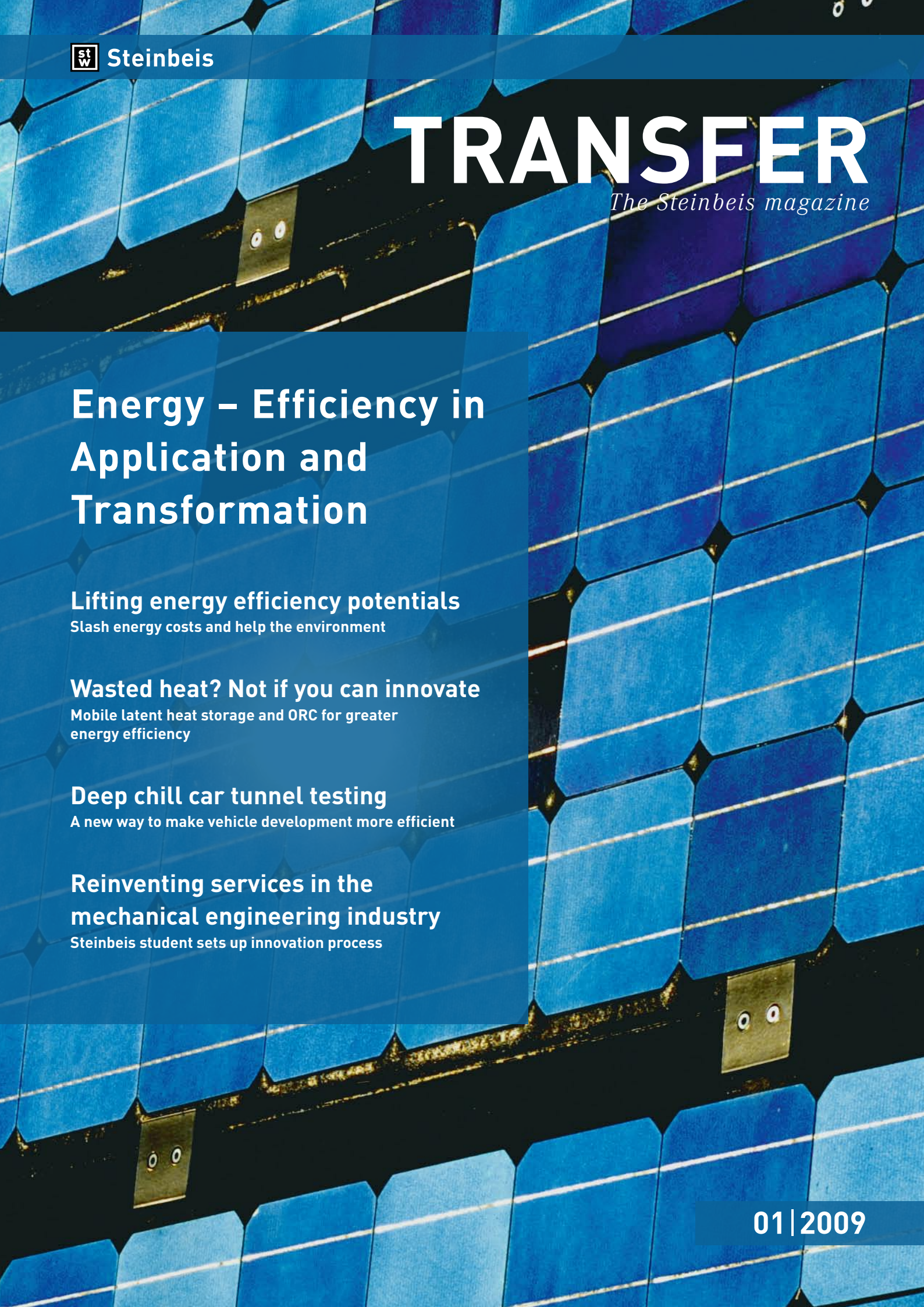

Steinbeis

TRANSFER

The Steinbeis magazine

Energy – Efficiency in Application and Transformation

Lifting energy efficiency potentials
Slash energy costs and help the environment

Wasted heat? Not if you can innovate
Mobile latent heat storage and ORC for greater energy efficiency

Deep chill car tunnel testing
A new way to make vehicle development more efficient

Reinventing services in the mechanical engineering industry
Steinbeis student sets up innovation process

01|2009

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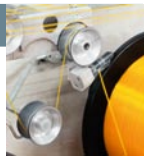


News

Editorial

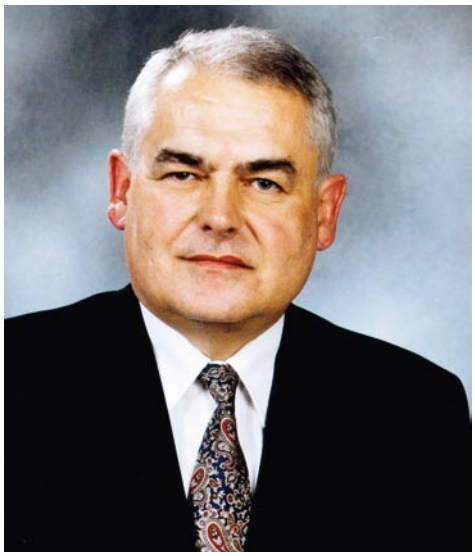
Dear readers,

The global economy is experiencing rapid and sweeping change. Seemingly unforgotten principles are breaking new ground, to the beat of a classic mantra: "only people create value" (Springer). In the current climate, this takes on a whole new meaning. The classic concept – that enhancing and safeguarding social prosperity depends on the pace of technological development – could not now be clearer. Consequently, developments depend on technological progress and, to a large extent, the ability to innovate with technology.

As most technological progress happens in or via manufacturing, everything will boil down to our ability to master, shape, develop and apply production technology. Similarly, education and knowledge play a key role in driving innovation. To do this role full justice, since its foundation the Steinbeis-Technology-Group at Steinbeis University Berlin has been raising its profile as a provider of technical and industrial engineering services. Bound by Humboldt's principle of uniting teaching with research, and following the fundamentals of Löhn's transfer theories, what ensued was a network within a network, offering everything from research to development, training, employee education and media marketing. The approach has allowed us to create individual and complex solutions from our own basic and applied research, plus consulting. The conflicting goals of productivity, cost and quality are evaluated systematically in every research and development project, examining fundamental technical relationships vis-à-vis time – plus time vis-à-vis cost. This is then structured systematically, not only making research and development services tangible entities, but also a basis for curricula.

Accepting the reality that knowledge has a "half-life" acts as confirmation that the validity of research knowledge is shortening – rapidly! This is the case, although in essence this "only" applies to knowledge of facts, not methods. And just because things move quickly does not necessarily mean there is maximum throughput. The same applies to education backlogs and people's attempts to solve backlogs by shortening the length of studies! The real challenge for society when it comes to education lies in synchronizing fields that move at different speeds. The Steinbeis University "project skills" degree makes a profound contribution in this respect, not only by addressing the situation but also by actively shaping it. Today's customers are not just passive recipients and consumers. Increasingly they have to play their own part in adding value. Lifelong learning has become a synonym for needs-based training and employee development and there will always be a requirement for needs-based training, plus an employee development system that balances academic principles with the technological, commercial and management needs of industry.

This is the issue being addressed at the workshop in Stuttgart on 1 April 2009 – "Energy – Efficiency in Application and Transformation", a forum for experts who discussed the energy supply side to efficient energy use and the conservation of resources. This latest edition of Transfer provides a compact and



we believe powerful summary of our philosophy and strategy. Our aim was to provide you with an informative read that would leave a lasting impression, and we would be delighted if one day this leads to a fruitful partnership!

Prof. Dr.-Ing. Ulrich Günther

Ulrich Günther is a director of the Steinbeis-Technology-Group (STG) at Steinbeis University Berlin.

To read about an STG project on the use of cutting tools in production, see page 6.

Slash energy costs and help the environment

Lifting energy efficiency potentials

As part of the BEST program run by the Baden-Württemberg State Institute for the Environment, Measurement and Conservation, experts from the Munich-based Steinbeis Transfer Center for Energy and Environmental Process Technology and Eco-Management investigated ways for SMEs in the plastics processing industry to save energy. The aim of this across-the-board analysis? To uncover the use of energy in the company and kick-start the optimization of the production in order to lower energy costs.

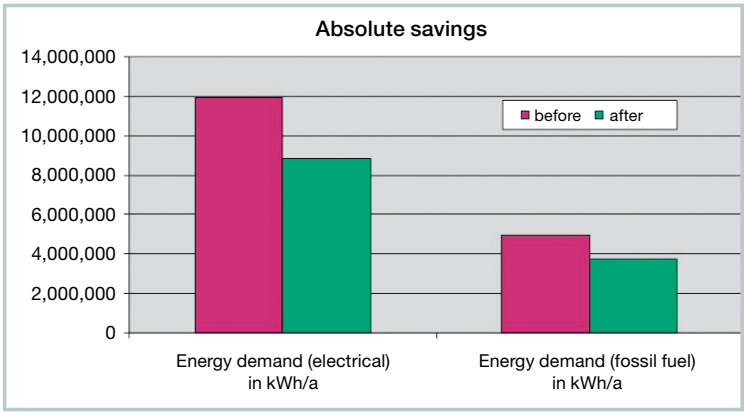
Another aim of the project was to improve working conditions for staff at the company by reducing the amount of excess heat generated during production – as well as improve competitiveness by lowering the specific energy costs per ton of product. And last but by no means least, the project also strove to reduce the environmental impact of production.

The middle-sized plastics processing firm in the study produces filaments for the brush and textile industries, as well as sport and leisure applications. During production, polyamides and PET are melted and extruded into filaments, which are stretched in a multi-step process. Next, these filaments are heat treated – ensuring they behave as required in their future application. The energy this requires is supplied mostly as electricity, but steam from a gas boiler also plays a role. Overall, the production process requires substantial amounts of energy. It also generates considerable amounts of waste heat due to its low efficiency.

The Steinbeis team began by undertaking a rough analysis of the plant operations according to the VDI 4075, a guideline of the German Engineering Association. This indicated that filament production consumed the most energy and was thus responsible for the highest energy costs. In a subsequent microanalysis, two typical production lines were assessed in detail. This entailed using specific parameters to estimate the theoretical energy demand while measuring the actual energy demand of each production stage during normal operation. Key variables were the absolute energy demand – electrical and fossil fuel – and the demand per kilogram of raw material processed. All values were extrapolated to forecast annual consumption, then compared with the firm's actual annual consumption.

Analysis of the energy and material flows revealed that most energy was consumed by the extruders (36 per cent) and tunnel kilns (37 per cent), which heat the filaments. A significant proportion was used for cooling – 9 per cent in total. The energy demand of the extruders could be reduced by insulation, while that of the tunnel kilns could be substantially reduced by narrowing the entrance and discharge gaps and improving insulation. Cooling currently takes place via a cooling tower and several cooling compressors – however, alternative cooling methods using wells and river water were investigated.

Together, all of these optimization measures would result in a potential annual saving of around 320,000 euros – not including revenue from CO_2 trading. At current prices, the company's annual energy consumption costs 1.2 million euros – for around 12 million kWh of electricity and around 5 million kWh of natural gas. These relatively simple measures could slash energy demand – and thus costs – by as much as 25 per cent. In turn, this would lower annual CO_2 emissions by around 2500 tons – allowing the firm to optimize energy costs while doing its part for the environment.



Company electricity demand and significant individual consumers in kWh/a

These aren't the only benefits of the project. Internal processes are now much more transparent, resulting in considerable improvements in communication and information flows. Staff are also much more conscious of the need to save energy and are committed to implementing the optimization measures.

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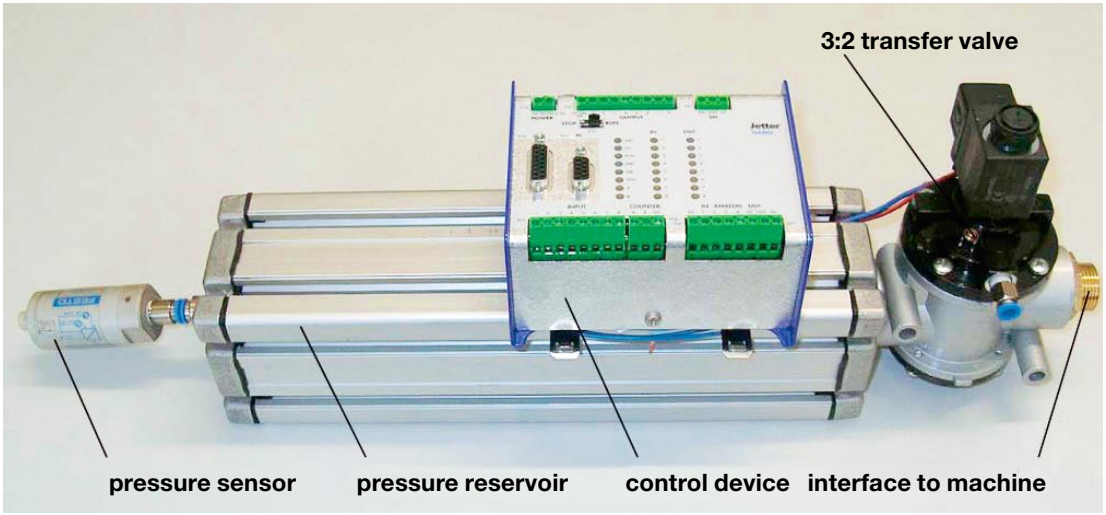
Less compressed air consumption during plastic blow molding

Using compressed air to save energy

How can we make plastic blow molding procedures more energy-efficient by reducing the amount of compressed air they use? Thanks to a research initiative sponsored by the German Foundation for the Environment (or DBU), the Chemnitz-based Steinbeis Transfer Center for Drive Engineering and Robotics in Engineering tackled this very question. Their efforts paid off: the Steinbeis experts developed a procedure that temporarily stores the high-energy exhaust air and feeds it back into the process.

Blow molding is a "high-yield" way of manufacturing hollow objects out of plastic. It's impossible to imagine how we would package our consumer goods today without these handy vessels, such as PET bottles. And that's not all: plastic containers are gaining ground in technical areas.



A prototype efficiency unit

In blow molding, compressed air up to 40 bar is used to expand the preform within the cavity to the object's final shape. Once the plastic has cooled, the high-energy compressed air is released into the ambient air and the object is removed. One drawback of this procedure is the amount of energy it takes up – mainly due to the large amount of compressed air needed to shape the object.

Together with an SME named Drucklufttechnik Chemnitz, the Steinbeis Transfer Center (also based in Chemnitz) joined forces with the fluid technology research group at the Institute for Engineering and Plastics Technology (attached to the Chemnitz University of Technology). It was all part of a pilot project to engineer a way to reduce the amount of air blown during reshaping. The experts studied the process to establish a baseline for their solution. This solution would come into play at the end of the production process, where compressed air channeled into the ambient air would be stored temporarily and then reintroduced into the blow molding process.

