Saxony-Anhalt: Advanced Distribution Logistics Hub

Secure Logistics: Continuous Monitoring of Valuable Cargo

Time and Cost Cutting Warehouse Concepts with Telematics

Pinpoint Accuracy: RFID in Professional Sports
Dear Readers,

Saxony-Anhalt lies in the heart of Germany. The state’s motto “We get up earlier.” demonstrates its dynamism, drive and richness of ideas. This slogan reveals the resoluteness with which business and research are striving forward and developing vigorously.

Saxony-Anhalt and the region of Central Germany exert an attraction on the logistics industry in particular, which draws investors. Since logistics companies, transport firms and distribution centers are profiting ever more greatly from our excellent geographic location, they are increasingly locating here or expanding their facilities. Saxony-Anhalt has become a hub of advanced distribution logistics. By land, water and air, European transportation routes now crisscross Saxony-Anhalt, the new gateway to the East. These emerging economic regions can best be reached from here.

In the interview with Karl-Heinz Daehre, Saxony-Anhalt Minister of State Development and Transportation, you will find out how the state government intends to smooth the way with a new logistic concept for the future.

The Fraunhofer Institute for Factory Operation and Automation IFF is a partner to logistics companies that have already established themselves in Central Germany, regardless of whether they are a small and medium-sized enterprise or a large internationally operating global market leader. In this current issue of IFFocus focused on logistics you will read about fascinating research services of today that will make the advanced logistics of tomorrow possible. As different as our clients and their requirements may be, all our project work has one thing in common: It is intended to make people’s lives easier, better and more secure – with state-of-the-art technological innovation. That’s what we stand for.

Form your own opinion, find out for yourself. I wish you interesting reading in the process. Perhaps it will inspire you in one way or another – we in Saxony-Anhalt would then be glad to assist you to make your visions reality.

Your,

Prof. Michael Schenk
Director of the Fraunhofer Institute for Factory Operation and Automation IFF and Editor of IFFOCUS

Photo: Viktoria Kühne
News

6
11th Science Days in Magdeburg
BMBF Supports Virtual Reality Projects in the Eastern States

7
Confidently into the Future with Reliable Technology

8
Virtual Engineering: The Future of German Plant Engineering
Forum Vision Maintenance Hosted

9
Logistics Day Fascinates the Public

10
Jugend forscht State Champion Chosen at the Fraunhofer IFF
Wood Logistics Experts Meet in Hundisburg

11
Magdeburg Wants to Know
Bridge-building to Kazakhstan Planned
Gesellschaft für Informatik Meets at the VDTC

Interview

12
"Saxony-Anhalt is the new gateway to the East."
Dr. Karl-Heinz Daehre, Saxony-Anhalt Minister of State Development and Transportation

Research and Development

14
Saxony-Anhalt, Advanced Distribution Logistics Hub
From the Center of Germany to the Center of Europe

16
The Latest from the LogMotionLab
Gloves that Communicate, Boxes that Count and Containers that Work Anywhere

20
It’s Time to Straighten Up!
Time and Cost Cutting Warehouse Concepts with Telematics

24
Off and Away
Intelligent Small Containers Keep Roads Open

26
Continuous Monitoring of Transports of Valuables
A New RFID Transponder Solution from the Fraunhofer at Wincor Nixdorf
30 With Pinpoint Accuracy
How Performance Optimization in Professional Sports Is Helping Improve Process Flows in Companies

34 Mobile Bits and Bytes
Lifesavers of the Future

38 Always With One’s Nose to the Wind
Next Generation Maintenance Concepts

42 “World Class Launch 2020” Reveals Future Trends of Process Optimization
The Changing Automotive Industry

46 Sharp Minds
Professor of Precision Sensor Systems
BVL Honor for Fraunhofer IFF Director Schenk
Power in the Grid

47 Gallery
Looking Beyond the Horizon with the Fraunhofer IFF
Creative Researching Spirit

48 Outlook
ILM Recruits Distinguished Professor
Career Start in Magdeburg
Metrology Engineer on World Tour

49 "World Class Launch 2020" Reveals Future Trends of Process Optimization
The Changing Automotive Industry

50 Logistics Skills - Skillful Logistics

56 Meet up with us

58 Editorial Notes
Virtual reality (VR) and augmented reality (AR) technologies are playing an ever greater role. These technologies can be used wherever complex or even dangerous process sequences have to be simulated to already eliminate problems before the start of production. To advance such technology and make it applicable, the Ministry of Education and Research (BMBF) is supporting three new joint projects through 2011 with around 39 million euros as part of its Virtual Technologies Innovation Alliance. Minister of Education and Research Annette Schavan stated, “With these virtual reality technologies we are establishing an important basis to strengthen the competitiveness of our business. Without efficient production, Germany would be unable to be the world’s leading exporter.”

The research and technical hub of the three projects AVILUS (Applied Virtual Technologies in the Product and Production Equipment Life Cycle), AVILUSplus (Applied Virtual Technologies Focused Long-range on the Product and Production Equipment Life Cycle) and VIERforES (Virtual and Augmented Reality for Maximum Reliability and Dependability of Embedded Systems) is the Fraunhofer Institute for Factory Operation and Automation IFF in Magdeburg. The institute is a partner to clients from medium-sized enterprises, industry, research and government. Together with its clients, it develops and optimizes solutions in the fields of logistics, virtual engineering, automation and plant engineering.

“Magdeburg is an outstanding center of virtual technologies.”

Dr. Werner Schreiber, Volkswagen Konzernforschung, Dr. Rainer Jansen, BMBF and Prof. Michael Schenk, Director of the Fraunhofer IFF (l. to r.) discuss the possibilities of virtual technologies for the automotive industry. Photo: Viktoria Kühne
Technical devices, machinery and plants are increasingly being filled with computer technology. Where levers were once engaged, processors hidden inside devices now activate desired functions. Newer and newer models with increasingly sophisticated technology are entering the market. Yet, these lovely new devices often just don’t function as reliably as they ought to.

Germany is a recognized center of technology. German cars are top worldwide. We are the world’s market leader in eighteen of thirty-eight technical branches of machinery and plant manufacturing. If this is to remain so, technical products must be one hundred percent safe and reliable. So that complicated software functions correctly, researchers from Magdeburg and Kaiserslautern will now be jointly working on concepts intended to help manufacturers perfect their products. If this is to remain so, technical products must be one hundred percent safe and reliable.

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Confidently into the Future with Reliable Technology

"We are rigorously backing strengths," said Minister of Education and Research BMBF Schavan at the press conference in Berlin on May 5, 2008. Saxony-Anhalt Minister of Education and Culture Olbertz welcomed the BMBF initiative for the eastern states. Photo: Anna-Kristina Wassilew

The Federal Ministry of Education and Research is supporting the project with 7.5 million euros as part of its initiative Advanced Research and Innovation in the New States. Support is intended to boost the capacity for innovation and thus the economic power in the eastern states. The Virtual Technologies Innovation Alliance was officially kicked off at the 11th IFF Science Days.

"Virtual reality is perfectly suited for this and will be instrumental in bringing us closer to this goal. Our Virtual Development and Training Centre VDTC in Magdeburg has made us a national leader in this field," says Prof. Michael Schenk, Director of the Fraunhofer IFF in Magdeburg. Prof. Peter Liggesmeyer, Director of the Fraunhofer IESE adds, "This is an extensive topic of research. Ultimately, technology ought to make people’s lives easier. Since this is not always the case, we have to address these issues, in particular wherever we fully rely on machinery and devices and often even trust them with our lives, for instance in traffic or in a hospital."

The standing center of research and development for virtual technologies and therefore also suited for the pilot project VIERforES as part of its program Advanced Research and Innovation in the New States," according to Schavan. Not only the BMBF but also industry partners will be contributing support over the next five years with investments of 170 million euros.

In the AVILUS project, a consortium of twenty-eight leading German industrial companies, small and medium-sized enterprises and research organizations is developing and testing efficient technologies, e.g. from the field of information management. The objective of the project is user friendly technology, which can be used to create VR systems without effort. Volkswagen AG has assumed the coordination of AVILUS. In the research project AVILUSplus, nine research organizations are researching aspects of fundamental technology emphasizing visualization and interaction as well as data management and methods of measurement.

The VIERforES project is one of six pilot projects in the BMBF’s program Advanced Research and Innovation in the New States, which is building upon regional strengths. Support is intended to boost the capacity for innovation and thus the economic power in the eastern states. The Virtual Technologies Innovation Alliance was officially kicked off at the 11th IFF Science Days.
Virtual Engineering: The Future of German Plant Engineering

The plant engineering industry gathered at the Maritim Hotel in Magdeburg on March 6 and 7, 2008 for the conference on “Plant Engineering of the Future”. Some 200 specialists discussed the latest trends and prospects for chemical and power plant engineering. The experts focused their attention on the potentials of virtual engineering for planning, engineering, qualification and dependable plant operation. Information on the current situation in plant manufacturing and beyond and the industry’s future outlook was provided in presentations by Dr. Stefan R. Deibel, President of Corporate Engineering at BASF AG Ludwigshafen on “Challenges in Engineering in the Plant Manufacturing Industry,” and Dr. Markus Henneberg, Managing Director of Anhaltinische Verfahrens- und Anlagentechnik GmbH Magdeburg, on “Optimizing Fluidized Bed Processes with Simulation Programs”.

The organizers, the Fraunhofer IFF, FASA, Wirtschaftsinitiative Mitteldeutschland and heir partners VDMA and VCI Nordost are united by a common interest. Fraunhofer Director Michael Schenk put it in a nutshell: “We must sustain and continue to boost the com-

Forum Vision Maintenance Hosted

Every company has unique staff, structures, goals and problems. Nevertheless, many companies have commonalities. Holistically analyzing the corporate function of maintenance is a key task that successful companies perform rigorously. At the Forum Vision Maintenance FVI held at the Fraunhofer IFF in April 2008, FVI members found out about the Magdeburg research institute’s newest technologies. A tour through the Elbe Dom, the LogMotionLab and the service robotics testing facility interestingly illustrated to the guests the high level on which the Fraunhofer IFF is researching and setting trends in development. The forum’s goal is to use presentations and discussions to highlight current trends and define future requirements for employee qualification, technical equipment and the organization of maintenance. Practicable solutions for cost effective maintenance for today and tomorrow are prominent.
petitiveness of the mechanical and plant engineering industry. Germany is the world’s leader in 18 of 38 specialized sectors of machinery and plant manufacturing. That can only remain so though, when Germany continues to be an attractive location for businesses. Economic policy has to face this and do everything to safeguard sustainability and innovation. Only then will “Made in Germany” continue to be a globally recognized seal of quality in the future too."

A sound technological basis is indispensable for such sustainability and innovation. As a method and tool for planning, engineering, qualification and dependable plant operation, virtual engineering is a state-of-the-art technology without which plant manufacturers or operators will be unable to manage in the future. Hence, the organizers see the future of German plant engineering in the utilization of virtual engineering before and after a plant has been built. Already applying virtual engineering in early phases of development makes it possible to achieve potentials for remarkable savings. For instance, production planning can be accelerated by 30 percent, production costs reduced by 40 percent and investment costs cut by up to 30 percent.

