressure on this front. By the end of 2006, customers will be demanding that we provide them with integrated solutions for read devices and software for RFID labels for a range of radio frequencies in the U.S. and Europe. The aim is to cut warehousing costs and make the supply chain more transparent and efficient in all its stages, from production all the way to the consumer. As a member of the EPC (Electronic Product Code) Global Group, Siemens is helping to develop RFID standards for trade and industry in the long term.

We are currently launching a system in the 860 to 956 megahertz UHF range which enables long distances to be covered between the read and write unit and the data carrier, called the tag. Pilot applications have been run at selected customers since late 2004; the first UHF system products will be presented for the first time at this Hanover Fair, and marketing is due to start in the middle of this year, at the same time as the EPC Global Gen 2 tags become commercially available.

The RFID example makes one thing very clear: It is only through extensive application of the existing wealth of experience and continuous development work that a company can become and remain the technological trendsetter. Siemens has both expertise in logistics in a large number of user industries and automation experience throughout the world. We pool all this know-how in the early development phase, thereby leveraging additional functionalities and synergies for our customers.

To establish innovations in the market requires both backbone and staying power: Siemens spent 5.1 billion euros on research and development during the past fiscal year (2004). Over 45,000 company researchers and developers registered 8,200 inventions, which represents an increase of 11 per cent on the previous year. We applied for patents for two-thirds of these inventions. This gives Siemens a leading position in the international statistics on patents filed: In Germany we hold the number one position, in Europe number 2, and in the U.S. we are among the top ten.

Our company-wide Intellectual Property Initiative (IP+) demonstrates our consistent determination to protect our innovations by patents and to use them in the global competitive environment. Our patent portfolio currently comprises over 48,000 patents worldwide. The inventive genius of our staff and the strategic management of this portfolio provide the basis for our strong global competitive position. A large number of patent exchange and license agreements give us easy access to all major markets and support the entire innovation process, which in turn benefits our customers.

### **Trends in industrial production**

Our innovations make sense only as long as our customers use them to achieve their own market success and profitability. Siemens does not innovate for its own sake but

always with market and customers' requirements in mind. What does this mean in terms of automation of industrial production?

The mega-trend in global competition is called productivity. It is found across all manufacturing industries in a continuing quest for greater efficiency, enhanced performance and platform strategies. Automation thus creates demand: It is only through innovative automation solutions that a wide range of top-quality products can be manufactured at competitive world market prices. Only by supplying such products can companies remain profitable and competitive in an extremely dynamic environment.

We are seeing consolidation processes in almost all manufacturing industries. More and more companies are merging to form ever larger units which, in order to cope with global cost pressure, are relying more and more heavily on platform strategies in their global production schemes. The automotive industry has always been a pioneer in this field. At the same time, suppliers are increasingly specializing in certain core competences. Anything which others can develop and produce in better quality and at a lower price is bought in complete modules or systems. To ensure the specified quality of a finished product, the processes involved in the complex and interrelated production of components need to be fully integrated across all production stages.

Another trend which production plant operators have to deal with is the increasing number of certificates to the regulator and certifying bodies. Legal requirements for full documentation of all processes and production paths are most in evidence in the pharmaceutical and food and beverage industries. Since neither consumers nor legislators make quality concessions, technical implementation requires the use of state-of-the-art industrial information technology, coupled with close cooperation between OEM, automation partner and producers. Both of the above-mentioned industries also illustrate the importance of production lines having to be designed to turn out top-quality products while also allowing for quick modifications or product changes. Those who strive for success as suppliers and manufacturers in this field must accordingly be able to provide flexible and modular automation systems which can be retrofitted or modified without long shutdown periods – or even 'on the fly'. Production safety and availability remain top of the list of priorities.

These trends towards greater productivity stand in the way of a number of developments in which an accelerated application of IT technologies in automation is

a major feature. Innovation cycles in hardware and software are getting shorter and shorter, raising expenditure on modernization and updates. The fact that companies usually cover their automation requirements from several different suppliers also makes the integration of different technologies ever more complex and costly. Users will be faced with a critical situation when suppliers have a shorter life than their machines and plants, if not before. Moreover, legacy systems resulting from consolidation processes in suppliers' markets involve cost risks for the user. I will be coming to risks in the field of data security a little later on.

### **Development of automation technology**

How then does Siemens take account of these tendencies in both market and technology in an effort to increase customers' productivity while protecting their investment?

Let us take a look back: The diagram shows the development of automation at Siemens over the past few decades – from individual products to system families and Totally Integrated Automation.

Throughout the years, we have continued to make the integration of products easier. This has been a matter of development as well as a market requirement. Whereas products used to be developed separately and subsequently sold separately, we set out to develop systems. The first proper systems were developed in the early Eighties, and by the mid-Nineties we were able to provide complete system families, such as Simatic S7, Sirius in low-voltage switchgear, and later on Sinamics and Simotion.

