




Structuring and designing the digital change in skilled crafts – points of view and best practices of an innovative, changing industry

Position paper





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Representation to the European Union
Florian Schöll
21, Rue Montoyer
1000 Brüssel
Phone: +32 (2) 74 21 906
Email: schoell@hwk-rhein-main.de
www.hwk-rhein-main.de

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practices of an innovative, changing industry





Introduction

The digitization of industry and society has progressed rapidly in recent years. The technical possibilities and challenges have never been as extensive as they are today. At the same time, the extent and speed of digitization will likely expand greatly in the near future.

Particularly small and medium-sized enterprises (SMEs) have to adjust more and more to a changing world and, with that, to more and more new conditions. Clever digitization strategies can secure important competitive advantages for companies, and at the same time expand the services they offer to customers and business partners. The usage of the most modern forms of communication simultaneously promises completely new possibilities, be it in the internationalisation of the business activity or the acquisition of skilled employees in times of demographic change.

As part of the „Branchendialog Handwerk“ (Skilled Crafts Industry Dialogue) on May 19, 2015 in Berlin, the Federal Ministry for Economic Affairs and Energy (BMWi) dealt extensively with the topic of digitization in skilled crafts. Intensive debates are already taking place in the political arena. A current survey by the BMWi shows that at present just about 10% of skilled crafts enterprises consider digitization particularly important¹. This snapshot capturing the moment at hand shows that the opportunities offered by digitization are not yet fully perceived and accepted within the companies. Especially many smaller companies are faced with the problem of finding solutions that are actually compatible with a more and more extensive and complex offer of digital instruments for greatly differing production-related, operational and communications applications. But fortunately over 70% of skilled crafts enterprises comprehend the progressing digitization as a chance².

¹ Cf. Federal Ministry for Economic Affairs and Energy (2015): Branchendialog Handwerk. (Skilled Crafts Industry Dialogue) <http://www.bmwi.de/DE/Themen/industrie,did=705266.html> (21.09.2015)

² Cf. German Federation of Skilled Crafts (2014): Digitization of Business Processes in the Skilled Crafts Sector. <http://www.zdh.de/themen/wirtschaft-energie-umwelt/konjunktur-umfragen/sonderumfragen/digitalisierung-der-geschaeftsprozesse-im-handwerk.html> (21.09.2015)

The European Union is an important generator of ideas in the area of digitization. Particularly the “A Digital Single Market Strategy for Europe”, presented on May 6, 2015 by the European Commission, combines a multitude of expansive measures. Moreover, the prioritising of the topic in the political guidelines of the European Commission is welcome: “A New Start for Europe: My Agenda for Jobs, Growth, Fairness and Democratic Change”. The urgency and the significance of the topic are already revealed here. The digitization of industry and society is progressing inevitably, and now it is up to the skilled crafts sector to actively shape the change and play a part in the broad political debate.



**SAY
YES**

TO THE MASTER QUALIFICATION

**WITHOUT THE MASTER QUALIFICATION
THERE'S NO VOCATIONAL EDUCATION
THERE'S NO QUALITY OF SERVICES**

The skilled crafts sector's demands on a digital world

Digitization is often summarised in Germany under the industry-specific catchphrase of “Industry 4.0”. From the perspective of the skilled crafts sector, the term is not broad enough and especially neglects the traditional, small business structures in said sector. In 2012, the average business size of a skilled crafts enterprise in Hessen was 4.4 employees³. Moreover, the digital changes not only affect the industrial value added chains and production areas; instead the entire economy and society are in a state of cataclysm. Ultimately all of the market participants are affected, which is why the term “Economy 4.0” appears to be more meaningful and to fit more accurately.

The example of the average enterprise size already shows us that the demands skilled crafts enterprises make of digital changes can occasionally fundamentally differ from other industries. There is a need for individual consulting possibilities and forms of information that accurately fit small and medium-sized enterprises, especially due to the structures of small business.