Logistics Day Fascinates the Public

At the initiative of the German Logistics Association (BVL), the first Logistics Day with the motto “Logistics makes it possible” was held nationwide on April 17. The event was particularly intended to provide school students and undergraduates insight into logistics operations and careers. The Fraunhofer IFF, Otto von Guericke University Magdeburg’s Institute of Logistics and Material Handling Systems, Magdeburg Port and the Institute of Automation and Communication (ifak) were involved in this day-long campaign.

The Fraunhofer IFF presented its sharp minds’ know-how and its worldwide one-of-a-kind technical facilities. Visitors were able to explore the LogMotionLab, one of Europe’s leading development, testing and certification labs for RFID and telematic technologies.

The ifak test vehicle provided visitors information on the latest technologies that detect oncoming traffic and localize vehicles. The transportation experts presented displays on vehicle telematics such as a multi-sensor system for communication between different manufacturers’ devices.

The virtual reality experts at the Fraunhofer IFF Virtual Development and Training Centre VDTC guided visitors into the world of the digital factory. Virtual reality technologies have long entered modern factory planning. A new plant can be toured and tested virtually long before it is built. The Elbe Dom, the unique large projection system in the VDTC, can realistically reproduce entire factories and production facilities in three dimensions and even on a scale of 1:1!

The Institute of Logistics and Material Handling Systems at Otto von Guericke University Magdeburg opened the doors to its logistics lab. A presentation by Prof. Zadek was followed by a tour through the labs. In closing, Prof. Ludger Brüll from Bayer Technology Services Logistik delivered a presentation on “Technologies for Material Identification and Tracking in the Process Industry” as part of the Guest Lecture Series at the Fraunhofer IFF.

The organizers take advantage of this diversity to demonstrate that logistics is far more than storage, transport and handling. Visitors learn about examples of intelligent logistics and obtain a new, broader picture of this field of research and business. According to Professor Michael Schenk, Director of the Fraunhofer IFF and Member of the Board of the BVL, “We are addressing anyone who wants to know more about logistics. School students looking for careers, undergraduates getting ready to enter the job market and young professionals find offerings specially tailored to them. This effectively presents and explains logistics services and solutions.”

Logistics Day allowed visitors to experience unfamiliar aspects of logistics in Magdeburg. The were thrilled to get a look behind the scenes. Photo: Viktoria Kühne
Ten young researchers at the state competition received coveted tickets to the national competition. Altogether fifty-six contestants with thirty-seven projects entered the state competition in Magdeburg organized at the Magdeburg Fraunhofer Institute by the energy service provider E.ON Avacon.

The winners of the state competition in physics were Dmytro Bershadsky (19) and Daniel Ferenc Rose (18) from Werner von Siemens High School in Magdeburg. The school students used experiments to analyze the oscillation modes of bubbling fluid films. First place in technology also went to two students from Werner von Siemens High School. David Terlinden (19) and Tina Rosner (16) worked on sensorless speed control of DC motors in autonomous robots. Carolin Breitling (17) from Albert Einstein High School in Magdeburg won the state championship in biology.

The Jugend forscht and Schüler experimentieren competitions for young researchers remain attractive to young people. The competition organizers were again able to point to high registration numbers. Under the motto Viva la Neugier young researchers presented their projects in seventy cities throughout the country this year. With over 10,000 registrations, the forty-third competition had the highest number of registrations since it was established in 1965.

E.ON Avacon has been supporting the competition in Saxony-Anhalt for years as a sponsor of the northern regional competition. This year, the energy service provider assumed the sponsorship of the state competition for the first time.

Industry experts in discussion at the “Wood Logistics” workshop. Photo: Viktoria Kühne

As part of the series of “Wood Logistics” events, the Forstliche Versuchs- und Forschungsanstalt Baden-Württemberg (FVA) and the Fraunhofer Institute for Factory Operation and Automation IFF jointly extended an invitation to discuss “Sustainably Supplying Raw Materials” at Hundisburg Castle. Presentations from the field concentrated on the issues of mobilizing and providing timber.

The raw material timber is again being used intensive-ly: Whether coming directly from a sawmill, accumulat-ing as a residual material or stemming from used products, it is outstandingly suited for use as energy and as charge material to be broken down in refineries. Discussions about competition for the utilization of timber to recover material or energy are increasing noticeably. Representatives from forestry, the wood processing industry, the forestry service industry and the research community presented positions, strategies, developments and technical solutions to deal with current and future challenges of cost effec-tively and sustainably supplying the raw material.
Magdeburg Wants to Know

For the third time, Magdeburg research organizations extended an invitation to their Long Night of Science. On May 31, visitors to these institutions were allowed to see what is usually hidden from view: Labs, research instruments, shops and teaching facilities. More than 10,000 visitors marveled at the diversity of research in Magdeburg.

The Long Night of Science commenced with a varied stage program from media partner MDR 1 Radio Sachsen-Anhalt in the Port of Science. Visitors were able to shuttle between research facilities with great ease with the popular science busses.

The Magdeburg Fraunhofer Institute opened the doors to both its facilities. On Sandtorstrasse, visitors were able to look over the shoulders of experts in robotics, metrology and logistics. At the VDTC in the Port of Science, they were able to enter virtual realities or listen to explanations of the Process and Plant Engineering Business Unit’s test labs.

Bridge-building to Kazakhstan Planned

A joint delegation from the Fraunhofer IFF and the German Logistics Association BVL traveled to Kazakhstan in early June. Their interest centered on economic development, possibilities for collaboration and preparations to launch cooperations with companies and institutions of higher learning in the field of logistics and technical training. By way of Russia, Kazakhstan is assuming an ever more important position as a transport corridor between China and Europe because of its very favorable geographic location.

In the capital of Astana, the representatives of business, academia and researched who traveled along held talks with Minister of Economics Bakhyt Sultanov, Vice Foreign Minister Kairat Sarybay and German Ambassador Rainer Schlageter. President Abzhaparovich of Aktau State University in Kazakhstan was demonstrably pleased at the agreement on imminent cooperation in the field of logistics in which the German-Kazakh university would also like to take part.

The Gesellschaft für Informatik’s (GI) VR/AR Technical Group will hold its annual meeting at the Fraunhofer IFF VDTC in Magdeburg on September 25 and 26, 2008.

It is primarily intended to give young researchers the opportunity to their research work to a knowledgeable audience. The group includes ongoing doctoral research and outstanding undergraduate studies from institutions of higher education.

The GI’s VR/AR Technical Group aims to promote research work in the field of virtual and augmented reality and to support the exchange of information among researchers working in the field. This includes holding workshops at which the latest research findings and ongoing projects are presented.

To register and for detailed information visit: www.gi-workshop-vrar.org.

Visiting Kazakhstan:
Prof. Peer Witten from the BVL, Hamburg’s Senator of Economics Axel Gedaschko and Prof. Burghard Scheel, Member of the Fraunhofer IFF Advisory Board.

The experts at the VDTC specialize in virtual and augmented reality and its application in corporate practice. Photo: Dirk Mahler
Saxony-Anhalt intends to develop into one of Europe’s leading centers of logistics in the coming years. To this end, the state government has presented a new concept to systematically develop the state’s infrastructure. Among other things, it is intended to respond to the rapidly growing commercial ties with Eastern Europe and Saxony-Anhalt’s increasing importance as a center of manufacturing and logistics. IFFOCUS editor Anna-Kristina Wassilew discussed this with Saxony-Anhalt Minister of State Development and Transportation Karl-Heinz Daehre.

On what does the state’s logistics concept concentrate?

Saxony-Anhalt is the new “Gateway to the East”. Its central geographic location and already well-developed infrastructure make it the ideal hub for international trade. The state has evolved into the most important hinterland hub for maritime transport in Central Germany. Saxony-Anhalt can profit tremendously from the positive economic developments in the wake of the EU’s eastern expansion. We must take advantage of the resulting opportunities.

Located in German seaports’ hinterland, outstanding conditions for the uninterrupted further transport of freight and goods exist here. Optimally developed logistics nodes with direct rail, waterway and road connections guarantee a smooth transfer between the different modes of transport. The development of well-functioning transport chains is the crucial prerequisite to efficiently networking the different transportation chains.

Everyone is talking about "energy efficiency" today. This means optimally utilizing every resource, namely raw materials and existing infrastructures, pushing climate-friendly aspects to the fore and smartly linking individual transportation routes with one another. What measures are planned to do this?

The concept’s main emphasis is on environmentally compatible modes of transport and thus improvement of state’s rail network and waterways and inland ports. For instance, the lock canal planned near Tornitz, for which the regional planning procedure began a few weeks ago, will significantly improve the site conditions for companies in the Saale region and the catchment area of Halle Port. In an analysis, the Federal Ministry of Transportation reached the conclusion that the nearly year round navigability of the Saale will make it possible to shift at least 1.5 million tons of goods in transit to inland vessels. Such a development will relieve the roads of heavy-load traffic and effectively contribute to the reduction of CO2 emissions at the same time.

However, supporting the international logistics hub around Halle-Leipzig Airport and Magdeburg’s waterway intersection and continuing planned road construction projects will also have high priority. Thus, A14 will be extended to the north, the new B190n will be built as a highway connecting A14 and A39 and the “Nord Harz Autobahn” B6n will be completed and extended toward Poland in the future.
I see one emphasis of future development in enhancing the rail connection. Substantial investment in the condition of the networks is essential in order to be able to deal with the traffic of the future. Only so can the conditions be established to take more transports off of roads.

Saxony-Anhalt has remarkable expertise in academics and research. How do you assess the opportunities afforded here?

Saxony-Anhalt has proven technological expertise in logistics. Novel solutions to support closed supply chains with satellite navigation, wireless communication or telematics are being developed here and are in demand worldwide. For instance, as part of the state initiative "Galileo Transport in Saxony-Anhalt", the Fraunhofer IFF and the Institute of Automation and Communication (Ifak) are working to design a test field for localization, navigation and communication in transportation and logistics. The project is intended to bundle applied research in transportation and implement the initiative "Galileo Transport in Saxony-Anhalt" in the process.

In addition, the state government is supporting the creation of the application and industry-specific platform MIDAS for logistics. The goal is to initiate and provide new technological logistics solutions to improve intermodality and "low traffic" logistics.

How does the state’s logistics concept incorporate regional business?

The state’s logistics concept is connected with hopes for effects of sustainable growth for the entire industry in the state and a corresponding increase of employment. Supporting infrastructures for the processing and refining industries is likewise part of the concept. This is intended to establish the prerequisite not only to efficiently transport goods and raw materials to and from Eastern Europe but also to process them further in the region. That holds tremendous benefits both for companies and the domestic job market. Hence, the state views appropriately supporting the education and training of qualified labor in these industries as one of its most urgent objectives.

Brief CV

Dr. Karl-Heinz Daehre is born in Langenweddingen (Börde) on June 11, 1944.