In 1996, a decisive step was taken for the benefit of our customers when we launched Totally Integrated Automation (TIA), our fully integrated automation portfolio. Some of you may still remember our press conference in Rotterdam on that occasion. With TIA, we announced an unprecedented performance leap in the integration of engineering, data administration and communication, giving our customers the prospect of overcoming system gaps between individual products, integrating these into working solutions and thus improving productivity. I believe that we have kept our promise.

## **Continuous automation as a productivity lever**

Back in 1996, only a few people will have believed us when we claimed that one single technological base with Simatic controller technology at its core would enable us to serve manufacturing and process industries equally well. Today, in 2005, we are more successful than ever with our former vision. Over the years, we have continued to expand on TIA, turning it into a consistent integrated concept. It enables both us and our customers to adopt all newly emerging technologies relevant to the market and to integrate them into our automation systems at low cost.

Totally Integrated Automation has come to be a sound foundation and the yardstick for users who want innovations on the one hand and investment protection on the other. Ultimately, TIA ensures a long service life for the user's production plant, as well as significant cost savings on conversions and extensions resulting from time and efficiency gains. Today, TIA serves all industries, with particular benefit for those requiring hybrid automation, i.e. a technology for the manufacturing and process engineering stages of production.

Totally Integrated Automation gives us the basis we need to provide a sound solution for exploitation of the productivity potential to be gained from the convergence of production and process automation in the form of hybrid automation. We are the sole supplier to be able to offer this type of solution. A special milestone in this success story has been our Simatic PCS 7 process control system, also first presented in 1996 in Rotterdam, which uses PLC technology as a core. This technological approach, certainly viewed at the time with a sceptical eye by many customers, mainly in the process industries, has gained wide acceptance today: Last year, we recorded 2,150 projects worldwide involving our PCS 7 process control system. Today, the number of projects has risen to over 3,200, mainly in industries using hybrid automation, but also in those using pure process automation, as is the case with power generation. This brisk demand goes to show that PCS 7, as the key component in the primary process, is viewed in the market as a modern and powerful process control system for all applications.

Our collaboration with Fuji Electric Systems, agreed in late 2003 for Japan, is developing highly respectably for this second largest individual process automation market worldwide. Fuji Electric is currently launching its new Micrex

NX system, which is based on Simatic PCS 7 and has been equipped with special functions tailored to the Japanese market. Fuji has already succeeded in winning over a dozen projects with this system.

At this year's Hanover Fair, we are launching our Simatic PCS 7 process control system release 6.1, which allows processes to be directly controlled via the web and plants to be maintained through asset management. Plant operators and maintenance staff use the same Simatic PCS 7 tools and user interfaces, with data being filtered and processed for their individual needs. Maintenance staff, for instance, can be provided with a full plant overview with status displays and system-wide alarm management to support them in assessing the state of their plant.

IT integration plays a crucial role in increasing our customers' productivity. We have worked longer and harder to extend our MES (Manufacturing Execution Systems) know-how than any other automation company. Today, the Siemens Simatic IT Framework provides a full product range, ensuring a proper link between production systems and the management level. We are thus in a position to optimize the user's innovation rate by means of carefully selected hardware and software interfaces which remain stable in the long term. This makes us less dependent on the innovation cycles of products such as particular operating systems or processor types, while at the same time protecting our customers' investments.

We will continue to use every opportunity to broaden and complement our comprehensive system and service portfolio in automation. This goes for both technological development and our regional positioning. Recent acquisitions such as US Water, as well as the planned acquisitions of VA Tech and the Flender Group constitute excellent additions in this respect. Our latest acquisition, Flender Holding GmbH, which, following approval by the cartel authorities, is to be integrated as a division into the A&D Group, makes us a single-source supplier for industrial drives. With the acquisition of Flender's gear units, we will be able to optimize all our customers' plants throughout the drive train. Especially in the field of handling and conveyor systems used in such industries as oil & gas, pharmaceuticals, cement, paper & pulp and metals, but also in transportation, power plant systems and in food production, there is growing demand for technically compatible and well matched solutions using motor and gear combinations, converters, controllers and motion control software.

## **Integration through industrial communication**

Let me illustrate our advances into the future of automation with a second topic which we have been able to shape in the last two decades: that of industrial communication. Industrial communication is at the very heart of any horizontally and vertically integrated automation, providing the backbone with all its facets, from field bus to high-speed Ethernet and from wireless technologies WLAN to real-time Ethernet. In 2003, I mentioned our special focus on adding real-time capability to standard Ethernet communication and extending wireless communication. This has already led to a large number of diverse developments and specific products.