The experts then got to work. With the formation process complete, pressure is now balanced between the tool and a separately attached pressure reservoir. This occurs as air is exhausted from the tool. Once the tool is fully exhausted, the finished object is removed. The compressed air inside the reservoir can be reused in the next cycle for another preformation process. To do this, the pressure is "rebalanced" between the tool and pressure reservoir, causing the preform to expand. Afterwards, the pressure reservoir is decoupled from the tool, and the object is worked into its final shape using fresh air.

To test the idea in practice, the researchers developed a prototype "efficiency unit". Using suitable components, they configured the pneumatic circuit diagram of a typical blow molding machine to make it possible to insert the efficiency unit into the process – without modifying existing technology. Tests showed that up to 20 per cent of compressed air could be saved.

According to Forum PET, Germany produces nearly 13 million PET beverage bottles every year; the average bottle size is liter. If applied, this new procedure would reduce electricity use by about 9.63 million kWh. No wonder there are plans to apply lessons from the pilot project to a module that meets market demand.

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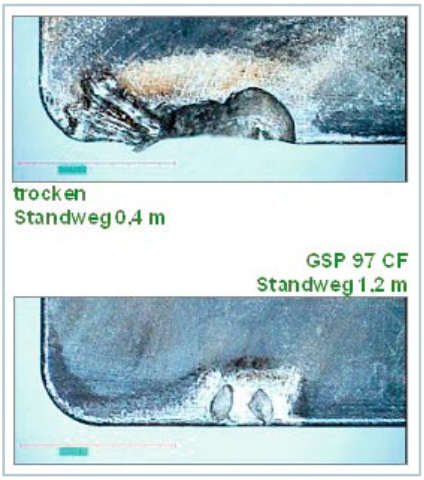
Using new materials in production

Machine cutting parts – and conserving resources

Now more than ever, new developments in manufacturing are dictated by environmental issues. Consumption, emissions, weight, recycling – all key terms that begin the list of specifications for any new product. This has led to increasing use of new materials such as CGI (compacted graphite iron), ADI (austempered ductile iron) and heat-resistant cast steel in the automotive industry, composite materials and titanium alloys in the aviation industry, and super-alloyed steels and titanium alloys in the power plant industry.



Milling austenitic steel using a solid lubricant

Thanks to these new materials' enhanced mechanical and thermal properties, manufacturers can use the materials to design thinner walls, reduce weight and boost application pressures and temperatures. The improvements made to these properties compromise the materials' machineability – in some cases, the trade-off is stark. Compared to those of older materials, the downtimes and cutting conditions manufacturers see today are much lower; the resulting spikes in costs, however, are simply too high.

Here, the cutting material plays a particularly important role. The most important shift in development: optimizing the cutting materials' resistance to wear at high temperatures and their tribological properties. Basic steps taken to boost the materials' resistance to wear – such as using a more rigid substrate or a thicker coating – have proven unsuccessful. The reason: these steps cause the materials to become less resilient, thus introducing unacceptable levels of risk into processes. Truly driving productivity to required levels involves improving two ratios: rigidity to high temperature properties; rigidity and toughness.

This is where the enormous potential of two of the latest advances in coating come to the fore: shotblasting of CVD coatings and PVD-Al_2O_3. The former was launched under the brand name Tiger•tec® by Tübingen-based WALTER AG in 2001. Tiger•tec® uses an ancillary mechanical treatment to significantly improve internal stress and tribological properties. As a result, processes are much more reliable as comb-type fractures, mechanical failures and built-up edges are kept to a minimum. Four years later, WALTER AG launched PVD-Al_2O_3, a coating procedure that opens up new opportunities for applications thanks to its considerably faster cutting speeds. Compared to the conventional TiCN and TiAlN coating systems, PVD-Al_2O_3 boosts application temperatures to by around 150-200 °C while maintaining the excellent resilience PVD is known for.

In a similar way to the cutting materials, improvements have been made with the microgeometry of the blades. Another area with great potential is optimizing cutting surface microgeometry in terms of tribology. Lots of these materials have high alloy content so they tend to "get stuck" – in other words, form built-up edges. This can have a dramatic impact on life expectancy and surface finish. Cooling lubricants improve the situation, but their use is hotly debated. Steinbeis, the TU Dresden, Shell and WALTER AG joined forces to investigate how structuring the cutting surface and developing solid lubricants can improve an indexable insert's tribological properties. By structuring the cutting surface's top layer in a particular way, the team was able to make the solid lubricant more effective and double tool life travel.

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Evaluating decentralized facade integrated ventilation systems

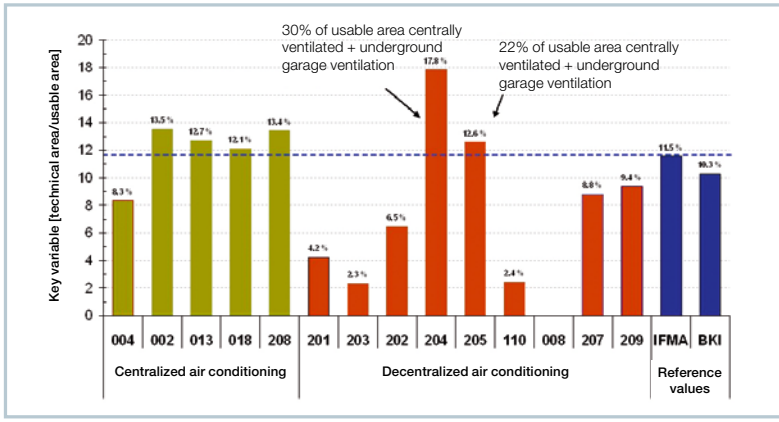
Flexibility and efficiency with decentralized ventilation systems

As part of the DeAL research project, the Steinbeis Transfer Center for Energy, Building and Solar Engineering in Stuttgart analyzed ten buildings with decentralized ventilation systems built into the facade. They rated the buildings for comfort, user satisfaction, owner satisfaction and energy efficiency. The firm Transsolar Energietechnik and the Institute of Building Services and Energy Design at the Technical University of Braunschweig were partners in the project.

Office layout and equipment are increasingly expected to be flexible and space-saving – just one reason why ventilation systems built into facades are more and more in focus compared to traditional air conditioning systems. Modern systems like these draw air into each room through openings in the outer wall. Some also expel outgoing air in the same way. Air is conditioned locally in each individual device. The way these ventilation systems work is totally different to more commonly used centralized ventilation systems, which take in and condition air through a central device. They also contrast with systems which use decentralized induction devices to condition both fresh and recycled air, but which take in air through a central device using air channels.

Decentralized ventilation systems are a relatively new technology and the DeAL project was the first scientific study on how these systems work in practice. The team conducted a detailed analysis, which included assessing the current technology status of the systems, a cost analysis on the buildings, a survey of users and owners, and measuring energy consumption and comfort levels.

By analyzing different building facades, the team demonstrated that decentralized ventilation systems can be integrated in all common styles of building facade today. The buildings studied needed significantly less heat energy and tended to consume less electrical energy than modern office buildings of a similar standard with centralized ventilation. Short and long-term mea-surements as well as user surveys all pointed to high levels of comfort and optimal temperature control. Some buildings exceeded limits for workplace sound emissions. In some cases, this was caused by incorrectly set ventilation systems, insufficient sound insulation, or no sound insulation at all. Another strong argument in favor of decentralized ventilation is the more efficient use of space, as less equipment is needed than in conventional systems. The buildings showed a 5 to 15 per cent improvement of space efficiency.



Area efficiency of building with decentralized ventilation

The DeAL evaluation underlined the benefits of decentralized ventilation – namely, improved comfort and temperature control, and more efficient use of energy and space. In many cases, however, there was still potential for optimization. To make the most of decentralized ventilation systems and extract their maximum benefit, they should be planned in from the very beginning as part of an all-round approach to building design. In particular, the systems should be coordinated with facade planning, architecture and building services engineering.

Decentralized ventilation

Benefits

- reduced floor heights, as no ventilation shafts necessary
- smaller control centers
- reduced energy costs
- flexible use of space
- only needs to be activated when someone is in the room
- people can directly control their environment

Disadvantages

- Slightly higher maintenance costs due to large number of devices
- Maintenance must be carried out in the room
- More difficult to control humidity levels

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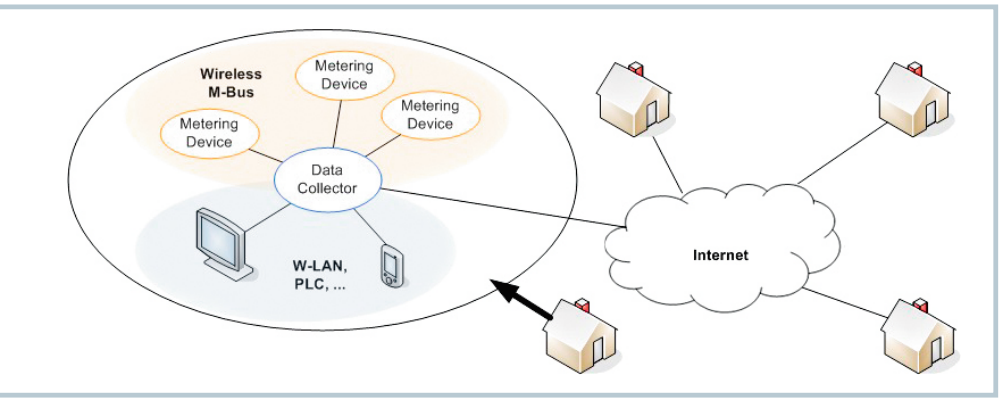
Decentralized energy and network management

Networks for decentralized energy efficiency

Advances in information and telecommunication technology have paved the way for inexpensive solutions to use and convert energy in ways that are now astoundingly efficient. One of these solutions is a new generation of ground-breaking metering and communications systems. Another solution involves managed loads and decentralized generator units. The metering industry is on the brink of a revolution, especially when it comes to the speed, frequency and detail of meter reading, linking various sectors, and broadening the latitude of operating metering points.



Applications for the wireless m-bus

DEMAX (which stands for "Decentralized Energy and Network Management with Flexible Electricity Rates") is a transfer network project being launched to develop an innovative energy management and communications system which would be made available to decentralized, commercial and private generators and loads. A Web-based communications platform built on the very latest embedded systems is also in the works. This platform will be able to integrate twenty-first century metering systems and wireless sensor actuator networks, connect into meters, and manage loads and generators.

DEMAX is backed by Germany's Federal Ministry of Economics and Technology. The project's research partners for energy and communications are the Freiburg-based Fraunhofer Institute for Solar Energy Systems and the Lörrach-based Steinbeis Innovation Center for Embedded Design and Networking (sizedn). Working with industry partners, the two initiated a pilot project within the catchment of EWS, a network operator, to demonstrate the technology underlying this innovative system while developing the right products to meet market demand. The energy management system will introduce a brand-new, decentralized "intelligence" to the distribution network. This is the first kind of "intelligence" that can handle higher-ranking demands on system operations while optimizing generators or modifiable loads at a local level.

In this industry, you find two types of communication. Tertiary communication – otherwise known as the "outdoor" connection – is most often performed with Web-based technology or a power line. Primary or in-house communication involves connecting the meters to a sub-station within the building. The developers at the sizedn Steinbeis Innovation Center chose to focus on primary communication. Apart from the introduction of a new protocol implementation based on a wireless metering bus, this allowed meters to be connected in a cost and energy-efficient manner.

The new protocol covers all current T1, T2, S1 and S2 modes for unidirectional and bi-directional meter reading and parameter definition. The R2 mode is still in development. After a series of interoperability tests with other manufacturers, the bus can now be used anywhere. sizedn also champions the standardization efforts of the Open Metering Group and puts their decisions into practice.

Parallel to this new protocol, a number of tools to commission and monitor radio nodes were introduced. One of those tools is a product called capt²web. Based on sizedn's "emBetter" embedded Web server, capt²web connects the wireless m-bus using XML. This makes it easy to monitor the network and link up directly to an intranet or the Internet.

- Wireless m-bus protocol stack adheres to EN13757 in the S and T modes
- Development platforms and gateway available
- capt²web Web-based sniffer: network monitoring and management done by telematics thanks to intelligent use of Web 2.0 – no software installation necessary
- Integrates into advanced meter management (AMM) and energy management systems

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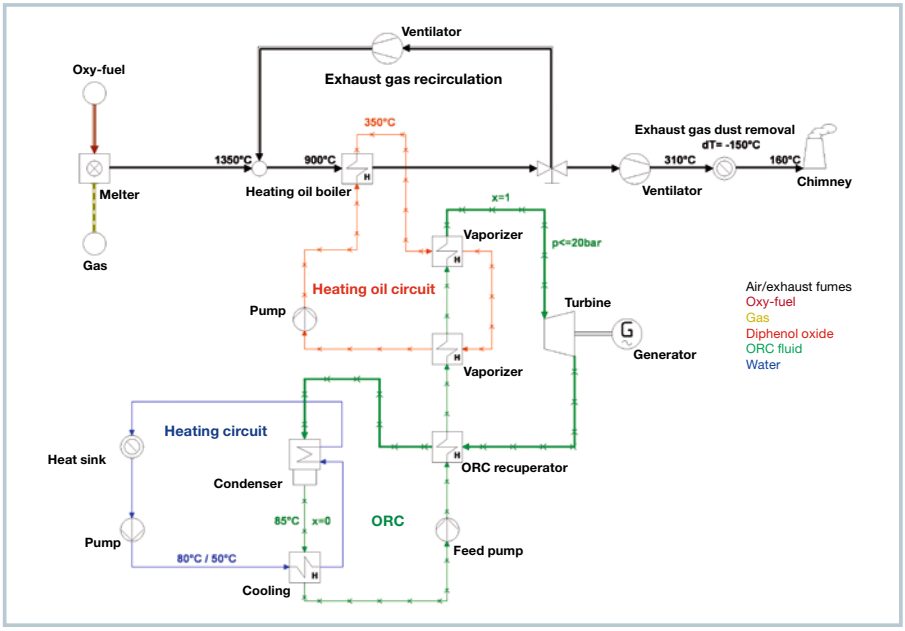
Mobile latent heat storage and ORC for greater energy efficiency

Wasted heat? Not if you can innovate

Rising energy costs, ambitious CO_2 targets, and perhaps most of all, public image – compelling reasons why many firms are paying ever more attention to improving their energy conservation. Using waste heat efficiently is a good place to start. Many firms already recycle waste heat, though often not to its full potential. The Steinbeis Transfer Center for Applied Thermodynamics, Power and Combustion Engineering (ATEV) advises clients on how to make maximum use of waste heat.

Heat energy can be stored in many ways. In "sensitive" storage devices, the storage material – which may be water or a solid – is simply heated. Thermochemical storage devices use a highly porous storage material which is dried while being charged with energy. Neither of these methods is particularly suitable for mobile applications – which would require a transportable heat-absorbing storage container. Latent heat storage devices are far more suitable. These store waste heat at a constant temperature, via state change from solid to liquid in the storage material. Upon discharge, heat is released as the material solidifies again. Various storage materials such as paraffins, salts, salt hydrates or fatty acids can be used, depending on the temperature range of the waste heat source.