Every enterprise and every entrepreneur is different – skilled crafts enterprises always accordingly expect and need **personal** and **individual** consulting and advice. Only in this way can it be ensured that the possibilities of digitization in an enterprise are completely exhausted. The consulting must take place in a manner that is **solution-oriented** and **independent** of the greatly differing production-related, operational and communications applications. The applications should be **interoperable**, **compatible** with the existing system and also offer **mobile** usage. The goal of the consulting and forms of information should be to present companies with **simple** digital solutions and ultimately reduce complexity in the digitization jungle. In doing so, the consulting must be oriented towards the enterprise's **practice-oriented** and **sector-specific** circumstances. Access to the consulting services and to information

³ Cf. Hessian Confederation of Skilled Crafts (2015): Structural Data of Skilled Crafts in Hessen 2004 – 2014. <http://www.handwerk-hessen.de/artikel/strukturdaten-des-hessischen-handwerks-2004-2014-5006,16,262.html> (21.09.2015)

should be as **unbureaucratic** and **uncomplicated** as possible. It would be helpful to have good regional coverage here – long-term successes can be achieved by just personally contacting the consultant. The Chambers' many years of practical consulting in other areas shows this to be true. Moreover, the procedures of digitization must be **secure** and come from **trustworthy** partners – data privacy and protection play an extremely important role for small companies as well.



Demands and wishes of the skilled crafts sector

The European Commission's Strategy for a Digital Single Market for Europe and the German government's Digital Agenda are both milestones in the direction of a digitized economy and society. Both communications are thus also of extremely high importance for the skilled crafts sector in Hessen. Particularly the goal of Commission President Jean-Claude Juncker of making the creation of a digital single market a top priority is expressly supported by the skilled crafts sector⁴. Plans for standard Europe-wide data privacy and protection laws for personal data are particularly important here. The skilled crafts sector supports this venture, but continues to emphasise here that these demands cannot exceed the possibilities of smaller enterprises. In the incorporation of European data privacy and protection laws into national laws, it must be ensured that there are absolutely no added burdens for the enterprises due to "gold plating".

The renewed deliberations of the Commission on more closely linking public business registers with one another and implementing the principle of a single registration

⁴ Cf. European Commission (2014): A New Start for Europe: My Agenda for Jobs, Growth, Fairness and Democratic Change – Political Guidelines for the next European Commission. http://ec.europa.eu/priorities/docs/pg_de.pdf (22.09.2015)

as part of the digital single market strategy is something we consider positive. The measures should contribute to relieving bureaucracy for small and medium-sized enterprises. The transition to completely electronic order processing and the introduction of an electronic signature are also well-received by the skilled crafts sector. In electronic commissioning, for small and medium-sized enterprises it is particularly important that the transition to purely electronic commissioning be designed in a manner that is friendly to SMEs. Among other things, this means sufficiently long transition periods and a simple, end user-friendly job commissioning system. This requires an internet infrastructure that performs accordingly.

From the skilled craft sector's viewpoint, the three pillars of the digital single market strategy with its total of 16 individual key measures fundamentally points in the right direction and is welcomed accordingly. But ultimately the individual measures lack a certain connection to the real economy in manufacturing and processing. According to information provided by the European Commission itself, 99% of all European companies are SMEs⁵ – including many skilled crafts enterprises. From the viewpoint of the skilled crafts sector in Hessen, the communication unfortunately leaves open to a large extent how those enterprises will participate in the digitization and can be supported. Digitization not only includes industry-specific sectors, but instead all economic sectors as well.

In addition to the aspects already addressed, the following points are also relevant from the skilled crafts perspective:

■ Digital infrastructure

A reliable and affordable digital infrastructure is the basis of any entrepreneurial digitization strategy. A fast internet is a basic requirement here. The expansion of broadband must thus be consistently driven forward. The planned usage of funding from the investment package of the EU Commission and the Connecting Europe Facility is welcome. It is necessary to promptly implement the corresponding measures. The Chamber of Skilled Crafts Frankfurt-Rhein-Main moreover advocates the improvement of cross-border communication based on lowering roaming fees.