As you are aware, we are pushing Profinet alongside PNO, the Profibus user organisation. Profinet combines field bus communication with Ethernet technology, providing automation-oriented functions with access to the IT world. Profinet covers the entire range of communication in automation – from standard TCP/IP communication to the control level via software-based realtime communication at Profinet IO, all the way to hard, isochronous realtime communication for motion control and demanding control tasks.

We are presenting a major step in Profinet development here at Hanover Fair in the form of the Asic Ertec 400, which has been developed especially for isochronous realtime Ethernet (IRT). The Asic Ertec 400 will be commercially available from May and we are exhibiting the first products containing this asic at our stand. The high level of integration enables the Profinet technology to be implemented with a small footprint, while integrated switch and processor functionalities help to save costs. The asic was developed by Siemens and is manufactured by NEC Electronics.

Isochronous real-time Ethernet is of particular benefit for demanding and complex motion control tasks when a large number of axles are synchronized with high precision: Based on our asic, Profinet is able to provide real-time communication with deterministic telegram cycle times of less than one millisecond and a jitter of under one microsecond. All of this occurs simultaneously on the same bus with its standard IT data traffic such as TCP/IP, http or ftp. This means that time-critical motion control tasks are completely unaffected by data traffic for operating and monitoring, service or diagnosis. Profinet IRT is already being applied in a web offset printing press at MAN Roland in Augsburg, where 31 axles are coordinated to ensure highly productive operations.

We have also been making major progress in the field of wireless communication. At last year's Hanover Fair, we showed a study of contactless power and data supply to single-rail suspended railways. Products which have been developed in this context are on display at this year's fair. For instance, our RCoax cable, a kind of "non-tight" coaxial cable, enables us to set up spatially limited, defined radio fields for wireless communication with mobile units via Profinet. In order to avoid a break in contact with mobile units when moving from one radio field to the next, as could easily happen at switches, we have developed a swift roaming method. The transfer occurs within a matter of a few milliseconds.

Safety of data traffic in industrial communication is a key issue to which we are devoting great attention. Whether wireless or wired, the growing convergence of office and production applications emphasizes the increasing importance of protection against unauthorized access, espionage or manipulation. For industrial plants, the security of communications to and from the outside world is an important criterion. Ultimately, it is the crucial factor in determining whether or not the Internet is accepted in automation. There is also a growing awareness of the importance of protective mechanisms against unauthorized or careless access from within the corporate network. Recent studies have shown that the risk of such attacks is greater than the risk of those from outside which seem to be held in such dread. Here, too, we see ourselves as technology and innovation drivers: Our Security Modules both control data traffic and protect plant components against unauthorized access, while also creating a secure encrypted VPN (Virtual Private Network) link between the various security modules.

### **Focus on user industries**

Innovations at Siemens are not necessarily of a technical nature; we are also continuing to develop in organizational terms. In order to demonstrate the necessary customer focus in our industrial activities, we have pooled our knowledge in Competence Centers and organized our portfolio in Industry Suites. They help Siemens to strive towards obtaining a deeper insight into the tasks, technologies and processes of our industrial customers and to push our technological advance further on the basis of this experience.

This approach has been tried and tested and has proven its worth. The Competence Centers for the industries shown here develop this knowledge step by step, in close collaboration with both corporate account managers and account management teams. This preliminary work, combined with our research and development capacities, results in ever more productive automation solutions. The competence of our staff also enables us to offer our customers cross-Group industry suites and online industry portals which incorporate specifically integrated modular products, systems and services throughout the entire automation and power system sector.

In Siemens' global plant business, the combination of pooled industry knowledge and process engineering is of vital importance to the success of all our Groups, and in particular to the success of Industrial Solutions and Services (I&S) as a global service provider, where it serves as a basis for the successful integration of electrical engineering. Our service portfolio ranges from plant construction engineering via plant modernization all the way to support throughout the life cycle of the plant. In addition to all of this, Siemens will continue to cultivate, and in some cases intensify its relations with mechanical engineers, system integrators and solution providers alike.

Ladies and Gentlemen,

I am sticking to my vision of the future of automation which I mentioned at the beginning of my speech. The requirements of manufacturing industry in global competition will accelerate rather than decelerate our pace as we strive to attain this goal. Siemens will continue to play a leading role in industrial automation on the basis of our open, standardized and integrated system portfolio, which we are set to develop and advance further. Our innovation process is instilled with the life of interdisciplinary work and will bring together all relevant partners: manufacturers, researchers, scientists and users alike.

To cover this entire range, we have invited two authorities from the fields of production and science: Prof. Bender and Dr. Dürr will now be presenting their views in the panel discussion led by Dr. Spohr.