Circuit diagram of an ORC system for using waste heat

However, the thermal conductivity of most materials used is relatively low. To attain optimal efficiency and cost-effectiveness when storing and releasing heat, the heat transfer method during charging and discharging of the latent heat storage device must be adapted to the needs of the system. Customizing the device's dimensions for each application improves the cost-effectiveness of this type of heat transport, even compared to local or district heating. The efficiency depends not only on the distance between the heat source and heat absorber, but also on the speed of charge and discharge. The Steinbeis Transfer Center ATEV in Bayreuth helps firms assess the economic viability of systems, brings customers and heat providers together, and works permanently on the improvement of storage methods.

If no customers can be found within an acceptable distance of the waste heat source, then power can be generated using the Organic Rankine Cycle (ORC). Power produced this way can be used for individual consumption or fed back into the power grid. The ORC process is fundamentally analogous to the classic Rankine cycle. Still used by steam power plants today, the classic process cannot easily be scaled down to efficiently generate energy from waste heat at low temperatures and quantities. So instead of water, the ORC method uses organic liquids which are far more suitable on a smaller scale. Simply selecting the most suitable fluid can result in significant optimization – and the Steinbeis team routinely selects the ideal fluid from a choice of over 1000. Energy efficiency is just one of many criteria considered here – factors such as toxicity, flammability and chemical stability are also key to safe operation and low maintenance. Using a mixture of fluids also increases efficiency, and changing circuit layouts is another area with optimization potential.

Mobile latent heat storage devices and power generation via ORC devices both result in increased energy efficiency. Crucially, these optimization concepts must be individually adapted to each application – they can't just be applied as a simple, all-in-one package. When it comes to custom optimization, the Steinbeis team in Bayreuth are the ideal go-to people.

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A fresh look at mobile user interfaces

The wide world of multi-touch

The Apple iPhone has turned the mobile communications market on its head. With hard and software working together like never before, new user interfaces have emerged that redefine "intuitive". But competitors aren't ones to sit idly by; by now, the entire smartphone market has plenty to offer. A Karlsruhe-based company called PTV joined forces with the Steinbeis Transfer Center Innovation > Development > Application (IDA) to explore emerging opportunities.

iPhone application with a map showing detailed information

As a provider of software in traffic, transportation and logistics, PTV pays special attention to mobile computer systems. And that's what you have to call the latest generation of "intelligent telephones" since the actual calling functions have almost taken a backseat. Today's devices are, in certain respects, small computers, more than capable of outperforming desktop computers from ten years ago.

That means new challenges for software developers. They need to engineer a new kind of user interface for these devices. Why? Neither the tree menus of older mobile phones nor the windows-based systems of today's PCs are suited to the new breed of phones. The difference an interface makes is perfectly illustrated by iPhone's Mobile Safari Web browser. It makes Web pages not specifically adapted to mobile phones simple to read – and easy to use.

A key Apple design decision for this phone was to forgo the stylus. Other manufacturers have followed suit. When you include a stylus, you can design complex and detailed interfaces just as you would with systems that rely on a mouse. This covers the spectrum of small scroll bars on tiny screen keyboards to buttons that you need a stylus to press. With this avenue closed down, designers need to engineer their programs for touch input only.

What prevents this from becoming cumbersome for developers and users alike? Today's mobile operating systems feature plenty of mechanisms. Instead of using scroll bars, you simply touch lists with your finger and

drag them. Buttons are large enough to press quite easily. And as multi-touch interfaces can follow the movements of several fingers, you can enlarge and rotate the elements you want without hassle.

As a complement to the touchscreen, motion sensors are gaining ground. All you have to do is turn the phone to rotate the screen. If your phone is equipped with a complete accelerometer, you can do even more: by tilting the phone, you can "fly" across maps or "shake" an application back to its starting point.

On behalf of Karlsruhe-based PTV, the Steinbeis Transfer Center IDA is investigating what opportunities the new systems offer and how they can be optimally exploited. The experts set their sights on the iPhone as, of all the smartphones in use, it has the most sophisticated operating system and the most flexible user interface. Multi-touch capabilities play a key role in this. The first stage of the analysis focused on maps; they lie at the heart of many road traffic applications. So the first components to develop would be ones that would work in a variety of ways to display map information and help users interact with the data.

The Steinbeis experts used the Apple iPhone SDK as a development environment. The outcome of their efforts: an easy-to-use and highly adaptable map. It can change how it displays information based on input from PTV's server systems. This includes up-to-the-minute traffic information, points of interest, routes, terrain information, and vehicle location. The system also makes it incredibly easy to integrate data from other sources – meaning developers can quickly create applications that are tailored to the needs of corporate clients.

The map uses iPhone standards – using multi-touch zoom and scrolling the map with your finger. You can show where you are at any time; this is calculated by GPS, WLAN or mobile communications. Optional: map navigation using a motion sensor – you can even zoom in by quickly turning the phone. Although this type of use is still being researched, its opportunities are appealing. The "turn and zoom" option could prove superior to conventional "finger operated" methods when maps need to keep up with rapid movements.

These maps were used to build two application prototypes. The first demonstrates the map itself; the second shows points of interest and extra pop-up information. The iPhone applications use the same servers as PTV's existing Web applications. As a result, the company can update map information without incurring extra server maintenance.

These first prototypes helped PTV secure contracts for customized iPhone applications. Development expenditures are more or less contained since work on the map also produced several other components that can be used for other purposes – client/server communication and the graphical user interface layout, just to name two. The future for this new generation of mobile applications looks very rosy indeed. If you've tested them even once, you're a convert. Using them is a great fun, any way you look at it!

An in-depth look at the development

The iPhone operating system is accessed through an array of frameworks that allow users to manage graphical user interface components, network communications and positioning as well as providing access to the latest acceleration values. The programming language is Objective-C, a blend of Smalltalk and C born in the early 1980s. Although it is much easier to work with than, for example, C++, Objective-C is found exclusively in Apple environments.

During development, the team was soon confronted with the limitations of the smartphone platforms. Despite the many advances in recent years, these platforms still have drawbacks that must be taken into account. The first key factor is speed, plain and simple. Tasks that desktop PCs can perform in the blink of an eye can dramatically impact performance on a mobile phone. This includes string operations that work with format strings. Accessing them with the iPhone simulator is discreet – quite unlike the genuine hardware.

Similar restraints are imposed on primary storage. When maps are displayed, the amount of primary storage dictates how many tiles it can juggle for rapid access. In this instance, part of the operating system notifies the live application that storage has exceeded a certain limit. This helps deallocate non-critical objects to prevent the application from crashing suddenly.

The performance – or lack thereof – of flash memory or the filesystem (or both) can have a drastic influence. With the hard drive running at full speed, caching worked well in the simulator, but the procedure had to undergo major changes to work with the actual hardware. Carefully balancing the cache along multiple threads was the only way to ensure that operations ran smoothly while tiles were read from the cache and written.

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"The Steinbeis Foundation – an institution offering professional, work-sharing R&D"

Written by Professor Dr. rer. nat. Dr.-Ing. E.h. Max Syrbe, Chairman of the Steinbeis Foundation Board of Trustees

In the 50s and 60s the German nation was reconstructed during the Wiederaufbau, almost without competition. This phase of reconstruction relied mostly on new types of technology. The Max Planck Society and the German Research Foundation (DFG) returned to their previous activities; the "Fraunhofer Gesellschaft" was founded in 1949. The aim of the huge institutes newly founded between 1956 and 1960 was to make core technologies of the time – nuclear, aerospace and computer technology – available to all Germans. For a certain time after the war in Germany these subjects had been forbidden. The first repeat of a recession in 1967, followed by others every five to ten years, raised competition which increasingly centered on technology. Society recognized the significance of scientific insight, technology transfer and, ultimately, innovation – with all the phases this entails. The scientific community soon became even more important to business, as business gained in importance to the quality of living. And it was during this time that the Steinbeis Foundation, or StW, was refounded as an organization in 1971 [1].

Ministerial director Herbert Hochstetter from the Baden-Württemberg Ministry of Economic Affairs was seeking further support for the regional economy, especially skewed toward medium-sized enterprise with its diversity of individual – if not daily – challenges. Further, until then the State Engineering Schools had had practically no involvement in the knowledge and technology transfer infrastructure already in place. So Hochstetter set about putting support in place himself – by founding Technology Consulting Services at engineering colleges, one of four remits sponsored and pursued by the Steinbeis Foundation. These services became its most important activity. Indeed they flourished, even if they never gained the magnitude needed to match current and future infrastructure changes in Baden-Württemberg's economy.

Lothar Späth, who became the Minister-President of Baden-Württemberg in August 1978, was keen to provide industry with the full scope of support it inevitably needed. He brought in Johann Löhn as Government Commissioner for Technology Transfer and directly linked his department to the Steinbeis Foundation, becoming chairman and its only full-time board member. Both bodies started implementing the Steinbeis model of knowledge and technology transfer formally captured by Löhn. This is based on skilled, knowledgeable experts working part-time as entrepreneurs in decentralized transfer centers (STCs). The model taps into otherwise unexploited knowledge and experience, especially knowledge at universities.

The move by Späth resulted in the authorities treating applications for part-time work positively and foundation capital being raised to 28 million deutschmarks. Löhn started expanding on the Steinbeis Model. The model

- aimed [2] to help companies, especially medium-sized companies, to become more competitive across the board, through knowledge and technology transfer in the fields of technology, management and employee development
- based its values [3] on the underlying principles of trust, tolerance, sustainability and consistency
- caters for a one-level organization with many (currently more than 750) skilled experts covering a broad area with respect to geography and specialty, operating as self-employed entrepreneurs (their profit, their loss) at their own STCs (now called SEs) backed up by centralized support adhering to rules that apply to all (comparable with franchising).

Späth decided that the StW should not depend on institutional support and could thus operate and enjoy success without the restraints of public administration. This is important when it comes to the often forgotten aspect of motivating the people carrying out the work. Motivation dictates performance, which is correlated to the product of "Ability multiplied by motivation". The StW was set up so well, its performance and significance as an organization improved rapidly (Diagram 1).

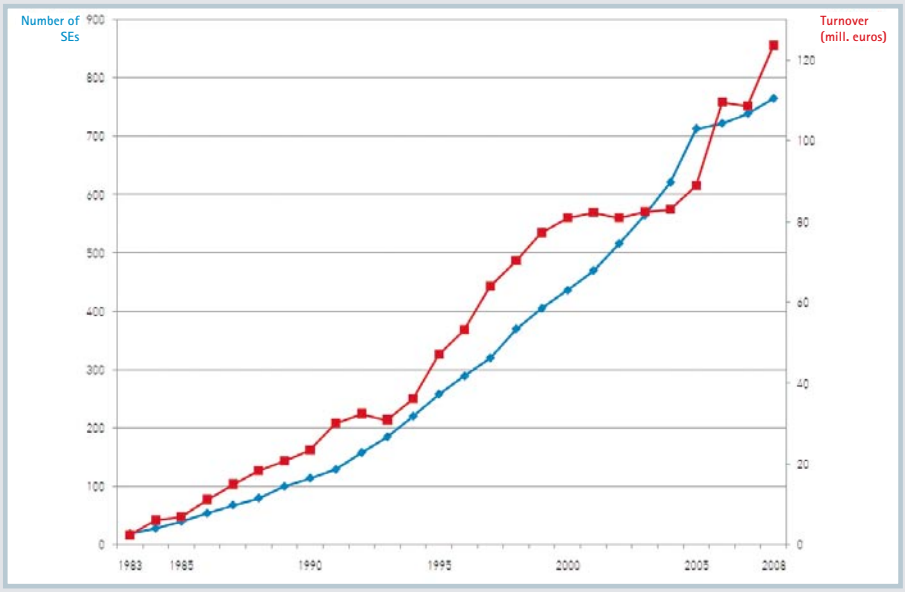


Diagram 1: StW Turnover 1983 – 2008 and the corresponding number of STCs/SEs

Sources:

[1] von Alberti, G.: Steinbeis 1971-1991. Steinbeis-Edition 2nd edition 2008, Steinbeis-Stiftung, Stuttgart
[2] Statutory purpose is less detailed
[3] see also Steinbeis Information System - SIS - LF-002, „Löhn-Methode und Löhn-Impuls"
[4] Friedrichs, Sigrid: Steinbeis 1983-2008. Steinbeis-Edition 1st edition 2008, Steinbeis-Stiftung, Stuttgart
[5] Auer, M.: Eine theoretische und empirische Analyse der Erfolgswirksamkeit des unternehmerischen Verhaltens und der Organisation von Transferunternehmen. Dissertation at the department of economics of Karlsruhe University 2000.
[6] Syrbe, M.: Grundlagenforschung, angewandte Forschung und industrielle Entwicklung: Autonomie, Instrumentalisierung oder Vernetzung der Teilsysteme? Reports of MPG, Munich, Issue 1/92, p. 47-77

Prompted by a change in laws regarding the taxation of project-related and contract research, in 1997 there were changes in the format of the StW to a business corporation. From then on it was spearheaded by a non-profit foundation, under this a GmbH & Co. KG for commercial activities (StCs) complemented by a GmbH (StG) [4]. StC participation in newly founded centers at the end of the innovation process strengthens the standing of this company.

In 1998 Löhn seizes an opportunity to expand on the StW's training and employee development services in Berlin by founding Steinbeis University Berlin, which is self-funding and based on the project-skills concept. In 2003 the university gains the right to offer PhD programs. Today the company structure looks like Diagram 2, with six columns representing the transfer centers, the university in Berlin, R&D centers, consulting centers, the departments responsible for shareholdings and real estate. With the lattermost, Löhn succeeded in doubling foundation capital to more than 30 million euros, primarily through property used by the organization itself.