⁵ European Commission (2015): Entrepreneurship and Small and Medium-sized Enterprises (SMEs) http://ec.europa.eu/growth/smes/index_en.htm (22.09.2015)

■ Consulting

Small and medium-sized enterprises continue to need vendor-independent, objective assistance in the selection and implementation of compatible digitization solutions. Offers directed at SMEs like those of the 'eBusiness-Lotsen' (e-business guides) supported to date by the BMWi thus remain indispensable. The Digital Skilled Crafts Competence Centre initiated by the BMWi, and the four 'Mittelstand 4.0' (SME 4.0) agencies are already a step in the right direction here.

■ Digital competences

In the German skilled crafts sector the dual education system contributes to covering the need for skilled workers in a manner tailored to suit those needs. Across Germany just about 384,000 young people were doing apprenticeships in 2013, approx. 26,200 of them in Hessen alone. The acquisition of competence, also basic "digital competence", is the basis of economic success. The acquisition of "digital competence" in schools should thus continuously be expanded. To do so, however, schools must be equipped with modern, digital infrastructures and teachers must have the necessary knowledge.

■ Learning locations

The skilled crafts sector distinguishes itself with training and education suited to the market. The training content is directly oriented towards the requirements of the market and is continuously adjusted to changes. In doing so, the respective relative aspects of digitization must also be taken extensively into consideration and in terms of perspective. To be able to teach the corresponding material also requires appropriate digital equipment in the learning locations of occupational training and continuing and further education.

■ Free access for SMEs

Increasingly intensive online competition has been recognizable in recent years. There is a need here for clear and comprehensible rules, so that all competitors have equally fair market chances, in regard to social and quality standards, for example. At the same time, it must be ensured that the company can be found on the internet. Monopolistic tendencies and quasi-monopolies in online platforms must categorically come to an end in the interests of SMEs.

■ E-Government

The progressing digitization of public bodies is fundamentally welcomed and supported as much as possible by the Chamber of Skilled Crafts Frankfurt-Rhein-Main. E-Government measures in EU member countries should be designed in such a way that they can also be used by citizens of other EU member countries. There are, however, limits to the digitization of public services. For example, in the guideline draft on a single-member private limited liability company (SUP), a completely electronically processed registering procedure is proposed for companies, with no personal appearance at all. Due to reduced demands in the registration and the obligations in terms of reserves, however, tax fraud is abetted (letter box companies, etc.). This cannot be the intention of the government and reveals the limits of E-Government.

■ Cross-border commerce

VAT law issues are already one of the most frequent problems for skilled crafts companies in regular cross-border provision of services. Based on the well-known problem situations, many skilled crafts companies already distance themselves from cross-border activities in an “analogue” world. The corresponding difficulties such as language problems when dealing with authorities and differing VAT regulations also prevent cross-border activities in online commerce as well. There is a need for simplification here in the interests of the SMEs.

■ Data privacy and protection

Due to increasing interconnectedness, expectations of customers and companies have also changed. Data must be available today anytime, anywhere. Cloud solutions combined with mobile internet already now enable universal access to customer, company and supplier data, etc. At the same time, through this the complexity of the systems has grown, and protection of data against unauthorised access by third parties is increasing in importance. In particular, this can quickly become a challenge for SMEs. Thus there is a need for targeted support of the companies, in order to reconcile data protection and privacy with customers’ interests.

■ Interoperability

Strict observation of the principle of interoperability⁶ is essential if a uniform digital economic region is to be a success in Europe. It is the job of the EU here to coordinate, not standardise the interoperability.

Measures taken by the European Commission to visualise the degree of digitization of a member country, like the Digital Economy and Society Index presented on February 24, 2015, are supported by the Chamber of Skilled Crafts Frankfurt-Rhein-Main. Benchmarking is a good possibility to identify weaknesses in the member countries and initiate measures to remedy the situation.

⁶ Interoperability is the ability of different systems, technologies or data to be combined or to interact – cf. Federal Office of Civil Protection and Disaster Assistance (2015): Glossary (German). http://www.bbk.bund.de/DE/Servicefunktionen/Glossar/_function/glossar.html?lv3=1956326&lv2=4968166 (29.09.2015)

Economy 4.0 – Successful skilled crafts enterprises in a digital world

A new tooth digitally – How new teeth are made in the dental lab using digital methods

Just one time not being careful, and it happens. A minor accident – and you're missing a tooth. A major annoyance for anyone it happens to, and it's nothing to wish for. It used to be a big problem, but today, thankfully, it can be taken care of quite well with a visit to the dentist. When a patient is having a crown or a bridge installed, they usually only see the dentist. Patients rarely think about where their new teeth actually come from – they are made in the skilled crafts sector, more precisely by a dental technician. Using their many skills as craftsmen and fidelity to detail, they make all kinds of bridges and crowns.