1964-1969 Attend Magdeburg Technical College and earn a Diplom degree in chemistry

1983 Earns his doctorate

1969-1991 Works at the Institute of Varnishes and Paints as lab manager until 1990 and as head of the institute until 1990/91

1990 Joins the CDU and, since then, has been a member of Saxony-Anhalt State Parliament and Bördekreis District Assembly

1990-1994 and 1999 to present President of the Bördekreis District Assembly


1993-1998 Saxony-Anhalt State Chairman of the CDU

2002-2006 Saxony-Anhalt Minister of Construction and Transportation

2006 to present Saxony-Anhalt Minister of State Development and Transportation
Saxony-Anhalt has evolved into one of the most important centers of logistics in Germany in recent years. More and more logistics companies and freight carriers are locating in the state or expanding their facilities.

Several factors in particular make the state an up-and-coming inter-European center of logistics. On the one hand, it is located geographically between the economically strong countries to the west and the emerging economic regions of Central and Eastern Europe. On the other hand, an excellent infrastructure system has been established here in recent years. In the next six years, the European Union will be supporting the expansion of business-related infrastructure with another 258 million euros. Other pluses are the highly motivated skilled labor, the longer and more flexible work hours and more moderate wages than in the western states and the first rate support programs. Logistics companies can count on investment subsidies from the EU, the federal government and the state until 2013.
An Important Hub for the German and International Transport of Goods
Saxony-Anhalt is increasingly gaining importance as a worldwide hub for transportation and logistics. The state-of-the-art intercontinental Leipzig/Halle Airport on the state’s southern border is evolving into the logistics region’s main artery. Operating twenty-four hours a day, it has trimodal transportation connections (air-rail-road) and a system of parallel takeoff and landing runways. The volume of freight is experiencing above average growth year for year and reached 101,258 tons (and over 2.7 million passengers) in 2007. The opening of DHL’s European Airfreight Hub in the fall will make Leipzig/Halle a global player in logistics, moving 2,000 tons of freight a day.

Its pendant in the heart of our state with around 2.44 million residents is the new Hansa Terminal and Hansa Port on the Elbe in Magdeburg. Central Germany’s inland port is an extension of the ports in Hamburg (via the Elbe) Bremen/Bremerhaven (via the Mittellandkanal and the Weser) or Duisburg and Rotterdam (via the Mittellandkanal and the Rhine). Three modern liquid cargo systems, canals with gantries in the industrial port, a terminal for containers and swap bodies and full portal luffing and slewing cranes for bulk cargo handling are ready and waiting in the different areas of the port, depending on the type of cargo, i.e. bulk, liquid, container or heavy load.

Logistics: An Industry of the Future in Saxony-Anhalt
Logistics is one of the key industries in our state. Outstanding transportation infrastructure, optimal transport chains, the linkage of every mode of transportation and the development of new intelligent logistics systems go hand in hand in the "state that gets up earlier". Government and the research community are jointly creating innovative solutions for the international movement of goods. Over 160,000 people already work in the shipping and logistics sector in Central Germany (Saxony-Anhalt, Thuringia and Saxony). According to experts, another 100,000 will be added by 2015.

Many important logistics providers are taking advantage of the benefits of Saxony-Anhalt’s location. Among others, such well known German companies as Hermes Warehousing Solutions GmbH (Otto Group), Dirk Rossmann GmbH and Mobis Parts Europe, the official auto parts supplier to Hyundai and Kia, have located here. Leading discounters such as LIDL and grocery chains such as EDEKA Hannover-Minden GmbH with its distribution center in Osterweddingen near Magdeburg have been drawn to Saxony-Anhalt’s highly competitive advantages as a location. The success foreign companies have when they operate from Saxony-Anhalt is also demonstrated by the Zur Rose Mail Order Pharmacy (Zur Rose Gruppe), which cares for and supplies pharmaceuticals from Halle to over 500,000 customers nationwide, or the Dutch Wolter Koops Int. Transporte GmbH, which ships from Osterweddingen throughout Europe and provides the attendant logistics of consolidated shipments, cross-docking and warehousing as well as delivery.

The Hub in Theory and Practice
Otto von Guericke University Magdeburg offers the only degree in Industrial Engineering/Logistics in Germany. In addition, Martin Luther University in Halle/Wittenberg and the Magdeburg, Merseburg, Harz and Anhalt Universities of Applied Science offer research and degree programs in the field of logistics.

The Fraunhofer Institute for Factory Operation and Automation IFF in Magdeburg is an outstanding example of the high level of research competence in our state. It develops cutting edge solutions for secure chains of goods, pedestrian flows, material flows or life cycle management in its LogMotionLab, a test and development lab. Well known companies such as VEM, Airbus, Siemens and DHL take advantage of the expertise at the LogMotionLab to test the latest radio frequency identification (RFID) technologies and have customized solutions developed for industrial use.

www.investieren-in-sachsen-anhalt.de
Continuous monitoring of shipments is a magic phrase in the logistics industry. For a long time though, there were huge gaps in the tracking of goods. In fact, one never knew what actually happened during a shipment. Since trust is good but control is better, the Fraunhofer IFF’s latest developments are now available to logistics providers. They combine innovative indoor localization technology with enhanced outdoor solutions, integrate logistics hardware in equipment and have finally made one thing possible: Continuous monitoring of shipments.
LogMotionLab: A Development Lab for Cutting Edge Technology

Major inventions seldom change our lives immediately. Rather, the small, effective advancements that build upon the underlying innovations transfer them to real use and applications. They enter our lives virtually unnoticed and bring the future a bit closer day by day.

One of the facilities that tests and further develops high-tech for practicable applications is the Magdeburg Fraunhofer Institute’s LogMotionLab. It is a special RFID, auto-ID and teleautomatic technology testing and development lab and a leader among such facilities in Europe. The specialists in Magdeburg primarily work on new and special applications of such proven principles as radio frequency identification (RFID) and applied communication in distributed networks.

Simplifying Operations

Essentially, the researchers are pursuing the question of how new technologies can be used to further simplify operations for employees in companies. Rather than with a new tool, their search ends with clever new configurations of innovations and proven technologies used daily. They primarily focus their attention on two domains. On the one hand, they search for new methods to create and improve closed chains of goods. On the other hand, they research methods to also apply RFID technology in adverse environments.

Thus, the Fraunhofer researchers are particularly focusing on those difficult domains of logistics that previously had to be excluded from transport monitoring or could only be made accessible to it with difficulty. Consequently, their work vigorously accommodates the steadily growing worldwide logistics market for sensitive cargo, and opens unimagined prospects there.

A Glove as Reader

One of the LogMotionLab’s latest developments is the RFID glove, a novel logistics instrument for highly flexible use for even the smallest or multipart items in complex warehouse and storage processes. Its newly developed antenna and transmitter unit makes it possible to read RFID chips directly on an item quite uncomplicatedly, quickly and reliably. Workers wear the glove while working and it automatically scans all relevant information with which items have been provided. This approach not only increases read reliability but also cuts the need for more infrastructure (read hardware) as well as a tremendous amount of time and thus costs. Workers’ valuable labor can be better utilized elsewhere.

UHF Box: A Paradigm Change in Logistics

This application of RFID technology is extremely effective for closed supply chains, especially when it is combined with the UHF Smart Box, another of the Fraunhofer IFF’s new developments. The UHF Box is nothing less than the container of tomorrow. Along with transporting goods, this intelligent container can do all sorts of things other containers cannot. Equipped with the new RFID system and an independent power supply, it can be tagged with RFID labels to scan its contents and determine its condition. Transported goods could be food, the temperature of which must be continually monitored, or high value multipart goods, the integrity or originality of which must be monitored continually. Sensors on the inside also reliably identify loose mixed goods in the container. The read rate is an unbeatable 100 percent. In addition, every activity and manipulation such as loading or unloading the box is registered. Together with a container’s exact position, the information compiled can then be retrieved throughout the world at any time. The UHF Box’s capability to function
reliably even in metallic environments and even with such objects as metal cans filled with liquid is unique.

This innovation is particularly being accorded growing importance in many domains. Until now, radio transmitters were unable to function in such difficult environments and their integration in these environments is technically extremely demanding. Metal and water are impervious elements. Radio waves are either reflected by the metal surfaces or scattered so widely that no usable information would be transmittable. However, our researchers have managed to overcome this obstacle and thus close an important gap in the logistical tracking of goods in transit.

Thus, especially in combination with the RFID glove, the UHF Box and its functionality constitute a paradigm change from monitoring supply chains at individual, fixed measuring points to continuously monitoring transported assets within a - if necessary even multimodal - transport chain.

This Interchangeable Container Always Works

While the UHF Box is still a relatively new innovation from the Fraunhofer IFF, some special applications already exist, which have proven their versatility in the field.

One is the interchangeable container, a novel container with UHF technology, which can hold up to ten cubic meters of cargo.

Its origin was the logistics experts’ idea to provide a closed container, i.e. the best option for shipments, together with UHF technology for all types of shipping.

Previously, only very small or very large solutions, e.g. overseas containers, existed for such shipments of goods. For the middle segment, goods had to be reloaded and packed on insecure pallets. This represented a preventable break in the transport chain and a significant element of uncertainty too.

The interchangeable UHF container concept made it possible to finally also securely transport medium-sized units of goods of up to ten cubic meters and for logistics monitoring to track them continuously. Their size allows flexibly transferring them to smaller vehicles and consequently also makes transport into cities very adaptable and thus ultimately environmentally friendly. Given their compact dimensions, interchangeable containers can be picked up by delivery vans without any problem. In turn, four containers fit onto the swap body of a large transport vehicle. When combined into a unit of eight, they fill a semi trailer. Thus, larger quantities of goods for delivery can be shipped

RFID glove with reader and power pack. Photo: Dirk Mahler
both in large and small units. What is more, the constant RFID monitoring allows easily and securely dividing them into smaller units and reassembling them into larger ones while in transit.

The institute’s director and a logistics expert Prof. Michael Schenk is confident, “This enables logistics providers to effortlessly fulfill the demanding security requirements in international supply chains. Coupling indoor localization technologies with outdoor solutions for advanced satellite navigation and integrating them in new interchangeable container concepts makes it possible to really continuously track goods directly to the point of delivery at a warehouse.”

Concepts for the Future
This concept is capable of even more. It is an opportunity to respond to the globally mounting pressure to optimize business processes. Cities and metropolitan areas have great need of such solutions. Pollution and gridlock, caused in part by unnecessary truck traffic pose ever greater challenges to planners. Models of the “city of the future” that already break down large flows of goods on the periphery and direct goods to their destination in ever smaller units have already integrated the interchangeable container concept. Without computerized logistics control centers with largely automatic process control systems, our cities of the future would no longer be viable. Megalopolises such as London are already unable to do without them. This trend will continue and significantly alter our flows of traffic and goods. The technologies necessary for this are contained, among other places, in the innovations the Fraunhofer IFF researchers have developed collaboratively. Clearly, the RFID glove, UHF Box and interchangeable container will not be able to absolutely solve the problems of the future but they will at least enable us to handle the future and tackle such logistical challenges.