In 2004, Löhn, then aged 67, resigned as chairman of the board to carry on working as an honorary trustee. He was succeeded by three , later two full-time board members, all with many years' experience in the Steinbeis network: Heinz Trasch (chair), Sylvia Rohr (until September 2006) and Michael Auer [5]. Both rise to the challenge of pushing Steinbeis much further forward in an expanding R&D market (see below). They agree to split responsibilities with Trasch taking on outside activities including the business strategy and Auer managing internal issues including

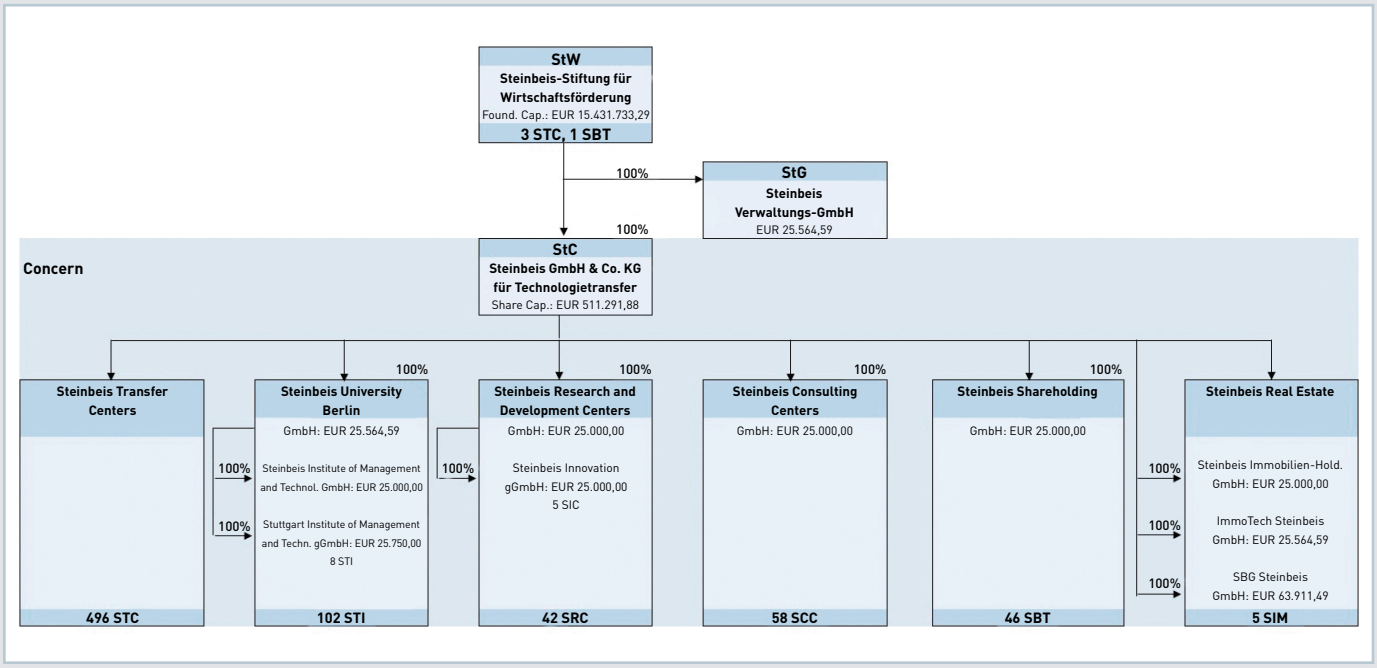
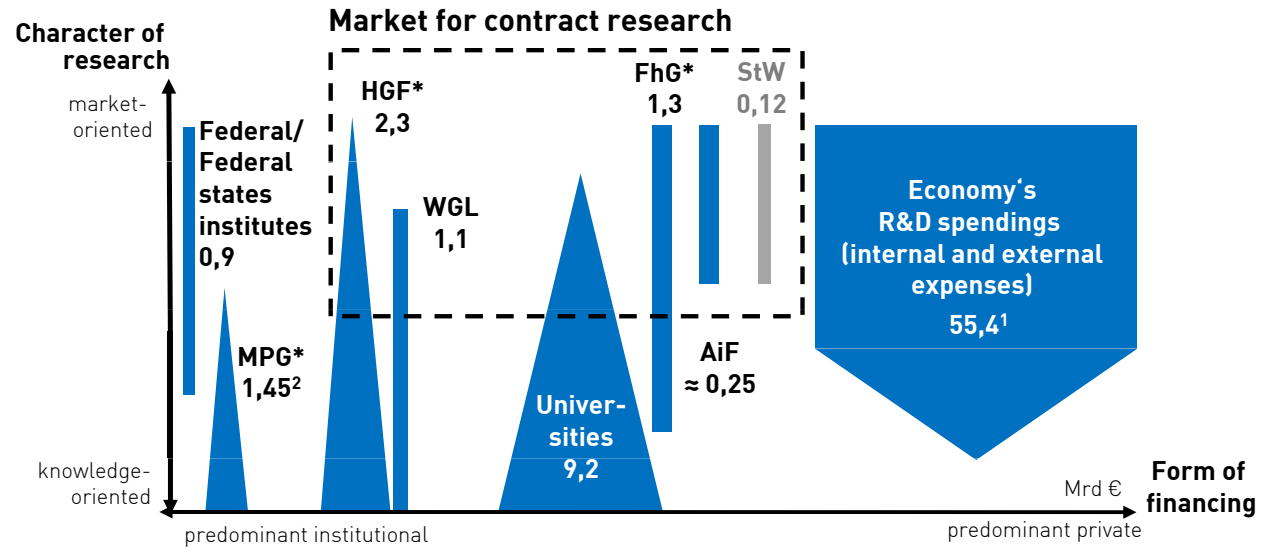


Diagram 2: the corporate structure of StW in 2008



HGF	Hermann von Helmholtz-Gemeinschaft	**MPG**	Max-Planck-Gesellschaft
WGL	Wissenschaftsgemeinschaft Gottfried Wilhelm Leibniz	**FhG**	Fraunhofer Gesellschaft
AiF	Arbeitsgemeinschaft industrieller Forschungsvereinigungen	**StW**	Steinbeis-Stiftung

[1] Approximation science statistics 2008, Stifterverband
[2] 2006
* Overall budget

Diagram 3: German research landscape (Source FhG, added by StW)

financial accounts and IT and management systems. They also develop new strategies to "make up lost ground":

- Openness (all information is available to staff), clarity (adhering to guidelines), delegated, spread responsibility for decision-making (to authorized representatives with central departments and managers within the columns described above)
- A widespread PR offensive outside Steinbeis (through congresses, Transfer magazine, the Steinbeis-Edition) and inside the organization (introductory and mentoring seminars)
- Strengthening of internal (through regional meetings) and external networks (involvement with chambers of commerce/ universities)
- Reintroduction of the preliminary advice program (paid by StW)

Preliminary results can be seen in Diagram 1: in four years turnover is up almost 50 per cent, achieving a respectable position in the R&D market (Diagram 3).

StW fills an important niche in the R&D sector hardly touched on by other research institutes (except, in part, AIF). The others are either focused on insight- or application-based basic research, or are involved in applied research into completely innovative technologies [6], which medium-sized enterprises are rarely able to carry out in sufficient scope within their markets. As mentioned above, what medium-sized companies need more than anything is help with individual – if not daily – problems pertaining to technology use, commercial issues or management. To provide this help across the board requires large numbers of highly motivated, knowledgeable experts. The Steinbeis model encourages people to take the initiative and reap the rewards, including material benefits – and this attracts skilled experts. This approach is unique as no other research institute is able to work in this manner due to formal internal restraints.

So it only remains to wish Steinbeis management every further success, and the same to everyone working at Steinbeis.

Max Syrbe has been a member of the Steinbeis Foundation Board of Trustees since 1983. Since 1991 he has been chairman of the board.

After studying physics and gaining a doctorate at the University of Frankfurt, Max Syrbe was appointed to a management role at BBC in Mannheim. In 1968, Syrbe became Director of the Fraunhofer IITB in Karlsruhe and had already been appointed to the senate of the Fraunhofer Society two years earlier. In 1983 he became Fraunhofer president, a role he fulfilled until 1993. In 1975, the Department of Computer Sciences at the University of Karlsruhe (TH) appointed Max Syrbe an honorary professor.

As well as research policy and research management, Max Syrbe's scientific work revolved primarily around the automation and the anthropotechnics especially man-machine systems.

Max Syrbe has been awarded the Fraunhofer Sculpture, the highest honor bestowed by the Fraunhofer Society. He is also an honorary doctor of the Department of Engineering Sciences at the University of Duisburg-Essen and an honorary senator of the University of Freiburg. Further, Syrbe has been awarded the Great Cross of Merit under the Order of Merit of the Federal Republic of Germany as well as the Order of Merit of the Federal State of Bavaria.

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Cold-cathode ionisation gauge for total pressure measurement in the vacuum range

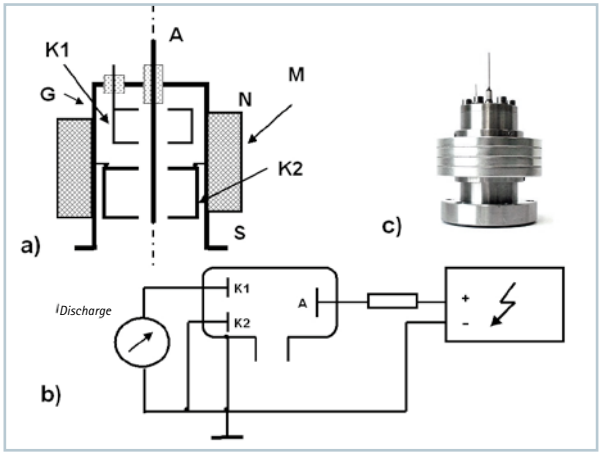
Inverse double magnetron gauge for longer life times

Cold-cathode ionisation gauges are used widely to measure total pressures in the vacuum range, particularly in industrial plants and special plants for scientific purposes. But these seemingly indestructible devices have one major disadvantage – they cannot be used reliably in gas compositions with a high content of hydrocarbons during a long time, as the operation of the gauge in such an atmosphere contaminates the electrodes. By this a reliable pressure reading of the gauge becomes impossible. As part of a dissertation project the Otto von Guericke University in Magdeburg and the Steinbeis Transfer Centre for Vacuum Science and Technology have developed a cold-cathode ionisation gauge with a significantly increased lifetime.

The life time of a measuring device is defined as the operating time during which the magnitude of unavoidable measurement errors (caused e. g. by contamination) does not exceed a certain maximum value. Experiments with a lot of commercial cold cathode ionisation gauges have shown, that these gauges can run without interruption in an hydro carbon contaminated atmosphere only up to 1000 hours. After this time they are so contaminated, that a reliable pressure measurement is impossible.

A standard cold cathode gauge contains two electrodes - the cathode and the anode - with a high DC voltage between them. Under the effect of this voltage and a high magnetic field produced by a permanent magnet a gas discharge is ignited between the two electrodes. The discharge current is nearly proportional to the pressure and is used for the measurement of the pressure in the chamber with which the gauge is connected via the open end.

To avoid the disadvantages of the commercial gauges (short life time in hydro carbon containing atmospheres) an inverse double magnetron gauge was developed in co-operation of the Otto von Guericke University Magdeburg and the Steinbeis Transfer Centre for Vacuum Science and Technology by mounting two barrel shaped cathodes (K1, K2) one after the other in a cylindrical casing closed on one side. A concentric , rod-shaped anode (A) travels through the centre of the two cathodes. Thus two separate discharge cells are formed, which are penetrated by the magnetic field generated by a ring shaped permanent magnet (M) surrounding the casing (G). Two separate gas discharges are ignited between the two cathodes and the anode. But only the gas discharge between the cathode K1 and the anode is used for pressure measurement, while the other between cathode K2 and the anode merely cracks or polymerizes the hydrocarbons entering the gauge, because the cathode K2 is located closest to the vacuum chamber and the gas flow has to pass it before it enters cathode K1. The result: only a small percentage of hydro carbons vapours reaches the discharge space used for measurement - meaning the life time of the gauge is 3 to 4 times longer than with conventional gauges.



Two-cathode ionisation gauge of the inverted magnetron type.
a) schematic cross-section of the gauge
b) Basic circuit diagram
c) Photo of the prototype with uhv flange CF 40.

The electrical circuits used to generate the high voltage and to measure the discharge current are nearly identical to the circuits in a normal commercial cold-cathode ionisation manometer. The mechanical structure of the gauge is marginally more complex than for a normal cold cathode gauge. Cathode K2 which is not used for pressure measurement but only for trapping the hydro carbon vapours. It can easily be removed, cleaned and remounted, meaning the user can "regenerate" the gauge time and again. The internationally patented measuring device has a range of pressure measurement from ~ 10-10 mbar to about 10-3 mbar and is particularly suitable for use in industry and in big plants for nuclear research.

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TQU training for automotive specialists

First TQM Manager® Automobil receives degree

The TQU Akademie now offers Germany's first employee development program to become a TQM Manager® Automobil for the automotive industry. The aim is giving graduates an overview of the industry and its standards, equipping them with the tools they need to tackle the challenges facing the automotive world. Philipp Schäble, employed at Aluminium-Werke Wutöschingen, was the first to be awarded the TQM Manager® Automobil degree.

From left: Referent Dieter Börner, Gudrun Jürß (TQU Akademie), Philipp Schäble (AWW)

The automotive industry is a powerhouse of Germany's commercial realm. "Competition between car manufacturers as well as first, second, and third tier suppliers is intense," explains Schäble. "Price, service, and quality are all competitive differentiators. These companies need to manage the incredible demands placed on them."

Setting the quality bar high – that's a cornerstone of customer satisfaction for Aluminium-Werke Wutöschingen (AWW), a German company steeped in tradition. Their core product lines: slugs, profiles, and system components made of aluminum. This diversity of products is complemented with technical advice and support, helping AWW stand out from the competition. "The programs help people marry their expertise in metallurgy, design, and high precision processing with their know-how as a manager in the automotive business," says Board Member Dr. Andreas Baum, explaining the benefits of the program. "The tough automotive market and all of the specific customer needs that go with it will benefit from improved service and thinking."

TQM Manager® Automobil is a carefully planned training program spanning four modules. The first module takes a thorough look at ISO/TS 16949, the international standard for quality management systems in the automotive industry. When employees have a solid grasp of this standard, they can take part in improvement projects and apply their knowledge to quality management initiatives.

The second module addresses project management within APQP and PPAP, two automotive industry standards. Forming "project teams", students delve into ISO/TS directives that impact companies' planning units. Close cooperation with customers and suppliers lies at the heart of AWW projects. Flexibility is key in reacting quickly to each change in customer needs. "Our customers' requirements may keep changing, but we still adhere to and apply APQP structures," explains Schäble.

During the third module, students are trained as an Internal TQM Auditor® Automobil. Such auditors assess the company according to ISO/TS 16949, suggest improvements, and evaluate the efficiency of measures taken. This is where the training program dovetails with AWW's objectives. "We expect audits to deliver ways to continuously improve our processes, avoid nonconformity and complaint costs, and pinpoint internal weaknesses in our quality management system," outlines Dr. Baum.

The training program concludes with a seminar on supplier management, ultimately assessing the supplier. The strategic significance of this practice extends beyond the automotive industry. Skills imparted in the program benefit AWW twofold: as a supplier of first-rate aluminum products and as a purchaser of materials and components used in its products.

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A wood-based heat and power station in Scharnhauser Park

EU project POLYCITY promotes sustainable energy

Innovative ways to save energy for town planning

Stuttgart University of Applied Sciences and its research centre for sustainable energy technology are coordinating the EU project POLYCITY. Steinbeis-Europa-Zentrum provided support for proposal writing and is as a partner responsible for the financial and administrative project management. Under the POLYCITY project, communities in Germany, Spain and Italy work with small companies for construction and energy as well as research institutes on the use of "green" energy.

The main focus of POLYCITY is to find innovative ways to use renewable energy in energy-efficient buildings in urban areas: in Scharnhauser Park near Stuttgart in Germany, in Cerdanyola del Vallès near Barcelona in Catalonia, Spain, and in Arquata in Turin, Italy. Using real buildings in parallel to scientific research, the project will demonstrate how to reduce consumption of fossil fuels in favor of solar and biomass energy.