The production of bridges and crowns is what the company Rainer Ulbricht Dental-Technik GmbH specialises in. Just a few years ago, dental technicians had to carry out almost all steps of the procedure of producing a dental crown/bridge analogue by hand, but in today's world digitization has found its way into this segment as well. The dental laboratory, established in 1990 in Bad Vilbel, has been intensively involved with digital solutions for companies since 2006. In addition to classic production techniques, this company, with its 20 employees and 4 master technicians, has also come to rely on digital production methods. In the meantime, dental technicians also need well-grounded computer knowledge in addition to the ability to work with their hands. Due to the most modern technologies, their occupation is changing more and more into the challenging profession of tooth designer.

But how is the new digitally created tooth developed? Two different procedural methods are fundamentally conceivable. If the dentist has an intraoral scanner in their practice, they can use it to create a three-dimensional digital impression of the tooth. They send this scan to the dental lab via the internet. Alternatively, the dentist can also make a classic impression. The dental technician uses a special form of plaster

or plastic to create a positive mould from this (called the master model) – ultimately a detailed replica of the dentition that is true to scale. This master model is then also scanned. Ulbricht labs specialises in both methods.

A new custom-fit crown or bridge is created on the computer (CAD) in both methods. Using a milling machine (CAM), the new crowns and bridges are then produced in a fully automated process. At this point craftsmanship and skill come into play again. Using the master model, the machined elements are given a porcelain veneer until the aesthetics and the complete fit with the existing dentition are both perfect. Only when the new crowns and bridges meet the demands of the dental technicians are they ultimately given to the dentist and used on the patient.