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Magdeburg’s Fraunhofer IFF is a leader in the field of RFID and telematic solutions. Its LogMotionLab, one of Europe’s best equipped logistics labs, tests and certifies RFID applications common in different industries.

Photo: Viktoria Kühne
Nonautomated warehouse logistics has been a matter of individual employees’ personal skill. The introduction of semi-automated management systems will even enable medium-sized enterprises to optimally utilize every pertinent resource and thus optimize costs and processes considerably with little effort.
There are many and diverse reasons why automated warehousing is seldom implemented in companies despite its advantages. The high costs of implementing automated systems are frequently a prime reason. Moreover, not every type of item is immediately suited for automated warehousing.

Adapting Conventional Warehouse Management
Magdeburg’s Fraunhofer IFF has presented a semi-automated solution that, above all, responds to the aforementioned problems. It allows easily and cost effectively transferring the advantages of automated warehouses to other types of warehouses, even those with bulk goods.

In principle, the solution follows established concepts of automatic localization systems and functions on the basis of AutoID and the localization of loading equipment in a warehouse (e.g. loading cranes). It provides the backbone for a three-dimensional rendering of a warehouse in the management software.

New software modules had to be created to adapt it to the particular challenges of conventional warehouses. This modularity facilitates its integration in a company’s existing ERP systems, thus augmenting already existing infrastructure. The solution not only entails a significant cost advantage but also enables utilizing data throughout a company despite the implementation of new software and hardware.

Automatic Localization System
The technical components for localization have already proven themselves many times over. Loading equipment...
can be localized optically, e.g. by laser, or wirelessly, e.g. by active RFID tags. The widest variety of systems can also be employed to identify goods in a warehouse. The use of printed labels with barcode or matrix code or RFID tags is not crucial for the warehouse management software. This decision is solely determined by the type of goods being stored. Important is only that the labels used on the identification points can be read automatically and are thus available to the management software.

**Management Software Modularity**
From the start, the solution developed at the Fraunhofer IFF has been configured so that it supports the implementation of different variants of the application. The basis of the entire systems is a basic software that serves to process the data collected from the identification of goods in a warehouse and the requisite localization data. Afterward, the collected information is available in virtually any format. This makes it possible to also couple the system with already existing warehouse management systems.

**Storage Management**
Another module building upon this serves storage management. It can both manage existing storage locations and - by defining geometric boundaries - create new ones. In general, it is designed to implement different warehouse concepts and allows retaining a company’s existing warehouse structure without any problem. It is flexible enough to effectively visualize and optimize both a fixed location system and chaotic storage. However, this module does not perform any control functions. Instead, it accepts workers’ specifications and thus familiarizes them more rapidly with the new system. It provides supporting information though, e.g. if storage locations are inaccessible or completely filled. Should
workers ignore the recommendation, the actual storage site is recorded in the software and supplied when retrieved later. The same happens during redistribution. The storage site is always displayed to workers during retrieval operations. If identical goods are stored in different locations, the choice of whence to retrieve the good is open.

**Active Warehouse Control**  
The system’s true strength becomes clear when used as an active control element in a warehouse. If this software module is implemented, it automatically controls all storage, retrieval and redistribution process to utilize the warehouse optimally. Unlike the function described above, the warehouse management system specifies storage locations to the workers. If its instructions are not followed, it registers the actual storage sites as before and incorporates them in its system.

**Warehouse Concept Simulation and Evaluation**  
A software module for downstream evaluation and verification of the warehouse concepts employed is particularly useful. It includes a special process and planning option used to analyze existing operations and check their performance. This provides companies a valuable basis to decide on new warehouse concepts as well as to train and optimally schedule staff.

**Visualization Tool**  
Should a company decide against automatic warehouse control, the system provides another extremely useful added function with its special visualization tool. The data entered serves as the basis to represent both the warehouse and the loading equipment two and three-dimensionally. Together with a software generated map, e.g. for crane operators, it constitutes an excellent planning aid for worker-controlled warehouse management.

**Numerous Benefits**  
The implementation of semi-automatic warehouse management systems increases transparency in warehouses considerably. The clear identification and localization of every item dramatically reduces the work required for search and retrieval and simultaneously boosts the capability to plan warehouse turnover. The new data can be used to produce near real-time indicators and monitor work operations in a warehouse. Medium-sized enterprises with larger and heterogeneous inventories especially ought to profit from this solution in the future. Its flexibility, ease of implementation and substantial improvement of transparency make it the optimal solution for such companies. The warehouse concept to be implemented can be determined from case to case. The system’s high adaptability allows fully customizing it as a function of the boundary conditions.

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**Introducing the Gesellschaft für Wirtschaftsservice Magdeburg mbH**  
The GWM Gesellschaft für Wirtschaftsservice Magdeburg mbH is a service the Capital City of Magdeburg provides to enterprises in the Magdeburg region in the sectors of:  
- Machinery and Plant Manufacturing  
- Healthcare  
- Waste management/Environmental Engineering  
- Rental and Commercial Properties

We communicate information between business, government and enterprises, establish contacts to institutions and organizations, bring together compatible partners, support organizational projects and cooperation. By connecting and utilizing local and regional know-how and business networks we are doing what’s possible to safeguard and boost the competitiveness of companies in the aforementioned industry clusters in the region.

Direct dialog is an integral part of our work, which is primarily oriented toward benefitting companies.

The staff of the GWM would be happy to help you identify deficits you can control, search for potential solutions and initiate their implementation together with the right partners. The services the GWM provides companies are information and time. Impartiality and discretion are basic principles of our non-profit work.

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Off and Away

Intelligent Small Containers Keep Roads Open

Prof. Michael Schenk

My city should only have the best, of course. Fresh air, open roads and no more traffic during my daily drive to work. Above all, no more monstrous, stinking trucks that already bring traffic to a standstill in the morning by loading and unloading on their delivery runs.
Everyone has different ideas of what’s best for the city. In the research project Best4City, the logistics specialists at the Fraunhofer Institute for Factory Operation and Automation IFF in Magdeburg are giving thought to what best for the city means in their field of expertise. The researchers are studying the volume of small and medium-sized shipments of goods in Saxony-Anhalt’s capital. Their interest is concentrated on the potentials of and boundary conditions for the use of intelligent transport and storage containers to reduce urban traffic.

Especially in densely built neighborhoods such as the “old city” or downtown, carriers and retailers often face the problem of an absence of loading zones for their trucks. Trucks stop right on the street, usually in the lane right next to parked cars and obstruct traffic even more. As everyone knows, that costs time and nerves.

Therefore, Fraunhofer researchers have developed a clever system that, on the one hand, solves the problem of urban commercial traffic and, on the other hand, provides retailers completely new options for inventory management. Logistics companies and couriers make their deliveries to their customers in interchangeable trailers on light trucks. Monitored by wireless RFID transponders, these “intelligent small containers” can be parked locked in parking lots or underground garages in direct proximity to the store being delivered to. Thus, annoying traffic jams caused by wildly parking trucks are no longer a problem. Retailers enjoy the advantage of being able to use the interchangeable trailers as intermediate storage and to unload them at exactly the right moment. This RFID system solution on the containers for asset monitoring lets carriers know where small containers are located all the time, when they have been completely unloaded and when they can be picked up.

This is precisely the point where the circle closes, where researchers speak of rectifying processes and it becomes noticeable that driving through the city only takes half the time because the roads are open. Double parked trucks will no longer get anyone riled up first thing in the morning.

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Countless types of RFID transponders are commercially available. The experts at the Fraunhofer IFF are extremely familiar with them and develop customized solutions for products and processes.

Photo: Dirk Mahler
Continuous Monitoring of Transports of Valuables

A New RFID Transponder Solution from the Fraunhofer at Wincor Nixdorf

Dr. Klaus Richter

Until now, it was invariably difficult or even impossible to electronically monitor the contents of transports of valuables. The metallic superstructures in ATMs prevented the use of appropriate equipment to transmit information externally. The novel RFID transponder developed at Magdeburg’s Fraunhofer IFF now enables companies to finally resolve this problem. It even functions in metallic environments and allows continuously and exactly checking both the contents and location of a container of valuables at any time.
Process providers in the banking and cash services sector deal in a special good – trust. Maximum value is therefore attached to comprehensive security and documentation of every operation executed. Wincor Nixdorf is one of the industry’s leading players. The high-tech company not only delivers state-of-the-art IT systems but also designs complete solutions for every process in banks and commercial enterprises with branch operations. This also entails providing ATMs, ATM recycling and complete POS systems as well as the attendant service.

The banking sector, an integral part of which also involves the transport of valuables, is a world rarely accessible to outsiders. The security barriers installed by the industry are too substantial. This made the company’s decision to contract Magdeburg’s Fraunhofer Institute to upgrade the security of containers for the transport of valuables all the more remarkable.

Risks Transporting Money
They were motivated by the desire to implement even more intricate monitoring of cash cassettes in the future, specifically in the business sector of the transport of valuables. Concretely, their contents ought to be directly and continuously monitorable, thus eliminating any doubt about the fundamental security of their transport. However, sensitive points, which primarily by employees’ manual intervention during the receipt and transfer of amounts of cash can still be discerned in the chain of transport.

Individuals are involved in two stations of cash transport in particular. First, when the cash cassette in an ATM is exchanged. Then, at the cash point, a point of transfer in a logistics company, when the cash in the cassettes is handled. The workers there receive, check and redistribute the sums of money before they are finally taken to their destination. Here, an individual still constitutes a potential source of error for the precise staging of transports of valuables and cash. Therefore, the intention is to largely eliminate such eventualities as miscounting or incorrect sorting of sums of money in the future.

RFID Transponder Solution for Work in Metallic Environments
Resolving this problem is a logistical and technical challenge. Yet, in this context, one innovation from the Fraunhofer IFF specifically aroused the security experts’ particular interest: Rugged, all-environment RFID antenna and reader structures. Radio frequency identification or RFID is a well established system that uses electromagnetic waves to automatically read and capture data. A sender and a special reader ensure information is transmitted. One of its fields of application is the contactless identification and localization of objects and living beings. However, until now, the use of RFID transponders has been limited to uncomplicated environments. Direct proximity to metal, for instance, disrupts the electromagnetic waves’ transmission, making its use in such environments and thus for the transport of valuables impossible.

Nonetheless, in cooperation with various companies, the Fraunhofer IFF successfully developed a novel RFID transponder solution that, among other things, is also suited for use in difficult metallic environments. The clever modification of a special reader and antennas make this possible. They allow the reliable transmission of information to a transponder on a cash cassette in an ATM. Thus, a solution to automatically and logistically monitor transports of cash cassettes exists for the first time. This makes it highly interesting for high level transport business.
Complete Documentation

Its capability to continue functioning even in closed metal containers such as ATMs makes it ideally suited for the continuous documentation of transports of valuables. Once integrated in such a container, both a cash cassette’s position and contents can be captured precisely all the time. Constant access to information pertaining to a cassette’s level of fullness increases the number of potential control points infinitely. In the future, this new RFID transponder technology will enable Wincor Nixdorf to capture and check the exact content of all the cash cassettes it transports and track their redistribution in detail anywhere and anytime.
New Possibilities for the Entire Industry
Not only Wincor Nixdorf will profit from this solution though. The entire industry in general is expected to pay increased attention to the new RFID transponders from Magdeburg’s Fraunhofer Institute. It will increasingly affect retailers that adopt the new cash function. Anyone working with automatic POS systems, ATMs and other vending machines with bank functions has likely just been waiting for such a solution.