The main focus of the research at the former Scharnhauser Park army barracks near Stuttgart are thermal cooling technology for air conditioning buildings in the summer, year-round use of solar energy, combined cooling heating and power (CCHP), and community energy management based on the very latest IT solutions. A combination of jobs, housing estates and parks results in an integrated residential and traffic concept with an emphasis on quality of life and low energy use. The total cost of the project are € 1.5 million. The innovative energy solutions that have been developed include:

• Solar energy generation
The Stadtwerke of Esslingen, the town of Ostfildern and the energy supply company Siedlungswerk GmbH in Stuttgart have built a photovoltaic plant peaking at 37 kW. The largest facility is linked to a wood-based heat and power station with solar panels on both the south-facing wall and the flat roof.

• Biomass power plant
A wood chip power plant designed for 6MW output will provide the major energy supply. Every year, the plant supplies 80 per cent of the heating energy and 50 per cent of the electrical power needed for an area where 10,000 people will soon live and work.

• Local heating network
This network spreads for a length of 13 kilometers. POLYCITY also supports hot water accumulators and an adsorption refrigeration plant.

• Thermal cooling systems
As the first plant of its kind in Europe, a lithium-bromide refrigeration machine has been installed. It is powered by the heat generated by the combined woodchip heat and power plant and is entirely produced from biomass.

At a second site supported by the project in a suburb in the north of Barcelona, a residential area for 50,000 people is being built, complete with an integrated technology park. Research at this site focuses on planning and improving a local heating and cooling network based on innovative technologies. Sustainable energy is supplied by an electric biomass thermal plant with its own hot-water heat recovery system. This is powered by wood refuse. A solar-thermal plant will power the low-temperature adsorption based refrigeration system. At the same time the excessive energy coming from the heating power plant will power hot water for the networks.

On the third project site the working class neighborhood of Arquata in Turin, which arose at the end of the 19th century, is undergoing a general renewal based on ecological principles.

The project is part of a major initiative to promote integrated energy systems powered by a variety of energy sources.

The Steinbeis-Europa-Zentrum (SEZ) in 2008:

- 6395 business transactions
- 351 consultations on EU-funding
- 25 information days on European funding
- 37 EU proposals submitted
- 10 EU projects started, with SEZ acting as coordinator or partner
- 24 other EU projects involved the SEZ as a project partner
- 577 consultations on transnational technology transfer
- 11 partnering events in Germany and abroad

With the support of the SEZ, European Commission funding amounting to 3,881,155 euros was awarded to recipients in Baden-Württemberg in 2008. This funding went to companies, universities and research institutes in the state. The SEZ acts as a partner or coordinator of European projects. It also helps its clients submit successful proposals for their projects.

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Student at Steinbeis University launches "Milk run" logistics

Simple, swift, special: just what the milkman ordered

Shorter processes, more reliable deliveries, lower stocks, faster throughput times, less physical handling – just some of the benefits brought by a project carried out by Sibylle Millich, a master's student at the School of International Business and Entrepreneurship (SIBE) at Steinbeis University Berlin (SHB). Acting as the coordinator of an in-house project with colleagues, Millich has launched a "milk run" system in the Reutlingen-based department at Bosch which is sponsoring her studies.

Workshop operative Cilo Bozkurt offloads raw materials at the milk run waypoint.

Sibylle Millich and her colleagues in the "MFT Department" faced three main problems. Previously, MFT only ordered materials sporadically. But the materials it needed were only delivered on weekdays in the early or late shift. Finished products were not picked up at night or the weekend. The upshot: high stocks. Also, materials came on wooden pallets so wood chips and dirt kept entering clean areas. At the end of the process, finished goods had to be taken to a separate packing room to be prepared for shipping. Overall this meant parts were "wandering all over the place".

The project team ran a workshop to look at possible improvements. It didn't take long to work out that changes in isolation would not be much use. What they needed was a new logistical process to solve a few other problems at the same time. So Sibylle Millich sat down with colleagues from other departments to work out a milk run system. Basically, the idea involves only topping up again with the amount of material being used. The team looked closely at value streams of raw materials and finished products in MFT and soon arrived at a new value stream design.

First step: do away with the wooden pallets goods previously came on. They were too bulky and heavy for the milk run trolley to be used for moving materials. This solved the wood chip problem. Now everything was in place to go live with the milk run: the trolley is loaded by an outside company in Kusterdingen which supplies the ordered raw materials, tapes, paste and ceramics. A lorry transports the trolley to the back gate at Bosch where a workshop operator collects the trolley and rolls it to waypoints in the three workshops used by MFT. The operator offloads the raw materials. The trolley, now loaded with empties, is picked up again by lorry and returned to the supplier. Depending on the kanban orders issued by the workshop, the supplier reloads the trolley with goods, thus completing the cycle.

The milk run now makes a tour of the workshops once every shift, every eight hours. "That includes night shifts. Optimizing the process in the sintering room also freed up spare capacity," says Sibylle Millich. As a result, there are no more overstocks during the week. As a second step, there are now plans to arrange regular supplies of materials at the weekend. The team is currently working on a system for the entire site in Reutlingen.

While they were at it, Sibylle Millich and her team also simplified the to-ing and fro-ing of finished goods within the MFT department. Instead of carting everything to a central packing room, finished goods from two of the workshops are now packed directly during processing. "Previously, goods were picked up and put down five times. Now, once everything's been inspected it's laid on a dry cushion in a pre-prepared box, the lid goes on, it's vacuum packed – finished. Total

Sibylle Millich and Cilo Bozkurt checking kanban trolleys...

...Cilo Bozkurt tugs the milk run trolley from the warehouse to the first floor...

...and offloads the requested materials at the waypoint.

Images: Robert Bosch GmbH

throughput time is down from two days to less than one," explains Sibylle Millich.

"We knew from the dummy run that it would work," explains the foreman, Günter Walker. Cilo Bozkurt, workshop operative in one of the workshops confirms this: "The process is much simpler now, easier to understand and cleaner. We've not got any of the wood chips and muck around any more. And we hold much less stock. We used to have boxes of finished goods standing around in the corridor outside the workshop. It's all gone now."

Edith Grupp, a member of the project team summarizes: "The overall logistical process is more transparent now and more importantly this has helped standardize reliable and regular supplies to the workshops."

Source: Bosch KuRT, 09/08

Milk run

A milk run is based on the old milk bottle principles used by milkmen. They only dropped off fresh milk on your doorstep when you put out your "empties". That way, you always had enough fresh milk, without having to cram your fridge with milk bottles. Milk runs in an industrial setting work the same way: the idea is to stock as little as possible. But to work, you need regular delivery runs. The "milkman" comes at defined intervals, drops off goods – but only if you've filled in the kanban card beforehand – and takes the finished goods away again. Bottom line: less stocks, uniform use of production capacity, everything is less hectic.

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New Steinbeis Enterprises

Abbreviations:
SCC: Steinbeis Consulting Center
SRC: Steinbeis Research Center
SIC: Steinbeis Innovation Center
STI: Steinbeis Transfer Institute
STC: Steinbeis Transfer Center
FTC: Focos Transfer Center

The following Steinbeis Enterprises have been founded as of November 2008:

SRC Analysis of Complex Systems, Rostock
Director: Prof. Dr. Olaf Wolkenhauer

STI Biotechnology in Interdisciplinary Dentistry, Berlin
Directors: Dr. med. univ. Gregor Slavicek
Birgit Gaida

SCC Development Renewable Energies and Energy Efficiency, Wolpertshausen
Director: Dipl.-Ing. (FH) Sebastian Dürr

SCC Local Government Consultancy, Kehl
Director: Prof. Dr. Jürgen Fischer

STC Capital Goods – Optimization – Team, Braunsbach
Director: Prof. Dr.-Ing. Wolfgang Albrecht

SCC Corporate Succession, Stuttgart
Directors: Dipl.-Kfm. Ralph Kuntz
Dr. Gerhard Keck

SCC Organizational and Communicational Development, Sigmaringen
Directors: Harald Class, BBA
Dipl.-Ing. Alfred Emhardt

STI Carl-Benz-School of product engineering, Berlin
Directors: Birgit Gaida
Dr. Claus Becker
Dipl.-Ing. Wolfgang Brähler

STC Infrastructure Management in Transportation, Bruchsal
Director: Prof. Dr.-Ing. Markus Stöckner

Steinbeis Produktions- und Fügetechnik GmbH, Jena
Director: Prof. Dr.-Ing. Günter Köhler

STI Communication and Education Partnership, Berlin
Directors: Dipl.-Ing. (FH) Beate Harmel
Elisabeth Wentzel

SRC Development Technology, Schramberg
Director: Prof. Matthias Vogel

SRC Institute for Biosignalprocessing and Medical Engineering, Stuttgart
Director: Dr. habil. Niels Wessel

STC Energy-efficient Process Technologies, Karlsruhe
Director: Prof. Dr.-Ing. Rüdiger Haas

Steinbeis Center for Technology Transfer India, Hyderabad
Director: Bhawna Goyal

A promising new partnership with Steinbeis

Tver – the center of Russia's supplier industry

Steinbeis has launched a partnership with the government of the Tver region in Russia. One of the collaboration's key aims is to encourage the development of the local automotive supplier industry. Although still primarily focused on assembly, foreign automobile manufacturers in Russia are set to increase their level of localization – meaning they need local suppliers. As domestic suppliers are barely able to meet the industry's high demands, this leaves tremendous scope for German suppliers to step in. Steinbeis hopes to capitalize on this by cooperating with Tver's regional government.

Russia is rapidly becoming the largest market for the European automotive industry. Though the effect of the economic crisis on the industry means projections should not be overly optimistic, Russia continues to have a high demand for cars – one which cannot be satisfied by domestic manufacturers alone. But the Russian government has stipulated that in future, 80 per cent of vehicles sold in Russia should be domestically produced. And although it's hard to predict whether this highly ambitious target will ever be reached, the direction is clear: Russia is stepping up its vehicle production. Manufacturing in close proximity to the customer generally has a wide range of benefits – particularly in Russia, as demonstrated by the many industrial projects planned and executed by German firms there. Currently, the government demands a localization level of around 30 per cent, meaning that almost a third of the parts in each domestically produced vehicle must have been produced in Russia. If not, manufacturers incur customs and tax penalties. This presents automobile producers with a problem: the parts they need for production are extremely difficult to find in Russia. German suppliers can tap into this attractive and growing market by opening production sites in the country.

Tver is strategically located on the main highway between Moscow and St. Petersburg – close enough to key locations in the Russian automotive industry, but at a sufficient distance from expensive areas like Moscow and the high-priced supplier centers currently springing up. Establishing new production sites in Tver should ensure the region enjoys sustainable success in the Russian market. Tver also meets the key expectations of German investors: the industrial region is well established, with excellent infrastructure and a pool of specialized workers ready to be tapped into. Not only that, a range of incentives await investors, and Tver's local government has committed to providing organizational support. Investors keen to learn more can get in touch with the Steinbeis Transfer Center for East-West Joint Ventures, which provides easy access to information on the region as well as the chance to contact potential partners and key decision makers. As the center has been active in Russia since its foundation in 1994, the Steinbeis experts understand the ins and outs of the regional market and know exactly how to handle partnerships with Russian firms.

As a university town with internationally recognized teaching and research facilities, Tver also offers significant potential for cooperation in other areas. Russian R&D is set to become increasingly important as the automotive and automotive supplier industries grow. Steinbeis aims to help develop this potential and open it up to German investors.

Back in Germany, Nürtingen-Geislingen University is also closely involved in the partnership. Economics students have the chance to learn about professional project management and put these skills into practice. Eight student workgroups play an active role, conducting research, surveying companies and running analyses – making a vital contribution to the project's success. Supervised by Jürgen Raizner, head of the Steinbeis Transfer Center for East-West Joint Ventures, the students are encouraged to develop concepts to support German investors.

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Company employees: today co-entrepreneurs, tomorrow sitting at the helm

Dynamic management succession – an opportunity in hard times

The Steinbeis Transfer Center for Rehabilitation and Financing has been working in partnership with an interdisciplinary consulting team called "IBU-NachfolgeManagement" (IBU Succession Management) on a concept designed to help owner-managed companies to overcome the challenges facing the business. Their "dynamic management succession" model merges the principles of an employee buy out with direct staff involvement. The result: the workers start by participating in the company before taking to the helm themselves.

According to an ifm survey, 47 per cent of all owners of family business are older than 50. This means that more than 700,000 family businesses in Germany will soon need to think about who will take over next. But only 48 per cent of those companies have someone in the family who could take over. So more than half cannot arrange a succession within the family. Based on the experiences of recent years and the current financial crisis, it is agreed that most of these companies will not find a buyer. The ifm suspects that 89 per cent of these businesses may have to close. If that would become reality , around 1.7 million jobs would completely disappear. So even if it's a complex process, it's probably worth looking at the "dynamic management succession" concept, not only for the sake of the company, but for society overall.

"Dynamic management succession" is a process involving three phases that can last between one and 15 years. During the first phase, using a "participation model" the employees of the company can become minority shareholders . In parallel to this, certain employees undergo training to prepare them for future management roles. During the second phase, employees take on more and more shares in the company while the existing owner gradually starts withdrawing from everyday business. How long this phase lasts depends on the aims of all parties. It finishes – and the next phase starts – when the company passes entirely or partly into ownership of the workers who have bought shares in the business. By this point the former owner has handed over management of the company entirely and can provide input on an advisory basis. The chief motives of owners to deal with this concept are the self-defined date of retirement and the capital deepening of the company. But they should be aware, only if a company's working atmosphere is based on partnership, employees are willing to become co-partners.

For many businesses, "dynamic management succession" basically means introducing a new business structure, realigning information sharing and communication policies or changing decision-making processes. Therefore they need support. Thus a group of leading experts formed an interdisciplinary consulting partnership (IBU), in order to provide advice in the underlying principles of this succession model. As a member of this partnership, the Steinbeis Rehabilitation and Financing Transfer Center is responsible for the financial field. IBU offers an comprehensive consultation by not only involving specialists in finance, tax and legal issues, but also experts on HR issues. The advantages are self-evident: this inter-coordinated teamwork is highly efficient. Above all the company owner has only one contact person to deal with. This person acts as the coordinator and project manager.

Employee buy out (EBOs) and employee participation can also be an option for re-organization or restructuring. But this needs to be considered carefully. The main focus should remain the company succession. But regardless of this, an employee involvement (in an appropriate manner, matched to the company) is in principal a useful instrument of modern entrepreneurship because it often results in a unique passion proposition which strengthens the business's standing in the market – and cannot be copied by competitors.