Rainer Ulbricht Dental-Technik GmbH

Mr Eiselt

Alte Frankfurter Straße 19

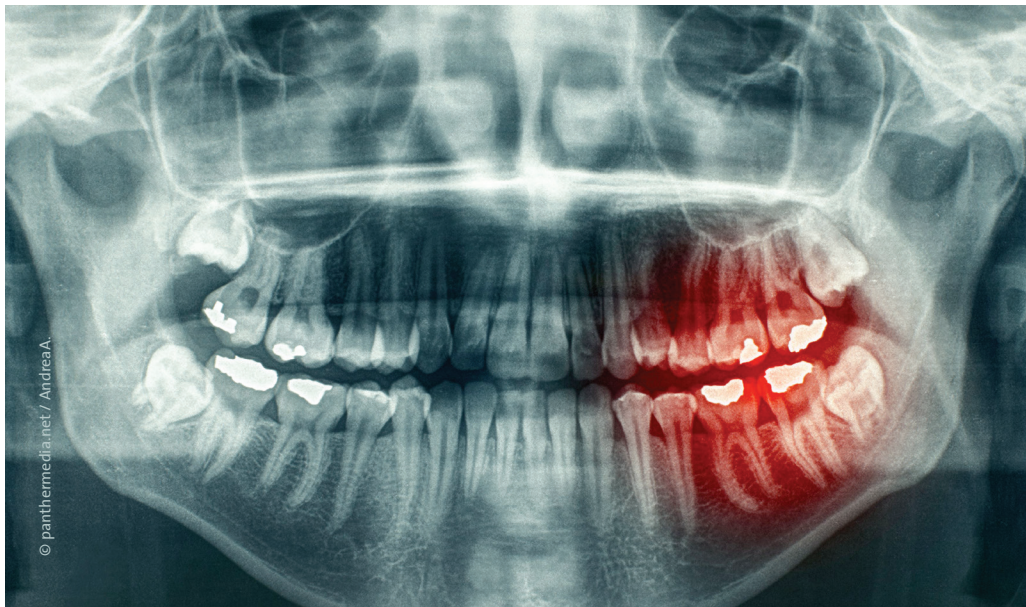
61118 Bad Vilbel

Phone: +49 (0)6101 - 16 37

Fax: +49 (0)6101 - 127657

Email: peter.eiselt@ulbricht-dental.de

<http://www.ulbricht-dental.de>



When the roofer comes with a drone – roof inspection by quadcopter

The roofing company “Dachdeckermeister Otto Gruß” in Eichenzell is already in its fourth generation. In 2002, Holger Gruß was the fourth master roofer to take over the family business, where 18 people now work. But this traditional company is not old and dusty – it is continuously changing and tries to integrate new technologies and techniques in everyday processes. The owner is particularly taken with drones.

Using his quadcopter, the entrepreneur regularly flies over his customers’ roofs. Thanks to the installed high-resolution camera, he always gets high definition pictures of his surroundings in ultra HD (4K). This picture quality enables him to zoom in closely enough on the details when subsequently reviewing. Thus every corner of the roof can be captured without a problem. The usage of the drone makes it possible to carry out roof inspections that are difficult, and in part also dangerous, without any major problems – not to mention the time savings. Impassable roofs of church steeples or slippery slate roofs can thus be effortlessly inspected from the ground. Plus the customer receives a direct impression of the damage and, thanks to the live transmission, can directly discuss details with the master roofer. At the same time, the entrepreneur is able to conduct an extensive analysis of the damage on his computer at home and provide the customer with a custom-fit proposal for the repairs. Positive side effect for the customers – they receive aerial pictures of their property.

Based on the quadcopter roof pictures, master roofer Gruß clearly expanded his business model. In 2013 he founded his own agency: “Die Mediengarage” (The Media Garage). In addition to the above-mentioned aerial pictures, he also offers image trailers and 3D visualisations of work procedures. Among other things, the entrepreneur made it his goal to make work procedures in the skilled crafts sector more transparent for customers, starting specifically with the craft of roofing. He conceives and develops high-quality 3D films, which visualise step by step the main work steps that have to be carried out with the greatly differing tasks involved in steep roofs, flat roofs or terraces in a simple and understandable manner. In this way, customers get a better understanding of the services of traditional skilled crafts and it also helps them to understand bids or invoices more easily. This type of visualisation of work procedures using 3D videos is also being planned for additional crafts for the future.