Thus, the interest is likely to be great and the industry's particular trust in the researchers from the Fraunhofer IFF absolutely justified. Yet, despite the value of the goods transported in the high level sector, convincing companies to invest to integrate these new security mechanisms in their processes hardly requires any effort because the procurement costs are disproportionately low. Moreover, the new transponder system is universally applicable and can be incorporated in any type of container without any problem.

Expansion to ATMs
The Fraunhofer IFF is already working on future solutions for suitably retrofitted or newly designed ATMs. The work on new ATM designs is straightforward. Mainly, simple and easy integration of the transponder system in the equipment has to be clarified.

Retrofitting will likely be more difficult. Understandably, older ATMs are not laid out for new systems. Engineers will have to consider where to modify the equipment’s communication superstructure to make it possible to implement the new RFID transponders. While this challenge will certainly require the industry to continue to fully place its trust in the researchers from the Fraunhofer IFF, it will make their work far more secure and easier in the future.

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Until now, highly precise satellite navigation has been reserved for outdoor applications. Using new radio frequency identification (RFID) systems, researchers at Magdeburg’s Fraunhofer IFF are taking advantage of real time localization systems for indoor performance diagnostics in professional sports and developing brand new approaches to monitoring logistics in companies in the process.
Performance Diagnostics in Professional Sports

International professional sports would be inconceivable without advanced performance diagnostics. More precise motion analyses and training methods promise better performance and, in turn, better results in athletic competition. Therefore, technologies employed for this have steadily advanced in the last decades. Systems that provide athletes and coaches immediate or rapid information on detailed movements or complex motions are especially valuable.

Computerized analyses of competition supported by advanced information technologies ushered in a new phase of development in the early 1980s. Computerized video analysis shifted the focus of attention to so-called expert systems. Video material is still utilized for later analysis, e.g. to coach the German national handball team. This requires an extremely great deal of time though. Analysts still need over twenty-four hours to analyze a handball game in-depth, a timeframe that fails to meet athletes’ demand for immediate information to correct their movements.

New Prospects

A leap in innovation promises developments from another corner, namely from real time localization systems. Given the innovations, particularly in the field of RFID technology, highly effective applications for indoor localization can be expected soon. Indoor application will break through in the first time, which conventional localization systems could not overcome. This is precisely where sensitive domains, e.g. logistics chains, could profit from tracking.

The European satellite navigation system Galileo will play an important role. The implementation of these ambitious indoor localization research projects will only be possible in conjunction with Galileo’s potential future uses. The researchers are primarily concentrating on methods of wireless localization or their combination with other technologies such as inertial systems to further improve the result of localization. Some novel systems, nearly ready for market launch, already stand out because of their remarkable features. They have very high accuracy (< 2 centimeters), high scanning rates (1000 hertz) and highly miniaturized mobile transponders (1 cubic centimeter) and are particularly resistant to reflection and absorption (ultra-wideband, ultrasonic).

This is a stroke of luck for the training of top professional and junior athletes because this new technology will also support the development of new methods of analysis that can be applied to their disciplines.

RF@Sports

The Fraunhofer Institute in Magdeburg is intensively collaborating with Otto von Guericke University’s Department of Athletic Sciences and Siemens AG to research and implement such an application. The project RF@Sports was launched for this purpose. Among others, athletes from the German national handball team and the German junior national rhythmic gymnastics team have made themselves available as “research subjects”.

New Methods of Analysis for Team and Individual Sports

The tests were based on the use of specially developed, real time analysis systems. The subjects’ motion sequences on a particular terrain can be visualized on a monitor, incorporating the particular time requirements. This makes it possible to perform real time analyses of both individual athletes’ complex motion patterns and entire team’s interactions with maximum accuracy. Ultimately, motion sequences expected from players can even be projected.

Handball

In handball, the capture of individual players’ positions during a game could be used to provide the coach running paths, lineup formations, heat maps, speed distribution diagrams and other important information. Such real-time analysis would enable him to immediately analyze both team performance and individual motion profiles tactically and strategically and turn this information into new instructions still during training.

Rhythmic Gymnastics

Perfect synchronization and symmetrical forms of routines are crucial performance determining factors in this discipline. Twenty-seven of the junior national team’s optional exercises could be evaluated easily and rapidly with the aid of RF@Sports. The gymnasts’ symmetry and timing can now be better synchronized still during training. Ultimately, individual need for practice can be identified more precisely with long time analyses and individual training adjusted accordingly.

Skiing

Performance analyses of material and athletes in alpine skiing necessitate extremely precise motion analyses of equipment. Initial tests have demonstrated that this precision is obtained with RF@Sports. Along with different path, time and speed studies, the program can detect and evaluate skiers’ distances to a slalom gate, their drifting or their skiing posture. In the future, this method will make it possible to analyze and optimize a skier’s material and technique very precisely.

Without question, this system is a great advance over conventional methods of analysis in professional sports. In combination with the RF@Sports detection and analysis program, not only the progression of games can be captured in real time for entire athletic teams but new
individual requirements profiles can also be formulated and updated quickly.

**A New Language for Logistics**
How, though, does the introduction of this innovative motion and interaction analysis in sports aid the future optimization of process flows in commercial enterprises?

Primarily, this research work sustainably increased the technical performance of indoor localization systems. Naturally, the improved quality also has a positive effect when it is transferred to other commercial logistics sectors where it opens new horizons. A whole series of further fields of application are already foreseeable in the transportation and logistics sector.

The transfer of the findings from the athletic scientists’ methodological analysis to the world of logistics should not be underestimated. This approach has greatly contributed to better understanding and controlling internal operations in companies.

Hence, the researchers involved agree that the interdisciplinary collaboration bore effective fruit in every respect. Magdeburg’s logistics experts readily admit they benefitted in particular. Their work contributed much to the enrichment of their own linguistic world and their capability to imagine interactive processes with different participants. Earlier, they would hardly have thought of including the figure of an opponent in their technical considerations. However, their cooperation with the athletic scientists demonstrated that also allowing such concepts as are employed to plan team sport strategy to enter into their own work can be a thoroughly good idea. Transferring this to operations in companies means inserting another level of actors into the scientific analysis, thus emphasizing the dynamically interactive character of logistics processes even more than before.

**Continuous Tracking of Supply Chains All the Way Indoors**
The new methodological approaches and technological innovations in the field of indoor localization inspire hope. Ultimately, they allow significantly expanding the mechanisms of logistical monitoring and control. This advance, e.g. far more precise signal localization, even enables precisely tracking and automatically controlling very complex motion...
patterns even inside buildings. Thus, even certain workflows in routine daily business can be monitored without any problem. Imagine simultaneously monitoring the movements of a forklift, the pallet of goods being transported and staff as it unloads the pallet from a truck. In the future, it will be possible to automatically determine all these processes, e.g. a delivery of goods to the extensive premises of a plant, their unloading and further transport or storage in a warehouse, and to draw conclusions about the proper handling of these goods.

This innovation has tremendous significance for companies and workers. On the one hand, it will distinctly increase on-the-job safety. On the other hand, actually continuously tracking supply chains from a manufacturer’s workbench to the end buyer’s sales rack will finally become reality.

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The exact position of the antennas is crucial for the accuracy of the measurements. Photos: Dirk Mahler
Pinpoint localization of severely injured individuals in unclear terrain or uncomplicated coordination of technical relief teams from all over Germany during an emergency – state-of-the-art communication concepts from the Fraunhofer IFF in Magdeburg could soon sustainably improve rescue operations and emergency management in Germany.
Far from any road, somewhere in Saxony-Anhalt’s Hochharz National Park, forest workers place an emergency call with a cell phone. They just watched a sliding tree hit one of their colleagues. His injuries are serious. A sender they carry with them enables a control center to localize their position by satellite and dispatch the unit closest to the site of the accident. A helicopter is unable to land in the middle of the densely wooded region. The ambulances from the hospitals and the fire department in Wernigerode are all in action elsewhere. What is more, the monitor in the control center indicates they are too far away. So, an ambulance from Braunlage in Lower Saxony is dispatched. The paramedics on board receive exact coordinates for their destination on the computer, which immediately displays the shortest and best route to take. After one kilometer off the rural highway, turn right onto the next forest road says the system. It unwaveringly leads the emergency vehicle past impassible paths through the labyrinth of forest roads. Continual position monitoring and data synchronization clearly shows the driver the team’s position and that of the injured individual on an electronic map. Almost there, just 300 meters is signaled. Without this assistance the paramedics might have needed hours to find their orientation. Instead, they reach the site in just two more minutes and begin to administer first aid to the severely injured individual. All in all, they have needed less than a quarter of an hour for the complicated off-road drive over unpaved roads and through unknown forest. Without satellite guidance, they might have arrived too late.

Granted, this scenario is idealized. Yet, modern route guidance systems could help save people’s lives much in this way in the future. However, while the aspects of this fictitious case appear downright logical and virtually self-evident, reality continues to be quite different.

Emergency Response Agencies Have Great Need to Catch Up

While satellite localization systems have already largely established a foothold in the private sector, e.g. the logistics industry, rescue services and emergency management still need to catch up considerably. For the most part, life saving information is still exchanged with outdated technologies and improvised solutions. Shortages of funds, differing technology standards and problems with software compatibility often impede the use of highly effective state-of-the-art information and communication technologies. In addition, organizational and structural changes being implemented in Germany, e.g. local government reforms, are generating even more complex requirements for communication. The reorganization of districts and the fusion of control centers entail new challenges to the planning and control of operations.

Insufficient knowledge of a place hampers the work of rescue and emergency response teams deployed nationwide and can result in substantial damage, e.g. when a fire is not fought or the coordination of support teams during flooding is misdirected. It is virtually impossible to put a figure on the economic losses, let alone the losses of human life such communication gaps may cause.

Galileo, the Satellite Navigation System of the Future

This could soon change if the researchers at Magdeburg’s Fraunhofer Institute for Factory Operation and Automation have their way. As part of the major European project Galileo, they are developing advance communication concepts for localization and route guidance in rescue operations and emergency management.

Europe’s independent satellite navigation system Galileo is scheduled to go online in 2012. Its thirty satellites will replace the American GPS system primarily controlled by the military and exclusively support civilian uses. Galileo will not only make options for far more precise localization available. It will also provide users significantly more services than GPS such as the search and rescue (SAR) system that combines the transmission of distress signals with simultaneous transmission of coordinates. Thus, users shall no longer only be localized passively but will be able to actively transmit distress signals that the satellites receive and automatically allocate and relay to the appropriate control center.