The advantages of the "dynamic management succession" model:

- Higher levels of proprietary capital and improved gearing
- Improved liquidity and credit-worthiness (rating)
- More flexible remuneration
- Solves the succession issue
- Current owner decides when to withdraw from the business, avoiding the sudden risk of loss of leadership
- Employees become more motivated and cost-conscious
- Positive changes in company culture

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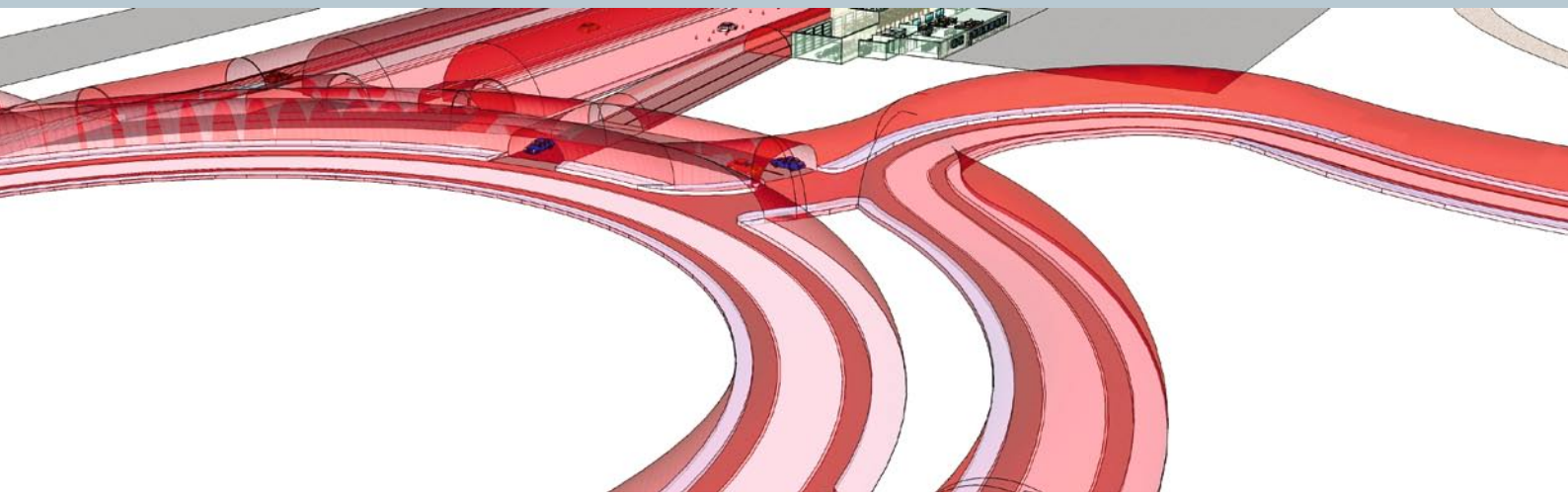

A new way to make vehicle development more efficient

Deep chill car tunnel testing

Testing new vehicles under realistic driving conditions is becoming more and more challenging, mainly due to tighter budgets, shorter development cycles and global climate change. A deep chill car tunnel in Finland should make things easier for the international automobile industry and OEM suppliers: now they can reproduce wintry conditions all year round and carry out dynamic driving experiments.

Developing new vehicles or components would be inconceivable without the huge battery of simulation programs now available, although nothing can beat real driving. Every year test drives clock up millions of miles testing vehicles in countries all over the planet, in hot and cold climates. Global warming has made winter testing increasingly difficult. Operators of testing grounds in the countries where most of the industry is concentrated – Sweden and Finland in the northern and New Zealand in the southern hemisphere – say the testing season has become noticeably shorter.

In Kajaani, a town in the heartland of Finland, lies a technology center where, after 10 years running a success cold tunnel for cross-country skiing, it was worked out that the tunnel system could also be used for round-the-year winter testing of vehicles. In 2007, the Finish national center of excellence for measurement technology, Measurepolis-Kajaani, was invited to plan the project with the Steinbeis Transfer Center for Automotive Engineering. Their brief involved four main tasks:

1. A benchmarking exercise
2. A description of testing tunnel requirements and what it could look like
3. Identification of key users, before establishing initial contact
4. Help with final testing parameters and the technical infrastructure

After intensive rounds of meetings with all key stakeholders at automotive companies and suppliers, the layout of the test station was finalized in the second half of 2008. It should be economically viable, so it's now time to start realizing their plans. The testing tunnel in Kajaani will be managed by Test World Oy, which has been operating a number of winter testing grounds since 1991. It will also market and sell the tunnel.

The total length of the fully enclosed testing tunnel is approximately 3.5 km. It consists of a variety of test sections connected by transfer tunnels. Each section of the tunnel can be used separately and reduced individually to temperatures between 0° and -25° Celsius. The exact humidity can also be set. The asphalt driving surface can be set to different testing conditions, if required with ice or snow. Each test section is managed through a control room which monitors access, use and safety. To prepare, refit or repair test vehicles, there are several workshop areas.

This new-fangled winter testing station is scheduled to start operating in 2010 by which team vehicle and car part makers will have the option of testing their products all the year round. More and more vehicle testing is going on these days due to the growing number of models, the effect of hybrid engines on the number of different drives, and the increasing complexity of mechatronic stability control systems. The planned testing tunnel combined with surrounding outdoor testing grounds will play an important role in the future in meeting the high expectations of customers and car markets.

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Using different composites to shield against radiation

Composite materials – protecting people and the environment

Radiation can be harmful to humans and the environment. Protecting staff against its effects is particularly important in nuclear facilities, as well as in medicine and research. Shielding against radiation involves placing radiation-absorbing materials between humans and the radioactive source – anything from simple slabs and walls to entire anti-radiation casings. The Steinbeis Innovation Center for Application-oriented Material-, Production-, and Process-Technology and imq-Ingenieurbetrieb für Materialprüfung, Qualitätssicherung und Schweißtechnik GmbH teamed up to investigate the radiation protection properties of a variety of composite materials.

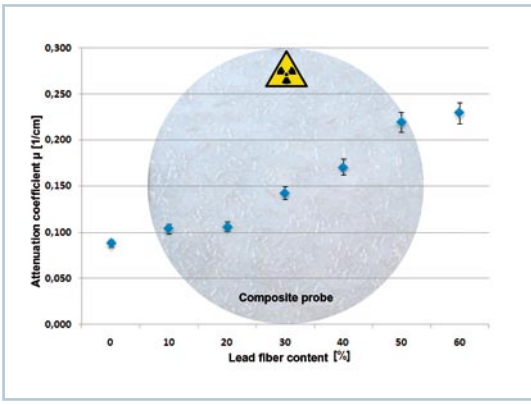
The level of a radiation dose depends on the type of radiation and its intensity, as well as the duration of exposure, the distance from the source, and the effectiveness of protective materials. Shielding against alpha and beta radiation (ionizing radiation) is relatively straightforward, requiring only basic measures and simple materials. However, shielding against gamma radiation (high-energy, short-wave radiation) demands thick layers of lead or concrete. Shielding against ionizing radiation not only protects humans and other life forms, but also objects and equipment. It also reduces background noise during radiation measurements. Radioactive waste must be stored according to radiation protection regulations and transported in suitable containers.

Of course, the key factor in radiation protection is choosing the right protective materials. Recently, composite materials filled with metal fibers or powdered metal have become a major area of research. The Steinbeis Innovation Center for Application-oriented Material-, Production-, and Process-Technology teamed up with the firm imq-Ingenieurbetrieb für Materialprüfung, Qualitätssicherung und Schweißtechnik GmbH to investigate composite materials using a new inspection technique based on eddy currents. The partners analyzed the effectiveness of different composites filled with highly absorbent metal fibers or powder in shielding against ionizing radiation.

This innovative solution has a number of benefits. Composites are much simpler to manufacture than pure metals, and the technology to do so is already offered by all composite manufacturers. Composite materials are highly diverse and can be manufactured with high precision in almost any conceivable form.

In initial experiments, lead fibers were introduced into a resin mixture. Absorptiveness tests determined the attenuation coefficient μ. Upon increasing the fiber content of the mixture, the attenuation coefficient μ also increased (allowing for an error margin of 5 per cent), indicating a rise in the level of gamma radiation absorption. Compared to a sample of pure lead with an attenuation coefficient of 0.5 1/cm, the composite with 60 per cent lead fibers demonstrated a value of 0.23 1/cm.

Using these new lightweight custom composites, the shielding properties of radiation protection products can be optimally adjusted to radiation emissions, allowing the best possible protection. As well as thermoplastics and duroplastics, elastomers can also be used as a substrate for the lead fibers, as they have higher elasticity. This means flexible membranes or components can be manufactured, allowing objects with unusual or complex shapes to be fully protected. Materials which strongly absorb x-rays could also be used in composites. The study was conducted as part of a research project funded by the German Federation of Industrial Research Associations (AiF).



Attenuation coefficient plotted against fiber content

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SHB spotlight

The Off Road Kids scoop two awards

The Off Road Kids Foundation from Bad Dürrheim has won no less than two awards in the national "365 Landmarks in the Land of Ideas" competition – one for its nationwide "streetwork system" for German street children, the other for founding the Institute for Education Management (IfPM) at Steinbeis University.

Since 1994, the new foundation, which works closely with streetwork bases in Berlin, Hamburg, Dortmund and Cologne, has helped save more than 1400 young people from a life on the streets. The system is funded by the foundation with government support – sponsors such as the Vodafone Foundation, Deutsche Bahn railways, the Schwäbisch Hall Sparkasse cooperative bank, ProSieben's Red Nose Day and the Franz Beckenbauer Foundation make sure the money doesn't run out.

The second prize was awarded for founding Bad Dürrheim's first university department for education management (IfPM) as part of Steinbeis University (SHB) with the backing of the investment company Permira. Working in cooperation with SHB, last year the Off Road Kids Foundation started to offer the first ever executive degree program for teachers and trainers, even if they do not have the German "Abitur" (after completing high school). A second degree program will start in October.

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Business psychologists – in strong demand

Coherent teams and smooth processes can be essential in hard times. A new bachelors degree at the Steinbeis Business Academy (SBA) specializes in business psychology and the interplay between people, business interactions and the organization.

In partnership with the psychology consulting company PSEA, the SBA has set up an executive degree program encompassing all key areas of general management and social research, social interaction, organizations, personal management, conflict management, systemic perception and organizational psychology.

Students on the program learn to think about the psychology of business and discover how to deal with unmotivated staff, how to manage time efficiently, and how to manage meetings and techniques for solving conflicts. They are also primed for managing their company and staff successfully.

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The first M.A. students embark on their studies

The School of International Business and Entrepreneurship (SIBE) at Steinbeis University Berlin (SHB) welcomed the first round of students to its Master of Arts program in January.

The new M.A. program at SHB targets university graduates with little or no work experience who have recently embarked on their career. Students who studied any discipline at a university, a university of applied science or a university of cooperative education are eligible. The program aims to give graduates – especially those with arts, social, law, technical or science degrees – a solid academic grounding for a career in a variety of industries or positions. This is achieved through the project-skills curriculum. Students who have already studied business can deepen and expand their theoretical knowledge with the M.A.

The Master of Arts in Management begins where knowledge and insights from the first degree end, providing first "on-the-job" experience in preparation for a management role. Students are expected to carry out a project with a bearing on the future of their company, strengthening their management understanding.

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Management and product engineering for the managers of tomorrow

Steinbeis Business Academy (SBA) launched a new degree program in March in Gaggenau majoring in general management and product engineering. These disciplines have been combined with future developments in the employment market in mind: the manager of tomorrow will need a solid grasp of management skills and technical issues.

The new degree is ideal for technical specialists or managers in trade and industry, as well as graduates from engineering colleges. True to the tradition of the founding father of the dual education system – Ferdinand von Steinbeis – the program centers on transferring technological insights from science and academia into everyday business practice. The curriculum includes all key areas of general management such as business management, economics, marketing, financial management and managing people. Turning the spotlight on product engineering, students learn about production and material management, product development, automation engineering, technology and innovation management, and quality management.

The Carl Benz Business School, which was founded specifically to offer this degree, is co-funded by the Rural District of Rastatt, the town of Gaggenau, the Südwest-Metall Employers' Federation, the Daimler factory in Gaggenau and the IGMetall union in Gaggenau.

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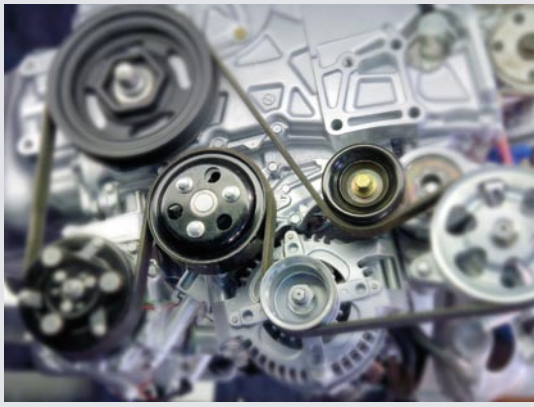

Steinbeis Career Center renamed Steinbeis Center of Management and Technology

The Steinbeis Career Center, one of the largest schools at Steinbeis University, has recently started offering courses and development programs under its new name: Steinbeis Center of Management and Technology (SCMT GmbH).

SCMT
Steinbeis Center of Management and Technology
Research | Education | Consulting

As a school of learning and application, the SCMT will specialize in education while featuring research and consulting in its curriculum. The idea is that after generating knowledge (through research), this should be shared (education) and applied to business (consulting). By bridging the gap to business practice and adding Research and Education to its program, the SCMT now covers the entire spectrum of a "business school of excellence". For SCMT managers this was the next logical step on the path to becoming one of Europe's leading business schools: the new fields allow the SCMT to offer students and partner companies innovative research instruments, high teaching standards, close supervision and the direct knowledge transfer through specific research and consulting projects – with everything under one roof.

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Skills spanning generations of company directors

New ways to hand on the business

When a company seeks new management, it's not just about a change in ownership. It's a watershed for the people handing over power (the incumbents) and the people taking over (their successors). It also marks a change in direction for the company. So if the handover works, jobs are not threatened. A change in senior management is a sensitive issue: the incumbent and the successor need to have a clear understanding of the financial and legal implications. The entire situation is unique, and can be quite emotional. Lifetime achievements are at stake.

The Steinbeis company successor model

The handover could be to another family member, another manager or somebody from outside the company – but the most important first step in successful company succession is planning who will take over in good time, i.e. early. To find the right successor, you need a detailed profile and may have to use unconventional means but with professional support, you can avoid wasting time and effort.

A further, crucial key to success is "matching". Matching involves comparing the company to the profile of possible candidates. When someone matches all the right criteria, they definitely come into question, but unfortunately the list of criteria is often too short and only includes the obvious factors such as salary, location, industry experience and qualifications. Yet often it is people or soft skills that the incumbent is most keen to find in a potential successor. Unfortunately matching does not yet operate on a national level in Germany as the chambers of commerce only conduct searches on a regional basis.