Dachdeckermeister Otto Gruß

Mr Gruß

Fasaneriestraße 17-19

36124 Eichenzell

Phone: +49 (0)6659-1659

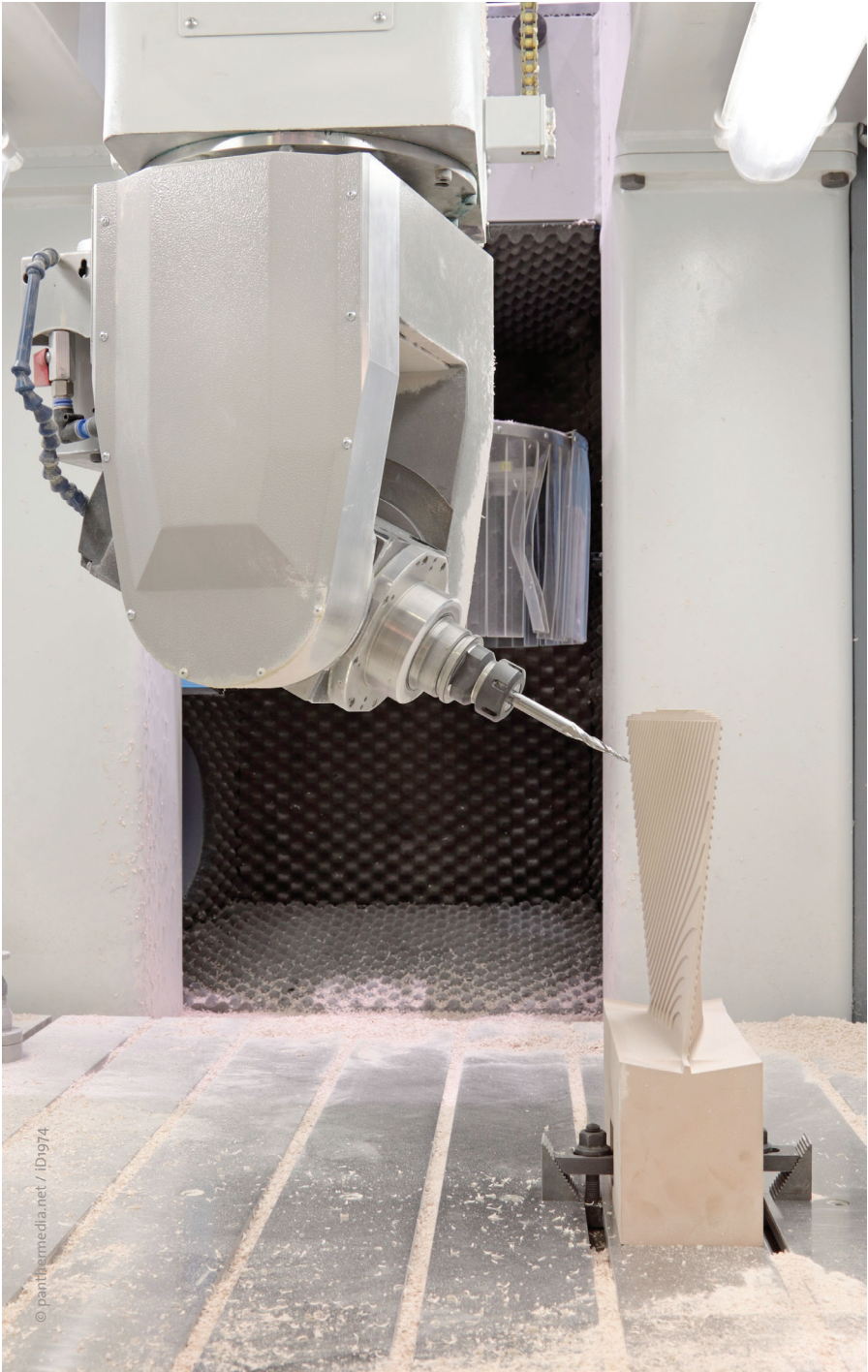
Fax: +49 (0)6659-1639

Email: info@dachdecker-gruss.de

<http://www.dachdecker-gruss.de/>

<http://www.die-mediengarage.de/>





Using the most modern technologies to create new furniture

The company Heinrich Kramwinkel GmbH has been around since 1957. After taking over his father-in-law's carpentry business, Heinrich Kramwinkel established a classic joinery workshop. Typical for the times, the carpentry business produced windows, doors and interiors. The range of production changed as early as the 1970s, when they removed the production of windows from their programme, and instead increased industrial supply and the furnishing of properties.

The company grew again with a move to the newly built production facility in the 1980s. In the meantime, the company H. Kramwinkel GmbH employs 40 people, working in sales, production, assembly and management. Today the company is built on solid production using craftsmanship, but equipped with the most modern technologies.

In order to be able to ensure high-quality implementation of its customers' wishes, the company relies on manifold digital solutions. The foundation is based on equipping machines with the most progressive technologies (horizontal panel-sizing saw, edge processing, CNC area machining). Surface refinement takes place in a separate, dedicated department. Paints can be sprayed or poured here to ensure an even surface finish.

Based on the customer's wishes, first a two- or three-dimensional digital drawing of the piece of furniture is created at the company. A parts list is generated from the drawing in a fully automated manner. The cutting data is then transmitted to the automatic panel storage department. Here the materials needed are delivered directly to the machines. Supervision of production takes place using online tools the company developed, ensuring consistently high product quality.

During the further processing, the working time is directly registered via barcodes. They are automatically transmitted to the industry software, and contain all relevant customer data, so that all information is available from the entry of the order to the final invoicing. The software additionally enables a real-time overview of all production times.

The company wants to continuously develop in the area of digitization. Among other things, specific job-related registration of the work times of the assemblers via tablet

and mobile phone when on-the-go is planned. Moreover, it should become possible to develop CNC production programmes from the 3D drawings. The 3D planning software is also to be made available to associates in the field without their own production department. In this way, associates without the corresponding machines can also offer their products at a reasonable price, since the production time is all that arises in terms of their own planning.