The prerequisite is the utilization of new components specially developed for Galileo in the respective transmitting and receiving equipment. However, it and the system are not yet available. It will take a little longer until they are ubiquitous, i.e. in cell phones, PDA, laptops and any other equipment designed for them.

New Communication Concepts

However, Fraunhofer IFF researchers do not intend to wait. Together with government agencies and rescue and emergency management organizations, they are working on solutions for localization and route guidance, which already function.

The core of their concept is to outfit all relevant forces with technical options to automatically transmit standardized information without format changes. This necessitates identifying new ways to reconcile the heterogeneous technical standards and equipment among available among all these entities. The goal is to create a common basis of communication to maximize the integrated transmission of information.
Advanced Localization Systems
To do this, Magdeburg’s Fraunhofer Institute is developing special telematic systems comprised of mobile and stationary components. In operation, they continuously determine position and, using GPRS for instance, send all the data captured to rescue centers and emergency management teams. Status information or other data relevant to operations can be linked with localization information by interfacing external signal sources. The telematic system’s stationary components in a command center collect the transmitted data and visualize it in maps. This provides a control center an excellent overview of an overall situation and can be instrumental in better assessing complex emergency and response situations.

The prerequisite is mandatorily equipping all rescue teams with advanced GPS devices, which, with a deviation of a few meters in open terrain, determine position sufficiently precisely for the purpose of operations. Localization information is the foundation for subsequent route guidance that control centers can use to guide rescue units to their destinations. Another innovation from the Fraunhofer IFF utilizes off-road navigation systems to facilitate route guidance on virtually any type of mobile digital receiver.

Simple Solutions for Complex Route Guidance
With their development of simple software interfaces, Magdeburg’s logistics experts have found a practicable and low cost solution to a very broad problem. The software can be loaded onto the widest variety of established digital receivers such as the newest generation of cell phones, handheld, etc. as an independent tool or add-on to conventional navigation solutions. In principle, this makes all important information accessible to all responders regardless of their technical equipment.

At present, the Fraunhofer IFF is working on complex structural solutions that will transmit operational information individually to response teams with different mobile terminals. Depending on their devices, recipients shall either receive simple text messages or more complex and even cartographic information when necessary. At any rate, every relevant responder shall receive necessary and current information with position data on a concrete emergency. This enables the systems in a control center to directly transmit operational destinations and provide continuous route guidance while incorporating the type and conditions of roads and terrain.

The system already enables pinpoint route guidance wherever conventional navigation systems cease to work, namely in open terrain off ordinary roads.

In the field, the devices automatically switch to off-road maps whenever paved roads are left and continue navigating. To maintain the quality and accuracy of the maps, it is important to continuously update them.

Hence, the Fraunhofer IFF recommends additionally allowing teams to be able to manage map content on site. Their knowledge of and immediate experience with conditions and accessibility of roads and networks of roads will be one of the main sup-

Anyone who has to direct response teams quickly and precisely during accidents and emergencies or operates off-road needs navigation aids far superior to the common standard.

Photo: Amt für Brand- und Katastrophenschutz, Salzlandkreis.
ports of the reliability of navigation. The ideal state would ultimately be a maximally accurate description of every operational area on and off-road down to the details. Virtually one hundred percent reliable navigation to a destination will only be possible when all operationally relevant information really has been recorded.

The Navigation System as a Central Knowledge Storage System
Ultimately, this novel route guidance technology will perform a tremendous service. It will create an integrated knowledge management system that collects and archives every single responder’s field knowledge on site and then provide it in an always updated, standardized form. It will, for instance, make lengthy briefing of new staff on roads and conditions largely superfluous. Response teams from elsewhere will be automatically informed about current conditions at a site. Implemented area-wide, such communication of information will be inestimably valuable for the preservation of economic assets and human life.

Long-term Cost Benefits
The principle holds another benefit. Since fire departments and rescue teams that gather the information are on the payroll of their local government, they in turn generate a monetary benefit for their communities. The valuable data can be provided to outside organizations for an appropriate user fee. Thus, financially strapped communities kill two birds with one stone and also redeem the costs of the advanced navigation system.

What is more, satellite navigation provides the individual organizations yet another benefit. Improved documentation of movements can also generate cost cutting organization of internal processes with regard to staff and organizational expenditures and thus further optimization of operating expenses.

Opportunities and Challenges
Ultimately, this new technology not only holds a great opportunity but also performs a significant function. While the system is able to merge maps and entered data into a single representation, regardless of their regional differences, it is essential to harmonize different map providers’ data formats beforehand. Moreover, national standards are needed to specify detail information and upgrades of objects relevant to operations and safety, i.e. water sources or evacuation and staging areas, including location and access points and their cartographic representation. Only so can information operationally relevant for government agencies and organizations responsible for safety and security be beneficially entered into localization and navigation systems and utilized area-wide.

In the end, such an initiative must come from the federal and state governments.

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Wind power is a market with a future. Offshore siting of wind energy converters particularly holds enormous economic potentials and could additionally help implement the federal government's ambitious environmental policy objectives to reduce CO₂ emissions. It has one disadvantage though: The servicing and maintenance of wind energy converters on high seas proves to be especially difficult. Therefore, researchers at Magdeburg’s Fraunhofer IFF are developing new innovative concepts for optimized maintenance strategies. Not only will they increase such converters’ reliability and availability – they could simultaneously initiate an innovation drive from which the entire industry will also profit in the future.
Humans’ use of wind power is likely as old as their search for energy sources for their unbridled urge to move forward driven by the modern spirit of exploration and the desire to make work easier. Its use in ancient Egyptian sailboats 4000 years ago has been definitely established. Presumably, humans already resorted to simple sail construction and thus the use of wind much earlier. Wind power advanced along with water power to become the main source of energy in High and Late Medieval Europe. Windmills were a significant basis of economic life and guarantors of progress and prosperity.

This success story only ended with the invention of the steam engine, industrialization and ultimately with the use of fossil fuels. Since wind is a resource that has always been available in virtually inexhaustible quantities, it is no wonder that wind power is experiencing a renaissance as oil and coal resources are steadily depleted and because their use contribute to climate change. After decades of development and steady improvement, wind energy converters have become a factor for energy recovery that deserves to be taken seriously.

Onshore Wind Power in Crisis
A state-of-the-art wind energy converter can supply up to 6 MW of electricity. Economically, operation of this multimegawatt class is absolutely worthwhile. The only catch is that wind is not constantly available. Frequently unfavorable wind conditions on land lower the average utilization of a converter to a maximum of 2,500 to 3,000 equivalent full load hours per year. Theoretically, 8,760 hours are possible though. This fact does not make wind park operators happy. After all, they also have to earn money. The investments for a converter, its construction, its connection and running operation are high. Moreover, such a wind energy converter’s potentials to recover energy environmentally compatibly are not fully exploited. There is another problem too. There is not much more room. Higher requirements from regional planning and approval procedures and growing resistance among the population to more new wind parks are having an effect. Thus, the number of potential locations is close to running out. Therefore, the number of new wind energy converters on land will decline greatly in the future. This will make it difficult to meet the federal government’s obligation from the Kyoto Protocol to decrease CO2 emissions in Germany by 2012 by 21 percent over 1990. This appears to be a difficult undertaking without wind power and the construction of additional nuclear power plants, especially since the energy demand is constantly rising.

A forecast from DEWI reveals that new installations on land will significantly decrease from 2006 onward. Great potentials lie in replacing old converters with new highly efficient wind energy converters at locations rich in wind. Another way out is to construct offshore wind parks.

Giant Energy Potentials in Offshore Locations
Extending the recovery of energy from wind to the sea holds a number of advantages. The greatest is the converters’ higher efficiency. At sea, the wind blows far more frequently, more steadily and with more force, enabling turbines there to rotate with up to 5,000 equivalent full load hours per year. According to a statistic from the DEWI, onshore recovery of energy from wind would total approximately 21,000 MW by 2030 and offshore approximately 26,000 MW. That would be a total output of 47,000 MW. Taking the energy consumption in 2002 as the point of departure, wind power could generate an average of 130,000 Wh per year. That equals no less than 30 percent of the total German energy demand in 2002. This would mean an annual reduction of CO2 emissions of between 24 and 39 millions tons by 2010 and between 73 and 121 million tons in 2030. Ultimately, the development of the recovery of wind energy offshore would enable utility companies to make an important contribution to national climate protection.

A Plus for the Environment and Fishing
However, such impressive potentials are still offset by many disadvantages, which high sea siting entails. Opponents primarily see a collision of interests in use. Shipping, for example, would be impeded in part. The military and fishing industry are also skeptical since future wind parks would be located in zones they claim for themselves. In addition, these are in part also regions for the passage of underwater pipelines and telecommunications cables.

In the meantime, fishers at least would welcome the construction of the parks. These wave breaking zones of calm water have been determined to be optimal spawning and breeding sites for the stressed schools of fish in the North Sea. From the perspective of environmental policy, such wind energy converters hold more advantages than disadvantages. Thorous planning approval procedures have proven offshore sites are far more environmentally compatible than comparable coastal or onshore sites.

Cost Disadvantages of Siting Offshore
On the other hand, the substantially higher costs of construction and maintenance cause far greater problems. After all, given the special conditions of Germany’s coastal regions, an offshore location means that the wind energy converters are located in the German exclusive economic zone (EEZ) and thus 50 to 60 sea miles off the coast. Enormous quantities of material must be brought by sea to their destination, thousands of kilometers of
underwater cable laid and the gigantic foundation structures anchored in the ocean floor in water depths of 40 to 50 meters. Converters easily measure 150 meters from top to bottom. At a total of 1,000 to 1,500 tons, every single wind energy converter weighs as much as 1,000 cars or three fully fueled Airbus A380s. 100 converters or more are planned for each wind park. Purely mathematically, that means a total output of roughly 700 MW and thus the equivalent of an average block of a coal-fired power plant.

A Challenge for Engineers

The efficiency justifies the additional costs incurred. If the environmental advantages that accompany the use of renewable energies are included, everything speaks for their construction. In actual fact however, engineers have to develop the underlying technology virtually from scratch. The components need substantially improved protection against aggressive seawater. Given their dimensions and longer service lives, converters must withstand far greater loads. That necessitates enhanced material properties and increased complexity of design. In addition, servicing and maintenance are ultimately also organized a good deal more complicately and complexly. Altogether, the specific conditions at sea confront engineers with entirely new challenges.

In particular, the downtimes of offshore wind energy converters have to be kept as short as possible. Above all, their longer service lives averaging 5,000 hours a year make them profitable despite the tremendous costs. This makes it all the more essential to prevent unscheduled outages caused by a defect. Slight material fatigue and defects can already jeopardize converter reliability and cause major failures.

New Maintenance Concepts for Wind Energy Converters

Therefore, wind energy converters are serviced regularly. At sea however, the unpredictable weather conditions combined with heavy seas frequently make converters difficult to access and fixed maintenance intervals impossible. Thus, if a converter fails, it can often take up to two weeks until technicians are able to look after it. When weather conditions are favorable, maintenance work must be completed as quickly as possible to quickly bring a converter back on line.