Ralph Kuntz, an MBA student at the School of International Business and Entrepreneurship (SIBE) at Steinbeis University Berlin, had already majored in business succession during his studies and struck upon a new idea. The basis of his model: nationwide matching, diagnosing skills in detail and thus, for the first time, thinking about soft skills as a key criteria for comparing profiles. "By introducing skills diagnostic methods, not only does this make selection much more precise, it adds weight to the entire succession process," says Ralph Kuntz, explaining his model. Incumbents can now check that the person is ideally matched to expectations. Just as importantly, employees, clients and business partners rest assured that established company values will remain a priority in the future and stay in place.

Making it possible to search for successors throughout Germany and assess their skills has established a solid basis for the success of Ralph Kuntz's model, even though he only considers this the first step: "It's key to receive professional support at every stage of the process, but in essence this should span all processes to provide coordination and ensure that the agree actions are implemented efficiently as planned." Ralph Kuntz is currently shifting the focus of the overall process to encompass another core component. Experience has shown how important the first phase is after the handover, for the person involved just as much as the company. Central to the process is therefore professional mentoring, covering the whole spectrum of topics. This continues for 100 days after the handover.

When he set up the Steinbeis Consulting Center Corporate Succession, not only did Ralph Kuntz translate his ideas into practice, he also set up a network of professional partners in different sectors of industry. He now works with people on both sides of the succession equation, before it happens, matching and mentoring managers until successful conclusion. By applying clearly defined criteria, all successfully completed handovers are awarded the Steinbeis Seal of Approval for Business Succession as a proof of the professionalism and quality of the process.

Not long after its launch, Ralph Kuntz's model was setting new standards: in December 2008 the Ministry of Economics and Technology awarded him the "Einfach gründen" prize for the introduction of skills diagnostics as a matching criterion.

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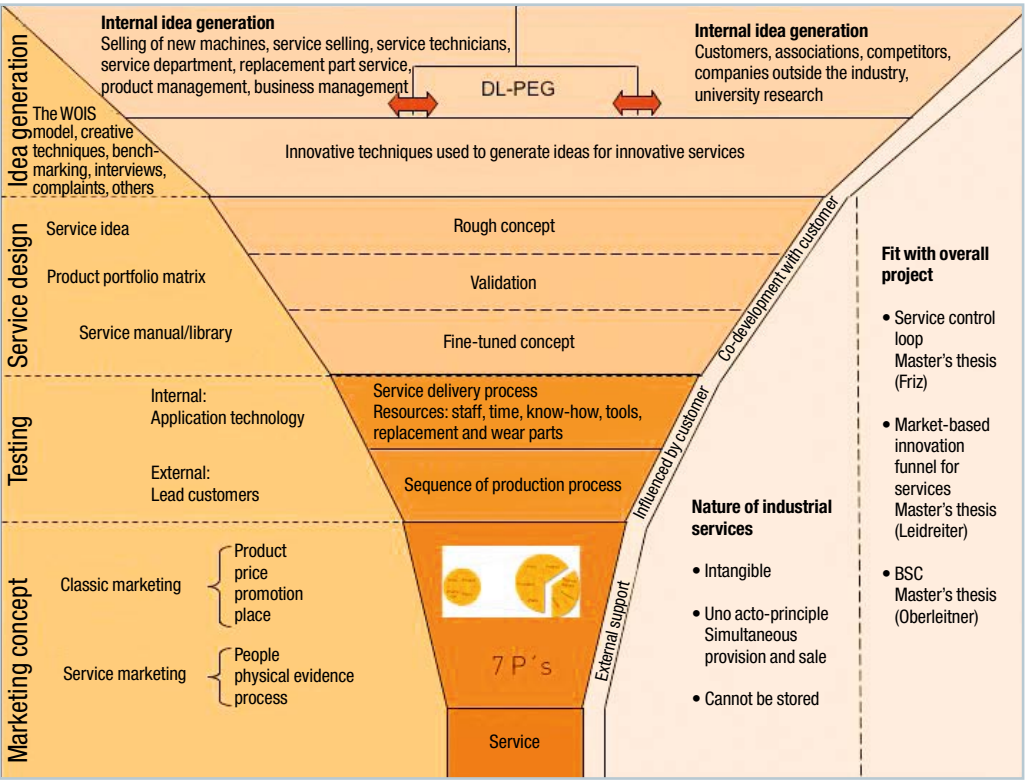
Steinbeis student sets up innovation process

Reinventing services in the mechanical engineering industry

Especially in the machine building industry, small and medium-sized companies used to focus most of their energy on tangible goods and individual transactions. The idea of providing support services, i.e. classic after sales services, only came as an afterthought. In fact sometimes it was positively distracting, or a necessary evil. This was reflected in the lack of emphasis on developing new services. Until a few years ago, researchers and businesses completely ignored them. Thorsten Leidreiter is an in-house consultant at VOLLMER, a machine-making company in Biberach. He's also on the executive MBA program at the Steinbeis Center of Management and Technology (SCMT) at Steinbeis University Berlin. As part of his studies he thought up an innovation process for services in the mechanical engineering industry.



The MOrITS innovations funnel

More and more companies are finding that their products and technology are interchangeable, mainly due to globalization and increasingly transparent markets. There seems to be little room to differentiate products on technological grounds, and increasingly companies are not just having to fend off competitors at home, foreign marauders have entered the scene. As markets become more and more open, another dilemma has emerged: customers have more and more suppliers to choose from. On the upside, however, open markets allows access to international markets and new customers. As a result, lots of companies are having to differentiate themselves by offering something new. The big challenge is to adapt strategies and shift away from being a classic product-oriented machine maker to a technology and service provider.

VOLLMER, a southern German machine maker faced a similar challenge so the company embarked on a strategic project to complement its operative services such as after-sales, replacement parts and training. The aim of the project: to realign the service area with novel ideas and translate them into practice. As part of the project, three of the project team members used their master's thesis to think up concepts, all of which had to fit together. One of them was Thorsten Leidreiter who had already looked at the issue during an earlier project. By offering a comprehensive portfolio of services, new customers could be recruited and retained. Thorsten Leidreiter's aim was to rethink the methods used to develop new services and revise how they are marketed at home and abroad, especially given the different nature of services. One of the chief aims of the overall project was to add a fresh sheen to company services.

Leidreiter's aim was to demonstrate to the machine making company that there are ways and means in business to business markets to be innovative with services. He tabled a variety of methods, from idea generation techniques to creating product concepts, validation techniques, testing methods and even service marketing. This culminated in a systematic innovation process which he coined MOrITS, an acronym in German for a "market-oriented innovation [funnel] for services".

Leidreiter finalized his funnel with individual steps along the way and a battery of process instruments. The filtering process outlined in Leidreiter's thesis consists of several steps

which are used to derive the possible actions needed to systematically innovate with services. The tools and techniques involved could be production development meetings, creativity workshops with customers, lead-user methods, evaluating customer questionnaires or complaints, benchmarking exercises, brainstorming sessions, strategy meetings, exchanging ideas internally and externally and drawing on inspiration from emerging technology.

Generating and introducing a service idea starts with a three-phase process of idea generation, service design and testing. Each idea has to go through these phases before they can be marketed. When marketing the services, the 7 Ps are used. Depending on the type of service, how it is provided and its fit with other services, a selling concept is then developed. This selling concept usually takes the form or a service manual, which in this case was also the basis of one of Thorsten Leidreiter's colleague's master's thesis.

Leidreiter believes his concept provides the company with all the right tools for innovating with services, emanate from each phase of the funnel process, influential features of the MOrITS model and the manner in which it dovetails with the overall VOLLMER services project. Customer opinion also plays an important role in the process. In fact it should shape the whole innovation process. It can be gauged through customer surveys, complaints or actively engaging customer in product development meetings in each of the individual phases. Which phases they are is decided by VOLLMER service developers on a product by product basis.

In the second part of the funnel process the marketing concept is created using the 7 Ps: product, place, price, promotion, people, physical evidence and process. This involves working out key actions, if possible underpinned by examples.

Thorsten Leidreiter's funnel process will not just be applied to the development of new services. At regular intervals – at least every two years – the company will use it to benchmark existing services. The company places a strong emphasis on data quality, and how good it is at predicting the efficacy of agreed actions as well the overall development process for new services. For example, it can not set up proper replacement part deals if the data (on things like the customer base, existing machine set-ups, the nature of the production program, and shift practices), is unreliable. Also, Leidreiter's model will only work if the company culture becomes more service oriented. The company is currently embarking on its first steps. For everyone to be thinking constantly about the service mentality, they have to be more closely involved in the delivery of services. The best way to achieve this is to be open with internal communication. It is also absolutely essential to work more closely with customers when developing services. In the long term Thorsten Leidreiter recommends that his company set up a service sales department in combination with product management.

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"VerMat" a German acronym for "Improving material efficiency" ("Verbesserung der Materialeffizienz") is designed to help individual or networks of companies improve their use of manufacturing materials. Given the increasing scarcity of resources and higher raw material prices, the program's aim is to improve product, process and system efficiency – and thus cut costs. According to the German Material Efficiency Agency in Berlin ("Deutsche Materialeffizienzagentur" or demea), the different options for improving material efficiency include product design, production processes and the overall production setting. Material costs should become the center of attention, along the entire process chain – from initial order to final delivery. To do this, certified consultants will come and analyze material flows and the causes of wastage, also inputting with actions plans, financial advice and implementation support. The fees of the consultants are subsidized by 67 per cent for an assessment of potential costing up to 15,000 euros, and 33 per cent for project support costing up to 70,000 euros.

Since the beginning of the year, in-depth analyses or support during implementation costing up to 15,000 euros are also eligible for a 50 per cent subsidy. The subsidy must not amount to more than 100,000 euros and is restricted to companies adhering to SME criteria that are producing in Germany. Exceptions – for companies with up to 1000 employees and no cap on turnover – are made when particularly high volumes of materials are involved or the overall level of risk is high. The program has been in successful

A material efficiency center to help SMEs improve their competitiveness

Injecting more means into development programs

As part of the German government's sustainability strategy, the Federal Ministry of Economics and Technology is offering small and medium-sized enterprises (SMEs) funding in the medium term to help improve competitiveness. Its criteria for an SME: no more than 250 employees and annual turnover of 50 million euros. This must be documented, although depending on the program the scheme also applies for up to 1000 employees with no turnover ceiling. Federal funds have been earmarked until 2013. A second economic stimulus package is offering funding in 2009 and 2010.

operation since 2006 with more than 300 approved assessments of potential throughout Germany. Of these, 236 resulted in 90 per cent satisfaction, with an average potential saving of 2.5 per cent of annual turnover. Of the improvements made, 50 per cent involved investments of less than 10,000 euros and could be realized straight away. 20 per cent involved investments of up to 50,000 euros with a payback period of less than six months.

The German ZIM ("Zentrales Innovationsprogramm Mittelstand" or "Central innovation program for medium-sized companies") provides individual and joint sponsorship of R&D activities with the aim of focusing SME-based R&D more on market needs, reducing technological and commercial risk, accelerating time-to-market and expanding technology transfer activities. It is funded by the AiF and VDI-VDE-IT in Berlin. This strategic initiative will improve long-term R&D at SMEs by providing financial incentives. Apart from the SME criteria, the general idea is to focus on reducing the risk of innovation projects, improving the availability of technology, enhancing collaboration between different companies, or between companies and research bodies. The overall aim is to raise competitiveness by improving companies' ability to innovate, to accelerate innovation and facilitate partnership. Support packages span partnership programs, start-up projects and services. They came into effect in March for individual projects with companies in the former states of East Germany, limited to two years, also sometimes extendable to SMEs with up to 1000 employees. The types of costs covered are direct personnel costs of up to 80,000 euros per person and year and contracts with third parties for up to 25 per cent of personnel costs, plus all-in costs for fittings and materials as well as costs of services of the same value of the approved personnel costs. Out of the approved overall costs of up to 350,000 euros depending on the support package and the size of the company, they can receive subsidies of 35 to 45 per cent research grants of up to 175,000 euros with 100 per cent subsidies, and services costing up to 50,000 euros with a 50 per cent subsidy.

VerMat – Impulsprogramm Materialeffizienz

ZIM impulse für wachstum – Zentrales Innovationsprogramm Mittelstand

Individual company consulting

- Potential analysis (PA)
- In-depth consulting (IC)

Consulting cost

PA: 67% up to 15,000
50% up to 30,000

IC: 33%

Overall maximum 100,000

Allowances are available for

- **Direct personnel costs**
  Basis: gross salary and productive annual working hours, max 80k p.a. per person
- **Contracts with third parties**
  Up to 25% of personnel costs
- **Other costs**
  All-in calculation:
  For SMEs 100%, for research institutes 75% of direct personnel costs

Simplified estimates

The Steinbeis Transfer Center Material Efficiency Center (MEZ) has accreditation for the subsidy scheme. Its senior consultants help customers submit their application, access their approved funds, and carry out assessments of potential. They also provide support planning and monitoring progress as well helping the expert consultant assigned to the SME on detailed issues such as factory planning, material management, machine construction, ERP software, warehousing systems and assembly methods. Based on total turnover, MEZ consultants' involvement in VerMat potential analyses (for companies such as producers of construction parts, subassemblies, and metal/plastic processing equipment) has helped reduce material wastage (or value-chain losses) between 2 and 6.5 per cent.

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Steinbeis University starts publication of its specialist magazine

Business + Innovation – the Steinbeis Executive Magazine (B+I)

In 2010 Steinbeis University Berlin (SHB) will start publishing its new magazine through Gabler Publishing: Business + Innovation – Steinbeis Executive Magazine (B+I). Targeted at decision makers and business executives in innovation-oriented companies, it will appear four times a year and feature a variety of theoretically and empirically well-founded solutions to everyday business problems and the challenges of business in practice. The aim is for university lecturers and students on business administration programs to share the latest theories and their application in business.

Business + Innovation
Steinbeis Executive Magazin

As an independent specialist magazine, B+I should become a melting pot of theory and management practice. This will be reflected in the main sections which are Strategy, Innovation and Global View. In keeping with other quality publications tailored to this type of readership (quality in terms of content and layout), B+I will reflect current management thinking. It will also contain useful information for making successful decisions, with a variety of special features including lessons learned, interviews, views on the news and interdisciplinary case studies. To ensure that they fulfill all the necessary criteria to translate knowledge from theory into practice, all submitted articles are assessed using "double blind review" processes. This is carried out by the editorial board made up of leading experts from business and academia. For example, coming at things from a business angle are Raimund Petersen (board member at Deutsche Post World Net), Sina Afra (Managing Director, ebay Turkey), and Henrik A. and Kristina Schunk (managing directors SCHUNK GmbH & Co. KG). Also on the editorial board are Prof. Dr.-Ing. habil. Prof. e. h. mult. Dr. h. c. mult. Hans-Jörg Bul-linger (President of the Fraunhofer Society) and Univ.-Prof. Dr. Gerrit Brösel (university chair for business administration, specializing in financial systems and management accounts, TU Ilmenau).

The editor in chief of B+I is Prof. Dr. rer. pol. habil. Frank Keuper chair of business administration, in particular in convergence and media management at SHB and academic head of the Sales & Service Research Center, which is sponsored by Telekom Shop Vertriebsgesellschaft mbH. The head of editorial staff is Prof. Dr. rer. pol. Marc Schomann, who is a junior professor at Steinbeis University Berlin for business management and IT-based management accounting. Stefan Röder MBE, scientific assistant in the business administration department, in particular in convergence and media management, will act as assistant to the head of editorial staff.