H. Kramwinkel GmbH
Mr Kramwinkel
Industriestrasse 16
63165 Mühlheim am Main
Phone: +49 (0)6108 90 440
Fax: +49 (0)6108 90 4420
Email: info@kramwinkel.de
<http://www.kramwinkel.de>



The small family company turns into a successful digital service provider in building technology

What started 50 years ago with the founding of a small specialised electrical shop by Walter Lück in Lich has become one of the largest skilled crafts enterprises in Germany in the area of complete building technology. The company was consistently expanded by sons Udo and Ingo Lück in the 1990s, and the Lück Group now employs over 900 people in twelve locations in six German states. Its core business is the implementation of complete, innovative building technology solutions in eleven areas, including classic electrical engineering, safety engineering, switchboard construction, industrial services, renewable energies, ventilation and air conditioning, heating and sanitary engineering, facility management, planning, IT and communications systems, and HR services. In each area, the LÜCK Group attaches importance to a philosophy directed towards people, and advertises using the slogan: 'Alles bestens. LÜCK gehabt' ('Everything's fine, you had Lück/luck').



The company has been intensively involved with the incipient digitization. On the one side, there is the optimisation and simplification of process procedures at the company, and on the other side an expansion of the services offered to customers. For example, both document and resource management systems and enterprise resource planning systems (ERP systems) are in use. These programmes combine business processes such as procurement, production, sales, HR and accounting and finance with one another via a common database at the company. Something that particularly stands out is manpower planning. The employees have access to their individual work plans in all warehouses via touchpads.

Moreover, at present the company is working on the further development of a system created there, with the first tests having already been successfully completed. In the future, the classic handwritten timesheet is to be done away with. The employees can directly register their work times via mobile phone and tablet, and allocate them to individual customer orders and thus work orders, which are now already issued electronically. In addition to saving time, this also leads to simplified calculation of labour costs as part of personnel management.

In recent years, particularly the area of information technology and communications systems has grown steadily, and its significance for the company has continued to increase. This ranges from network solutions and IT security to custom-fit, individual IT solutions for customers. Customers are sensitised with targeted information events on the topic of IT security and ultimately also professionally advised in how to remedy weak points.

The company also fully banks on digitization in the area of skilled labour recruitment. Thanks to its Facebook page, young professionals become aware of the Lück Group. More and more young trainees are being recruited by the company using this information channel.



LÜCK Gebäudetechnik GmbH
Mr Habermehl
Blumenstraße 28
35423 Lich
Phone: +49 (0)6404 9135-981
Fax: +49 (0)6404 9135-989
Email: andreas.habermehl@lueck-gruppe.de
<http://www.lueck-gruppe.de>



Change within the companies – How can companies be supported in digitization?

Mittelstands-Technologiezentrum 4.0 (SME Technology Centre 4.0) – consulting for SMEs

The Federal Ministry for Economic Affairs and Energy (BMWi) has started a new sponsoring initiative with the theme “SMEs 4.0 – Digital Production and Work Processes” (MiT 4.0). The new initiative is meant to help SME and skilled crafts companies increase their competitiveness and open up new business opportunities in the context of digitization and Industry 4.0.

The Fraunhofer-Institutes, the Chamber of Industry and Commerce Darmstadt and the Chamber of Skilled Crafts Frankfurt-Rhein-Main have come together to form a consortium under the direction of the TU Darmstadt. Together with other multipliers (including associations, unions and registered societies, among others) the SME Technology Centre in Darmstadt is being put into action by these groups.

The superordinate goal of the SME Technology Centre 4.0 is to increase the competitiveness of SMEs. Small and medium-sized enterprises are to be supported in recognizing the opportunities provided by digitization and interconnectedness, and individually implementing the related concepts in their companies. Ultimately the SMEs should be put in the position to more efficiently design their own value added processes and increase the customer benefit, in order to open up new market chances. The Technology Centre focuses on five central areas of action here: efficient value added processes, Work 4.0, IT security, new business models and energy management.