Extremely interested in using innovative energy recovery concepts to supply its territory in the future, the State of Bremen is closely collaborating with the researchers from Magdeburg’s Fraunhofer IFF to resolve this problem. They intend to develop new methods for the maintenance of wind energy converters under offshore conditions.

Development is focused on so-called on-condition maintenance concepts. They represent the next generation of maintenance methods, replacing approaches to maintenance based more on damage still predominantly in use or concepts with preventive but fixed maintenance intervals.
The foundations for this are advanced intelligent control systems, computer systems and effective methods of evaluation. They open the way to service and maintenance aimed at constantly maintaining wind energy converters in optimal condition.

The focus is on condition monitoring, i.e. constant monitoring of the condition of all converter components and each of the relevant operating and load conditions. New measuring systems developed at Magdeburg’s Fraunhofer Institute are being mounted on the converters’ sensitive points for this purpose. With their aid, technicians have the most important data on the condition of every component and mechanical or environmental load variables at their disposal all the time. Thus, with the aid of empirical values, critical conditions can be identified and proper countermeasures initiated promptly.

**Advanced Maintenance System as a Knowledge Storage System**

Intensively working on the future field of innovative knowledge management in general, the Fraunhofer IFF is thusly killing two birds with one stone. On the one hand, a highly sensitive, adaptive evaluation system is being established that can rapidly react to increases of knowledge. On the other hand, such specialized knowledge previously only available to a few can be made accessible to everyone in a standardized form. Thus, the information system, which will ultimately be able to provide recommendations for servicing and maintenance, will function as a central knowledge storage system constantly adapting to the latest knowledge. However, optimally implementing the data obtained will require everyone involved with the wind energy converters, e.g. engineers, maintenance experts and commercial controlling, to get together and contribute their particular specialized knowledge.

The sum of their experiences is primarily what will produce a giant leap in the maintenance of wind energy converters in the future.

**Cost Optimization and Environmental Protection**

The further development of this empirically based predictive maintenance will necessitate a transparent exchange of information between the operators of wind energy converters and, among others, the responsible insurers. The latter in particular have a great deal of converter data from their business operations, which are of great interest to developers and engineers. In the future, this information exchange would help make it possible to even sooner identify where exactly improvements have to be made, i.e. whether in the structural domain or the maintenance intervals. The knowledge expected from this will then make it possible to formulate flexible maintenance plans adapted to the accumulated experience.

All these new approaches will concertedly generate considerable growth of converter reliability. The consequence will be substantial savings of cost for wind energy converter servicing and maintenance, far shorter failure and downtimes through sustainable process optimization and higher efficiency exploiting wind power. This is a winning situation for all parties, which makes the utilization of renewable energy a highly profitable opportunity, not only economically but also environmentally.

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The Changing Automotive Industry

“World Class Launch 2020” Reveals Future Trends of Process Optimization

Holger Seidel and Steffen Gänzle

The automotive industry is under pressure worldwide. The many and diverse developments of recent years are making more and more innovation imperative in shorter and shorter time. One thing is certain: More than ever before, efficiency and effectiveness are becoming crucial competitive factors for sustainable business success. MBtech Consulting GmbH, a company in the MBtech Group, and Magdeburg’s Fraunhofer IFF jointly released a comparative study that analyzes the tremendous challenges to the industry and identifies options for action.
While European and North American carmakers are fighting for their market share, Asian competitors seem to be setting the tone for innovation and rapid market adaptation. Hence, the creation of production systems, i.e. integrated optimization of development, manufacturing and logistics processes spanning the entire supply chain, is an industry mantra. Yet, despite the potential significance of its implementation, in-depth comparative analyses of international carmakers are hardly to be found. Who has a leg up and why and where is there potential for optimization? MBtech Consulting GmbH and Magdeburg’s Fraunhofer Institute took two years to pursue such questions in a major international comparative study, World Class Launch 2020, aimed at delivering sound recommendations for strategies for the automotive industry.

The Study
Building upon benchmarking integrated throughout the product development process in the automotive industry, the study focused on the periods from 1992 to 1998 and 1998 to 2005. Above all, changes in OEM and their suppliers’ start-ups and their effects on product development, value added chains and structures were of particular interest.

Given the study’s global approach to analysis, the analysts from MBtech and the Fraunhofer IFF tackled an abundance of data. They closely examined sixteen manufacturers with over eighty-five plants and twenty development centers worldwide. In addition, over seventy suppliers with a total of eighty start-ups were also intensively analyzed. Among other things, the study was supported by eighty interviews with experts from middle and top management, project reports, excursions to plants and analyses and comparisons of fifty product development processes and 30 PPP master plans.

While the considerable effort may be surprising at first, it is absolutely justified considering the study’s distinctive mission. Ultimately, the World Class Launch Study makes it possible for the first time to map the automotive industry’s currently most important trends for the future and identifies the success factors and means of effective launch management. They are intended to help lay the cornerstone to formulate a new global market launch strategy and a value enhancing "product launch excellence" concept.

Key Questions
In its core, the study delivered answers to the following questions:
How will development and manufacturing processes for start-up and ramp-up be organized in the future in the automotive industry?
What demands on vehicle market launches will end consumers have in the future and how will manufacturers react to them?
What is the state of implementation of optimization efforts in start-up, ramp-up and market launch process?
What best practices currently exist, toward which future goals for start-up and launch performance can be oriented? What organizational forms accelerate start-up and ramp-up?

Asian Carmakers Have an Edge
The quest for answers to these questions quickly made one thing clear: An international comparison specifically with Asian manufacturers only conditionally benefits European and North American manufacturers. The main reason is their different customer structures. While Asians are primarily geared toward a homogeneous group of customers, their Western competitors must deal with a far broader range of customers. Hence, the former manage to launch a multitude of model variations on the market in next to no time on just one single vehicle platform. Europeans and North Americans on the other hand are not
only struggling with a largely saturated market but must also make far greater allowances for their discerning customers’ more individual demands. Dwindling purchasing power and increasing social segmentation are doing their part. On their one hand, the trend is moving toward smaller cheaper cars. On the other hand, demand is rising in the luxury segment. Moreover, they are witnessing how Japanese and Korean competitors are recapturing market shares – and manufacturing faster and cheaper in the process.

Thus, it is no wonder that some are attempting to draw inspiration from Asia for their own planning.

Yet, directly transferring Asian management methods to European conditions is not very easy for the aforementioned reasons. However, there is firm resolve to face the challenges particularly in the successful core manufacturing segments. According to the study’s conclusion, these will primarily be speed, flexibility and process and cost optimization in development and manufacturing. There are also intentions to further expand the profitable premium brand segment. Increased profits are intended to be made primarily here in the future, which are indispensable to the development and manufacturing of less profitable lower vehicle classes. However, these will make up the bulk of the vehicles sold in the future.

Two Key Strategies: Shorter Start-up Times and Integrated Engineering
The implementation of these goals will ultimately require a multitude of new strategies on the part of carmakers. Altogether, they constitute a highly complex pattern of innovative idea and a refinement of effective strategies. Two key trends particularly stick out.

On the one hand, new initiatives will be needed to design future models and shorten the product development process, i.e. there will be an ever greater diversity of vehicle variants in ever shorter intervals, however with less variance of the model platforms. Thus, end customers will be able to look forward to continuously differentiated vehicle models but must, in return, accept that few or even only one single platform is hidden behind the pretty “packaging”.

"Fast built car" is the name of this concept aimed at launching an entire model family simultaneously within only three months in the near future. This more than halves the market launch times of 1996 while it doubles the number of models and the number of countries where a model family is launched.
The second intended goal pertains to the future integrated development of the entire development and manufacturing process. Wide-ranging potentials for savings exist especially in the development process where most of the costs are also determined. The focus is on more effective methods of development, not least by fully taking advantage of the technological possibilities. One example is the increasingly important "digital factory". The time and costs savings expected merely from increasingly utilizing available VR technologies for vehicle development are tremendous.

Moreover, tying suppliers even closer to concerns is intended to insure management structures are altogether leaner and response capabilities are faster. Goals include improved know-how transfer between companies, shorter response times to model modifications, more efficient knowledge management among staff members and the creation of integrated, highly flexible manufacturing systems to name but a few.

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Ten Hypertrends for Vehicle Manufacturers
The answers to the study’s core questions can be formulated as ten hypertrends that will confront manufacturers by 2020:

Future Action Strategies
The analysts recommend simple action strategies to respond to these trends in a CEO program for managers in the automotive industry.

1. Clear definition of one’s future role on the world market,

2. Development of an individual vision for product start-up and strategy for manufacturing,

3. Maximally complete flexibilization of production facilities,

4. Creation of clear factory typologies for future requirements to mix models,

5. Global development of rapid adaptability when reorganizing production,

6. Programs to continuously reduce costs throughout the entire value added chain,

7. Early integration of vehicle construction and assembly programs,

8. Comprehensive definition of an integrated vehicle launch program,

9. Formulation of adaptive integration and start-up programs for new business models,

10. Acceleration of prototype development by developing high-tech methods.

The future will reveal the extent to which carmakers are able to follow these recommendations. Ultimately however, the issue of the specific organization of optimization processes will be crucially important in the industry when it is a matter of sustainably surviving global competition.

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Sharp Minds

Professor of Precision Sensor Systems

Automation expert Dr. Klaus Ulrich Schmucker followed a call to Otto von Guericke University Magdeburg. He will now teach courses on robotics as an honorary professor in the Department of Mobile Systems.

Prof. Schmucker is a native of Magdeburg. After his high school graduation, the talented student decided to study theoretical mechanics at the renowned Moscow State Lomonosov University. He learned Russian in the process and speaks it fluently to this day. Despite the demands of his studies, he found time in Moscow for his great passion, playing the piano, and completed a master’s course “on the side”. He headed back home to the GDR with a Diplom degree in mathematics and theoretical mechanics. Around 1983, he began research work in the field of robotics. This subject and sensor systems in particular aroused the young researcher Schmucker’s enthusiasm. At the Academy of Sciences’ Institute of Automation in Berlin, he developed a multitude of sensors and application solutions for industrial robots. In 1991, he heard the news that the Fraunhofer-Gesellschaft planned to found a new institute in Magdeburg. The founding father of the later Fraunhofer IFF, Prof. Eberhardt Gottschalk offered Schmucker a job in the founding team. Thus, Schmucker returned to his hometown, in the meantime the capital of Saxony-Anhalt. Prof. Schmucker has now been working at the Magdeburg research institute for sixteen years and played a crucial role in making robotics one of the Fraunhofer IFF’s important specializations from the start. In his present position in the Virtual Engineering Expert Group, he is working on the integrative virtual development of sophisticated products and manufacturing processes.

BVL Honor for Fraunhofer IFF Director Schenk

This year’s annual meeting of the BVL was held in Düsseldorf in advance of the anniversary sequence “Logistics’ Best”. Prof. Michael Schenk, Director of the Fraunhofer Institute for Factory Operation and Automation IFF, Magdeburg stepped down from the board at the end of altogether twelve years in office. He was presented with the BVL’s golden badge of honor and will contribute his expertise to the Scientific Advisory Board in the future.