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2008: a successful year for Steinbeis

2008, which marked the 25th anniversary of the Steinbeis Foundation reorganization in 1983, was another successful year for Steinbeis. The foundation witnessed strong growth in all business fields served by the Steinbeis network, these being the four service areas of Research and Development, Consulting, Evaluation and Expert Reports, and Training and Employee Development. Annual turnover was 124 million euros (2007: 109 million).

The Steinbeis network also expanded again last year, with 82 new specialized Steinbeis Enterprises (SEs). This brought the total network to 765 SEs (2007: 739). Depending on the specific service emphasis, these SEs are legally dependent Steinbeis transfer centers, research centers, consulting centers or transfer institutes. In some cases they are companies in their own right.

The Steinbeis consulting portfolio ranged from short consulting sessions to complex projects involving corporate consulting on business management and technological issues. The preliminary consulting program, which is financed by Steinbeis and was reintroduced in 2005 to help small and medium-sized companies, resulted in 228 consulting sessions by the end of 2008. In the Research and Development field, most projects related to information and communication technology, as well as electrical engineering. Our training and employee development activities focused on the degree programs and seminars run by Steinbeis University Berlin (SHB) and

Steinbeis Enterprises which have specialized in training. Evaluations and expert reports also witnessed a strong growth in turnover last year.

Our success in 2008 is down to our 5500 or so employees and project specialists. At the 765 SEs, 1383 (1340) employees and 3338 freelancers (2907) worked on Steinbeis projects. 801 professors (762) worked on behalf of Steinbeis in 2008.

Steinbeis organized a large number of events for and with people from industry and science and academia in 2008. This form of dialog with experts and observers of knowledge and technology transfer will be continued in 2009. The main event on the calendar is the Steinbeis Day which takes place this year on 25 September. Traditionally, this is the day for employees and customers to enjoy an exhibition and short speeches given by Steinbeis companies, brush up on contacts and enjoy lively conversion in Stuttgart's House of Commerce. For more information on events throughout the entire Steinbeis network, Steinbeis services and live projects, visit out customer and partner website at www.stw.de.

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New financing options for companies

Raising credit in times of hardship

When there's a downturn in the economy, as we know from previous economic crises, banks in particular start to tighten their belts. The current crisis, which is affecting most financial institutions, is making banks even more tight fisted. Margins have shot up and lots of banks are doing their level best to hand out less credit. As a result, companies are finding it more and more important to find the right strategy in dealing with banks. The finance experts at the Frankfurt-based Steinbeis Consulting Center for Medium-Sized Enterprise Finance and Investments have worked out and used successfully a number of ingenious approaches in recent years that are useful to owner-managed and listed companies in all sectors of industry.

"No, we're not issuing guarantees and we're not prepared to make any more commitments." When a Steinbeis customer – a medium-sized enterprise from North-Rhine Westphalia – heard these damning words, the experts took it upon themselves to lend a helping hand, provide professional support and work out an alternative financing plan.

The tooling technology company makes around 50 million euros a year and is profitable. It needed around four million euros for a sales and production investment. When the company's main banking partner turned it down, the experts at the Steinbeis Consulting Center for Medium-Sized Enterprise Finance and Investments rolled up their sleeves. First step: intensive discussion with management culminating in a financial rating based on the current standing of the company.

After examining company finances, they had a clear picture of the actual amount of finance needed and how much credit the company could afford to take on. But first it had to improve its working capital. The experts identified and approached another bank which would work alongside the existing bank to provide extra funding.

Only 10 weeks later the Steinbeis customer received a line of credit from another bank and a medium-term loan amounting to 4 million. Interest was around 2.5 per cent under the average bank lending rate for a similar term and arrangement. The banks had previously insisted on the directors acting as personal guarantors but now they could be convinced to issue their own guarantees and adjust their credit rates downwards.

Now, during an important phase of market consolidation, the company has the extra finance to expand and build its market share at home and abroad. The directors are no longer tied into personal guarantees.

The Steinbeis financial experts' final assessment is that, given the overall situation, banks will probably remain reluctant to extend existing credit agreements with companies – or issue new credit – well into 2010.

To make tangible progress and improve their financing, companies must analyze the figures in detail and be able to negotiate with banks on the same level.

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LTN displays – low in cost, low in maintenance

Save energy with smart signs – in all sizes

LED displays are lit by electricity flowing through each LED. These signs need to be bright – and the brighter the surroundings, the more energy they need simply to stand out. In contrast, liquid crystal displays (LCDs) use natural light. The firm element displays Dr. Wiemer GmbH, part-owned by Steinbeis, has developed a range of new technologies and a new all-in-one solution for low cost, maintenance-free LCD signs which are easy to manufacture and need only very little energy. Some of these innovations have now been patented.

Standard liquid crystal displays remain dark when not energized; the different segments can only switch to transparent when connected to a power source. These displays have a dark background, the exact color of which changes depending on the viewing angle. In contrast, the low twist nematic (LTN) displays developed by element displays have a light-colored background when idle. When energized, the background becomes uniformly black – and although it may appear slightly lighter when viewed at an angle, this background is colorless. The result: an attractive display which remains uniform, even from wide angles. When light shines on the LTN displays, they are noticeably brighter than standard LCD displays, which remain dark unless powered by electricity. Using LTN displays thus helps to reduce energy consumption.

To stay bright, LTN displays need to use natural light from their surroundings. To capture this light, element displays uses UV-stable plastic films and panels with integrated diffusers and fluorescent dyes. These "light converters" absorb light with short wavelengths and re-emit it in the emission color of the fluorescent dyes. When exposed to light with longer wavelengths, the light converters are translucent. This means the exact color of the "lit" display segments is mainly determined by the emission color of the fluorescent dyes.

Twist nematic (TN) or LTN liquid crystal displays must be mounted in special housings, as the polarization filters on the exterior of the LCD cells are not stable enough. This means a transparent screen must be placed in front of the display. Light shining on this screen creates reflections from the screen's front and rear surface – which make the dark background lighter and reduces display contrast. Not only that, the front of the LCD cell also creates reflections resulting in less contrast. This is normally fitted with an anti-glare layer which scatters incident light over a large area and dissipates sharp contours in the reflected image. Unfortunately, this also lightens the dark background. In the displays produced by element displays (which are optimized for low energy consumption), the LC cells are optically coupled to the front screen. This screen is generally made of float glass coated with a thin anti-reflective film or of Polycarbonate. This solves the reflection problem – with the sole exception of reflection from the front of the display. As a result, the dark background stays considerably darker than on standard displays. The LTN displays therefore maintain excellent contrast, even at low light levels.

LCD displays are usually mounted in opaque metal frames. This prevents light entering from behind, meaning the display must be backlit by energy-consuming light sources mounted beneath the display. element displays has developed a far more practical solution which uses LED backlighting on a transparent board. As the displays run on natural light, this is only needed in the dark – again helping to keep energy consumption significantly lower.

With its optically coupled LC cells, the front screen can be used to build a low-cost LTN display for outdoor use – simply by joining it to the rear of the housing using standard methods for the manufacture of double-glazing windows.

Customer benefits in focus:

- Flat design
- Require minimal energy
- Long term, low-maintenance operation – without a fan
- Excellent legibility, even at large distances

Areas of application:

- Road signs and parking information systems
- Passenger information systems
- Price displays at petrol stations
- Sports displays
- Advertising displays

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The 2009 Löhn Award: submissions open

The Löhn Award recognizes outstanding transfer projects in fields using competitive technology along with knowledge transfer between science and business. The jury pays special attention to transfer projects achieving above-average results in carrying out and completing the transfer process. The award is open to Steinbeis companies and customers who have been involved in a transfer project.

In particular, success is measured by the quality of the actual transfer process, the success of the transfer, and discernible transfer potential. The hallmark of successful transfer is quality, expediency, economic viability and a good working relationship between the transfer partners. Transfer potential and transfer success are reflected in the usefulness of the project to each party involved – tantamount to commercial success for both the "know-how provider" (the Steinbeis Enterprise) and the "know-how recipient" (the customer).

Prize winners are chosen by a jury made up of members of the Steinbeis Foundation Board of Directors and the Chairman and Honorary Trustees of the Steinbeis Foundation Board of Trustees. In addition to the unique Löhn Award sculpture, a prize of up to 60,000 euros is awarded to companies or researchers involved in the transfer project. The prize money may be awarded to a single project or divided between several winning projects. Prizes are bestowed during the annual Steinbeis Day. Submissions for this year's Löhn Award are open until 31 May 2009. You can find more information, including application forms, online, at the address below.

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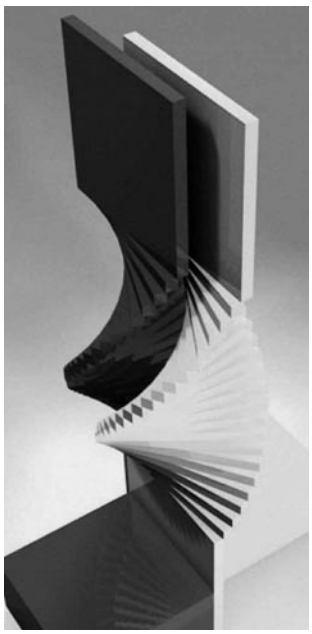
Application forms and information:
www.loehn-preis.de



Federal Minister of Building, Wolfgang Tiefensee, recognizes sustainable buildings

For the first time, the German Sustainable Building Council (DGNB) awarded its new Sustainable Building Certificate to selected buildings in Germany, at a ceremony at the BAU 2009 trade fair in Munich. The Steinbeis Transfer Center for Energy, Building and Solar Engineering in Stuttgart actively developed this certificate from day one.

Z-zwo in Stuttgart

Auditors Thilo Dülger and Dr. Boris Mahler (from the Steinbeis Transfer Center for Energy, Building and Solar Engineering) applied their expertise during the pilot phase. The "Z-zwo" building in Stuttgart and the Vileda building in Weinheim both received Silver Certificates.

The primary goal of sustainable building is quality – in every aspect. Sustainable buildings are designed to be economically efficient, eco-friendly and use resources best. They provide a comfortable, healthy environment for occupants, and are optimally adapted to their socio-cultural setting. This means sustainable buildings retain their high value in the long term – for investors, owners, and occupants.

Creating a sustainable building means keeping the big picture in mind throughout design, construction, use and end of live. Considering the building's life cycle is crucial, as is focused communication between the parties involved in design. In doing so solutions of tomorrow come into practice today.

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European research committee appoints Petra Püchner

In June 2006, the European Commissioner for Science and Research, Janez Potočnik, created a number of advisory committees to consult on the implementation of the EU's Framework Programme for Research and Technological Development. Two years on, these committees have new lineups. Dr. Petra Püchner, managing director of the Steinbeis-Europa-Zentrum Stuttgart, has been appointed to the committee on research for SMEs.

The committee focuses on small and medium-sized enterprises and provides advice to the European Commission on strategic issues regarding the SME research programmes and their implementation. Other areas which Petra Püchner will advise on include improving participation of small and medium-sized enterprises in all types of research programmes, and encouraging better networking of the different research programmes relevant to SMEs.

Petra Püchner has been with Steinbeis-Europa-Zentrum (SEZ) since 1995. As the centre's managing director, in recent years she has implemented numerous measures to support SMEs in Baden-Württemberg supported by the European Commission.and has encouraged innovation. This also includes the only EU project targeted specifically at female entrepreneurs and scientists to smoothen their access to European research programmes.

The SEZ has been a member of the European Commission's Enterprise Europe Network since January 2008. The network consists of around 600 partners in over 40 countries. Its mission is to support companies in areas concerning Europe, innovation, research and technology transfer, and to encourage the dissemination of European research results. The SEZ is a member of the Baden- Württemberg consortium, together with the organisation Handwerk International Baden-Württemberg, the Ministry of Economics Baden-Württemberg, and seven local chambers of commerce and industry.

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Federal Cross of Merit for Jürgen van der List

In January, Professor Dr. Jürgen van der List was awarded the German Federal Cross of Merit in Esslingen. Van der List was principal of Esslingen University of Applied Sciences until entering retirement in 2007 and manages the Steinbeis Transfer Center for Microelectronics since 1991.

"Jürgen van der List has always promoted close cooperation between universities, industry and commerce, resulting in many promising partnerships and productive affiliations," explained State Secretary Dr. Dietrich Birk, who bestowed the award. The Steinbeis Transfer Center for Microelectronics set up by Jürgen van der List has developed into one of the leading transfer bodies in the state of Baden-Württemberg. Birk explained how van der List invested great personal energy in facilitating the development of technology transfer at the Göppingen campus, and lauded his honorary commitments to art and culture.

Jürgen van der List studied electrical engineering in Karlsruhe, graduating in 1970. After working in Berlin and Dusseldorf, in 1980 he was recruited by what was at the time Esslingen University of Engineering. Van der List set up the new faculty of microelectronics at the off-site campus in Göppingen before being appointed principal in 1997.

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iNTeg-Risk to descend on Stuttgart

The 1st iNTeg-Risk Conference will be held in the Haus der Wirtschaft in Stuttgart from 2–3 June 2009. The host of the conference is the European Virtual Institute for Integrated Risk Management (EU-VRi), co-founded by the Steinbeis Transfer Center for Advanced Risk Technologies in 2006.

EU-VRi is both partner and sole coordinator of iNTeg-Risk (Early Recognition, Monitoring, and Integrated Management of Emerging New Technology-Related Risks) – the flagship project of the European Commission's FP7 program.

This project brings together over 80 partner firms from industry, science and research, with one aim: to address the risks of future technologies with a single, unified voice. Different project phases will focus on identifying these risks. The next step will be to put in place the means to establish a single European risk management system, and establish an integrated approach to the challenges posed by risks related to new materials and technologies over the next 10 to 20 years.

Over 200 attendees from business, research and politics are expected at this first annual conference, which aims to provide an overview of the initial phase of this cutting edge, Europe-wide interdisciplinary project, as well as forecast its future.

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New releases from Steinbeis-Edition

Reading – Learning – Understanding
Steinbeis-Edition publishes works mirroring the scope of the Steinbeis Network expertise. All titles can be easily ordered via our online shop, at www.Steinbeis-Edition.de

Innovationen ohne junge Talente – geht das?
Editor: Rolf-Jürgen Ahlers
Transcript from the Forum for Aerospace (Forum Luft- und Raumfahrt) Vol. 3
ISBN 978-3-938062-61-6 (German)

This conference transcript from the Forum for Aerospace covers the lecture series "Is innovation possible without young new talents?" – which addresses current demographic changes and how difficult it is to find talented young people in the aerospace industry. The book also presents possible solutions and strategies for attracting and training the next generation of aerospace engineers, and highlights the latest trends and developments. Excellence and innovation are constant goals in aerospace – a key industry sector in Baden-Württemberg with a strong research infrastructure.

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