Under the umbrella of MiT 4.0, an offer was put together that is suitable for the target group in the region. In the five areas of action mentioned, a programme is to be offered that covers the needs of and adds to the capabilities of SMEs. In every area of action, this includes the sensitisation via demonstrators and successfully implemented practical solutions, continuing education events in learning factories and

training centres of the consortium partners. Moreover, at present eight implementation projects are planned in selected individual companies. The close connection to the Chamber of Industry and Commerce Darmstadt and the Chamber of Skilled Crafts Frankfurt-Rhein-Main additionally ensures that there is direct contact to the SMEs and that there is customized support in the implementation of digitization strategies. The companies' direct experiences, moreover, contribute to practical scientific research.

Furthermore, the Chamber of Skilled Crafts Frankfurt-Rhein-Main attaches great importance to experiences from the SME Technology Centre 4.0 being directly incorporated in the content of skilled crafts training and continuing education. Digitization is thus integrated into training content for selected occupations in the skilled crafts training centres (Frankfurt, Weiterstadt, Bensheim) and the digitization in the region multiplied in this manner. The necessary digital competence is then taught as part of training and continuing education. Further, demonstrators will also be installed in the education centres on an adapted level with technical, organisational and operational digitization solutions and the facilities thus developed into satellite application centres for the skilled crafts sector to see.

The SME Technology Centre 4.0 is presently being put into action by the consortium partners. The project is supported by funding from the BMWi.

To inform and sensitise – showing the opportunities of digitization

Hessen's skilled crafts enterprises are already extensively making use of the opportunities of digitization. However, the diverse application possibilities are not clear to many enterprises. They are frequently missing concrete examples or ideas to be able to make digital solutions useful for their own company as well. To reveal a concrete idea of the digital application possibilities to skilled crafts companies, the Chamber of Skilled Crafts Frankfurt-Rhein-Main is utilising targeted information events on the topics surrounding digitization.

The spectrum of events is just as varied as the skilled crafts sector itself and attempts to cover all of the facets of digitization as broadly as possible. The goal of the series of events is to inform and also generally sensitise about digital processes. The topic

of digitization is also constantly being debated on the political side. For example, the next Demografiekongress (Demographic Congress) of the Frankfurt metropolis region in April 2016 will have as its theme “Demographics and Digitization”. The skilled crafts sector will play a part here as well on behalf of the member companies.

In the following, a small selection of corresponding events has been selected to serve as examples.

- **Event: Online Cooperations in Skilled Crafts – How to more efficiently structure your work with other companies**

The experts of the eBusiness-Lotsen Darmstadt-Dieburg present individual online tools which can facilitate and improve the cooperation between architects, engineers and other skilled craft trades providing services.

- **Consulting day: It doesn't work without a website – How user-friendly, modern and in compliance with the law is your website?**

As part of a consulting day, the eBusiness-Lotsen offer skilled crafts enterprises a free analysis and advice on company websites at regular intervals. Skilled crafts enterprises have the possibility to adapt their websites even more towards their customers' needs and increase their recognition factor on the internet.

- **Event: Modern Business Correspondence**

The goal of the event is to optimise and simplify business correspondence by using new means of communication.

- **Event: XING for Skilled Crafts**

No matter whether it is to win over customers or exchange experiences with business partners, social media are becoming more and more important for people working in the skilled crafts sector. The objective of the event is to explain the fundamentals of the professional network XING to companies.

■ **Event: Data Security and Data Protection & Privacy in Skilled Crafts**

Experts explain potential mistakes in data security, data privacy and data protection in companies. In doing so, they shed light on civil and criminal law consequences for management and show the legal demands and regulations.

■ **Event: Social Media in Skilled Crafts with Volker Geyer**

Master painter Volker Geyer talks about how he substantially expanded his client base with targeted usage of his website, blog and social media channels. Month after month over 100,000 people visit his website. In the meantime, 67% of his company's total sales come from digital advertising.

Publisher:
Handwerkskammer Frankfurt-Rhein-Main
Representation to the European Union
Florian Schöll
21, Rue Montoyer
1000 Brüssel
Phone: +32 (2) 74 21 906
Email: schoell@hwk-rhein-main.de
www.hwk-rhein-main.de

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