Power in the Grid

At twenty-eight, Dr. Przemyslaw Komarnicki has already achieved a bit. He has earned his doctorate, is married and is a passionate soccer player. The energy the native Pole puts into his undertakings is palpable. It is hardly surprising that the young researcher devoted his doctoral dissertation to the subject of power and wrote about the “Application of Highly Precise Synchronous Measurements to Improve the Operation of Distribution Networks”. He even finds surprising parallels between this topic and his great passion, soccer. “An electrical grid is like a soccer team. If you want to win, everyone has to collaborate and play the ball forward,” explains Dr. Komarnicki. He’s absolutely right. A strong soccer team or efficiently operating grid operators are only successful when they are all working for a goal.
Otto von Guericke University’s Institute of Logistics and Material Handling Systems ILM has a new professor. Prof. Hartmut Zadeck followed the university’s call and is now the new Holder of the Chair of Logistics.

Under ILM Managing Director Prof. Michael Schenk He succeeds longtime chairholder Prof. Dietrich Ziems.

Born in Berlin, Zadek studied engineering at the Technical University of Berlin and was a faculty member in the logistics group at the Department of Technology and Management there. He received the Konrad Mellerowicz Award in 1999 for his doctorate.

A symposium on “Excellence and Sustainability in Logistics” at which Prof. Hartmut Zadeck held his inaugural lecture was part of the 11th IFF Science Days.

Looking Beyond the Horizon with the Fraunhofer IFF

Roman Bystricky studied forestry science at the University of Zvolen in the Slovak Republic until 1999. After graduation, he worked on geographic information systems in a Slovakian national park for several years until the Robert Bosch Foundation enabled him to come to Germany in 2004. He deliberately decided on Saxony-Anhalt: From his studies, he knew that the most northerly and oldest stand of spruce is located on the Brocken. Reason enough for the nature lover to head close to Harz National Park.

After nine months of project work in the Ministry of Agriculture and the Environment, Roman Bystricky started looking for another challenge. His adviser at the ministry drew his attention to the Fraunhofer IFF: “He told me they look beyond the horizon. I liked that. I wanted to look beyond the horizon too.”

Roman Bystricky has been a research manager at the Fraunhofer IFF in Magdeburg since 2005. The logistician worked on many projects dealing with wood logistics, biomass and off-road navigation.

After three years of intensive research work, he completed his doctoral dissertation on “Creating the Forest Road Database in the Forestry Information System” in December of 2007. In it, the young researcher analyzed a German and a Slovakian forest. His doctorate also signals the end of his days at the Fraunhofer Institute. His colleagues have become good friends and both of his superiors, Dr. Ehrhardt and Mr. Seidel, have set a high standard for future bosses. An extremely interesting challenge certainly awaits Dr. Bystricky in the Slovak Republic in the future. Contract negotiations are well underway. One thing is certain: It will be a job in the open air.

Creative Researching Spirit

Fraunhofer IFF for the past few years devotes himself to both. His colleagues describe him as a creative thinker and passionate dancer.

The young Slovakian researcher has successfully completed his doctorate on the "Integration of Sensor Components in Prototype Components". Sulč came from Trenčín to Magdeburg as a young exchange student in 2001. His original plan was to spend five interesting months here. His plan expanded somewhat: Dr. Sulč worked on intensive research at the Fraunhofer IFF until 2007. The foundation for this path was laid by former fellow students who themselves had worked at the Fraunhofer IFF beforehand and aroused his curiosity about working at the institute. With his doctorate in his pocket, he has now been working as a main power engineering designer at Volkswagen in Brunswick since the beginning of the year and, among other things, designs front axles for the VW Golf popular everywhere.

What do rapid prototyping and dance have in common? Dr. Juraj Sulč who has worked on innovative product development at the Fraunhofer IFF can often be found in forests and fields.
Five young researchers from abroad are starting their careers in Magdeburg. Left to right: Kamil Lipiec (Poland), Ling He (China), Svetlana Budza (Ukraine), Izabela Sewerynek (Poland) and Sergii Kolomiichuk (Ukraine). Photo: Dirk Mahler

Christian Teutsch hasn’t had his doctorate very long. He’s been a research manager at the Fraunhofer IFF for a while longer. The talented young research began his academic career at the Magdeburg research institute in 2002 while he was studying computational visualistics. His Diplom thesis followed and he continued with this topic up through his dissertation entitled “Model-based Analysis and Evaluation of Point Sets from Optical 3-D Laser Scanners”.

As a balance to his research work developing measurement systems for 3-D laser scanners, Dr. Christian Teutsch particularly likes to travel the world with a backpack. “You can only demand one hundred percent from your brain, if you clear it now and then,” is the newly qualified doctor’s motto. He will take leave from the world of research for four weeks in September for an adventurous backpack tour when he’ll be off to the mountains and the wilderness of New Zealand. Even there on the other side of the globe, Dr. Teutsch will be busy “measuring” something on remote trails, his own fortitude this time. Obviously, everything in Dr. Christian Teutsch’s life has to do with measurement.
Dr. Mark Staiger earned his doctorate from Otto von Guericke University with his dissertation on "Knowledge Management in Small and Medium-sized Enterprises: Development of a Framework to Organize a Knowledge-oriented Organizational Structure and Organizational Culture".

Dr. Mark Staiger studied organizational psychology, economics and educational science in Munich. He came to the Fraunhofer IFF in 2002. As a research manager, he worked on topics of knowledge management. "Even though it was difficult to balance a girlfriend, free time and work, I enjoyed the time full of experiences," says the newly qualified doctor describing the last few years. For his new job, Dr. Mark Staiger has moved to South Africa where he is working for the German Development Service and providing consulting to network organizations working to develop the local economy.

Traditional doctoral initiation at the Otto von Guericke monument. L. to r: Prof. Sibylle Peters, Managing Director of the Department of Vocational Education and Human Resources Development at Otto von Guericke University, Dr. Mark Staiger and Prof. Michael Schenk, Director of the Fraunhofer IFF and Managing Director of the Institute of Logistics and Material Handling Systems at Otto von Guericke University. Photo: Jörg von Garrel.

Fraunhofer as a Springboard to Industry

Rico Schady from the Production Logistics and Factory Systems Group earned his doctorate with his dissertation on "Methods and Applications of Knowledge-oriented Factory Modeling". Schady worked on projects in the field of factory planning and production optimization. Rico Schady was born in Königs Wusterhausen in Brandenburg in 1977. After high school, he studied industrial engineering at Brandenburg Technical University in Cottbus and specialized in factory planning. After graduation, Schady devoted himself to different research topics at the Fraunhofer IFF such as extended feasibility studies, systematic analysis of qualitative criteria in factory planning and knowledge-oriented factory modeling. In addition, he was actively involved in the VDI Factory Planning Expert Committee. Dr. Schady is now a consultant in the Corporate Technology Division at Siemens AG where his job is to optimize and plan manufacturing facilities.

Graduates, students and instructors gathered at the traditional logistics summer party on June 28. During the day, attendees demonstrated their athleticism in a soccer and a volleyball tournament and their logistics know-how in a logistics competition with several events. In the evening, the outgoing graduates were bid farewell with personal gifts and the social portion of the program began. Many students took advantage of the relaxed mood to strike up conversations with graduates and establish initial contacts for internships and Diplom theses.
Magdeburg’s Fraunhofer researchers specialize in the continuous indoor and outdoor tracking of goods and real-time monitoring of warehouse zones and handling processes.
Ultrasonic localization excellently localizes logistics assets in three dimensions. A special system uses acoustic waves emitted in the 40 kHz frequency range to localize any number of mobile transponders. Thus, on the one hand, the location of an object being sought can be determined precisely. On the other hand, the system allows automatic inventorying, in hospitals for instance. It is also outstandingly suited for use in electromagnetically difficult environments such as industrial plants.
Order picking especially holds considerable potential for optimization. The monotony and strenuousness of this activity has long been recognized as an argument for automation. New variants of packaging and less packaging material are economically and ecologically expedient. However, they confronts everyone involved with great challenges. The Fraunhofer IFF’s project partner KUKA Robot Group is responding to these developments with flexible solutions. Here, a robot is unloading various pallets with gripper technology that uses friction rollers to roll products onto two support plates.
Gallery
Logistics is a field of work of the future. At the eponymous annual Fraunhofer Guest Lecture Series under the patronage of Minister of State Development and Transportation Karl-Heinz Daehre, speakers from well known organizations present intelligent logistics solutions they use to meet the challenges of the market.
Guest Lecture Series

Virtual Reality: Human and Machine in Interactive Dialog

Meet up with us:

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DOAG: Logistics and SCM 2008
Bonn

October 1-2, 2008
13th ASIM Professional Conference: Simulation in Manufacturing and Logistics
Berlin

October 8-9, 2008
Fuel Cells Science and Technology 2008
Copenhagen, Denmark

October 9-10, 2008
Fraunhofer VISION Alliance’s Technology Day 2008
Magdeburg

October 14-16, 2008
MAINTAIN
Munich

Outlook

October 22-24, 2008
25th German Logistics Congress: Creating Values – Connecting Cultures
Berlin

November 4-6, 2008
VISION
Stuttgart

November 6, 2008
10th Cooperation in Plant Engineering Industry Working Group
Arnstorf

November 18-19, 2008
AKIDA
Aachen

February 26-27, 2009
14th Magdeburg Logistics Conference: Sustainable Logistics
Magdeburg

April 20-24, 2009
Hannover Messe: Digital Factory
Hannover

May 11-15, 2009
ACHEMA
Frankfurt am Main

October 20 – November 26, 2008, Magdeburg

Outlook
Hansa Terminal
- High capacity intermodal container terminal for containers and swap bodies
- Portal crane, max. 50 t by water, rail, road
- Annual handling capacity of 30,000 TEU
- Maximum depot capacity of 1,500 TEU
- Hazmat storage area of 2,850 m²
- Container storage area of 4,500 m²

Heavy Load Area in the Hansa Terminal
- Dockside heavy load area of 60 m x 20 m
- Portal crane with 50 t capacity
- Mobile crane with 500 t capacity (rentable)

Construction of the Hansa Port
- 40 ha under development
- 1,400 m bulkhead
- 3,500 m port railway line
- 1,700 m beltway connecting to highway
- 700 m inter-port and delivery road

Connections
- BAB 2 – 1 km
- Optimal trimodal location connected to highway, waterway and railway
- Central hub independent of the water level for shipping within a radius of up to 200 km
- BAB 14 – 6 km
- B 1, B 71, B 81

Current Real Estate Offers
- 60 ha of industrial development sites directly on the port premises
- 100 ha of industrial development sites approxi mately 1 km from port
- Storage space
- Office space

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Magdeburger Hafen GmbH, Saalestrasse 20, 39126 Magdeburg
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Bet on the right card. Photo: Dirk Mahler