

August 2010

Seeking an alternative approach? Dürr has much to offer – not only in terms of environmental protection and sustainability but also as far as flexibility, faster process times and new production concepts are concerned.

Examples of all of these can be found in this issue of Dürr News, such as *FASTplant®* –originally developed for vehicle final assembly – now being utilized for aircraft assembly, car body plasma activation instead of manual sanding operations on production repair lines or SnapPlanner that makes complex planning projects so much simpler.

We hope you will enjoy reading this issue.

Dürr News Editorial Team

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Green Paintshop – Resource conserving paint processes and reduced costs

Resource conserving production plant makes a significant contribution to environmental protection while simultaneously cutting costs. This is why for many years Dürr has developed sustainable solutions for paint systems: integrating the results of the most recent research into the Green Paintshop to set new standards – whether in the form of savings in energy, water and material or in reducing waste and emissions.

The Green Paintshop is a modular concept allowing Dürr to tweak and tune all environmentally relevant aspects of the painting process: revised layouts with small plant cross-sections reduce space requirements and also cut energy consumption. Savings can be made in the materials used during pretreatment and electrocoating processes by utilizing smaller tanks or in paint application by improving transfer performance with efficient atomizers. A separation of paint particles that, contrary to traditional wet separation, saves energy by not requiring water or coagulation chemicals, also means less effluent water and material waste. Effective exhaust air purification systems reduce CO₂ and VOC emissions.

These and many other lines of approach are offered by the Green Paintshop, with its wide range of solutions. Depending on the process involved, it is possible by finding an optimum layout concept and combining it with energy and consumption optimized systems to save more than 40% of the energy required for the complete paint shop. In addition to improvements in layout and design - of continuous ovens and heat wheels, for example - it is Dürr's innovations that stand out as scorers of top marks for resource conservation: *EcoDryScrubber* for a real dry paint separation, the *EcoBell3* atomizer or the *EcoLCC* color changer to name but a few. In addition well-established systems, like the *RoDip* painting process, also bring energy savings of up to 35% to pretreatment and EC processes.

The first step towards energy optimization takes the form

of a plant evaluation to assess what resources are consumed where and what potential exists for reducing consumption. This is aided by optimized energy management using Dürr's *EcoEMOS* Energy software module to identify and control all energy usage points and thus to assist in utilizing energy more efficiently. With its Green Paintshop Dürr is targetting with a truly green approach, placing sustainability and ecological compatibility right at the core of its development activities. The Green Paintshop stands for our commitment to sustainability.

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Dürr has sufficient capacity – An interview with Dirk Gorges

Dirk Gorges is Head of Sales and Marketing at Dürr's largest business unit - responsible for the building of paint and final assembly systems. We talked to him about the current market situation.

Mr Gorges, since mid 2009 Dürr in China has received several major orders for new paint shops. What do you think has led to this high order intake?

The automotive industry in China is booming. In 2009 production of light vehicles rose by almost 50% and in the first quarter of 2010 passenger car sales increased by 77%. Against this background OEMs are investing in additional capacities in order to meet increased demand and either to win additional or at least to defend their current market shares. The fact that we are able to profit so much from this capacity expansion is primarily down to our strong presence in China: we employ almost 600 people ourselves in China and a great many agency workers as well. Some of our competitors do not have a workforce of this size even globally. This volume of manpower is also an important factor in taking advantage of the benefits in cost and time offered by the Chinese sourcing and procurement market.

In view of so many projects in China are you not approaching your own capacity limits?

By no means. Dürr has sufficient capacity to safely handle even more projects, whether these are in China or elsewhere. We have shown often enough in the past that, even when several orders are being handled at the same time, we are still able to deliver on time and on budget.

How will you cope with the large volume of orders, particularly in China?

We have continued to extend our capacity in China on an anti-cyclic basis, i.e. during 2008 and 2009 too. We shall abide by this course. In addition, our method of operation is very much that of an international Group network: our colleagues in China build a local 'bridgehead' which is backed up by a strong project organization team of colleagues from other Dürr Group companies. Dürr in Germany primarily makes a significant contribution here.

In view of geographical distance, time differences, etc, how does this work in practice?

We have a globally uniform IT landscape, one in which we have invested heavily in recent years – to the tune of around 15 million euros. So we are fully integrated, whether with regard to ERP and CAD or PIM, the project management software, which we developed ourselves. This means problem-free communication and job packet data exchange.

IT isn't everything...

But it is a great deal. And looking beyond it, our whole organization is geared to handling international projects. For paint shop builds alone, we are able to draw on an engineering network of around 550 engineers based at different competence centers – in Germany and the USA or in China, Brazil, India and Mexico to name but a few. As a result we are able to work on any project for 24 hours a day. Dürr is not just a collection of individual nationally established companies, it is a homogenous Group organization.

In view of the tasks you face in China, are you not in danger of neglecting other matters - those relating to product development for instance?

On the contrary. Even in the difficult year of 2009, when costs were cut dramatically, we still increased our R&D budget slightly. As a result we were able, just a few weeks ago, to launch a milestone innovation like the EcoBell3 atomizer. Dürr innovations are always aimed at cutting production costs for our customers. That's why a dry separation system like the EcoDryScrubber is so successful. In the meantime the EcoDryScrubber has been put into operation on 25 paint lines.

In China too?

In China too.

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Goodbye to sanding – An alternative, fully automatic process with plasma activation

Even when the very best technology is utilized in vehicle painting finishing, it is impossible to avoid a certain quota of reject bodies. Until now the repair of such bodies has meant an extensive process, the central element of which entails first the sanding of defective areas followed by sanding of the body as a whole. With plasma activation Dürr is now able to offer, as an alternative, a time-saving and better quality solution.

When a simple "spot repair" is inappropriate, a full repair job is called for. Usually, after sanding of the defective areas, an intricate process follows, whereby the paint is sanded down manually, before a new paint finish can be applied. The sanding operation is extremely time consuming and, because it is carried out manually, fluctuating in quality. Where the geometry of the body is complex, it is not always possible to sand down all areas satisfactorily and points that are sanded down too far have to be built up again with primer. The dust produced during sanding also affects quality.

One solution is plasma activation. Here, the surface is treated in such a way that it can be painted without the need for overall sanding. A system of this kind has been built by Dürr Services & Solutions for an auto manufacturer in Southern Germany. The body is connected to an electrical oscillator in a vacuum chamber. Activation of the body surface is achieved via oxygen plasma. After air evacuation process gas is led into the chamber, then the plasma is ignited via a high frequency generator. The alternating current flowing through the body generates oscillating magnetic fields that stimulate the plasma. As a result polar ester groups are formed on the surface in the primer paint. They increase surface tension and improve cross-linking and bonding characteristics. The process takes around 90

seconds. The body is then returned to the spray booth for repainting.

This fully automatic process reduces the time required for repair sanding operations by approximately 70% so that the cycle time for the complete repair process is less than ten minutes. In addition, plasma activation leads to consistently good bonding results, reproducible paint adhesion and, through the elimination of sanding dust, to better quality.

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FASTplant® spreads its wings – Pulse production for aircraft assembly

In May 2009 Dürr's Aircraft and Technology Systems business unit was awarded a contract to supply two wing assembly lines by US aircraft company Lockheed Martin for its manufacturing facility in Fort Worth, Texas. These flexible lines are based on FASTplant®, the modular assembly system already well-established in the automotive industry, marking the first time it will be applied in the aircraft industry. Initial phase of production of the system successfully started in March of 2010.

Lockheed Martin is taking a pioneering approach in serial production of wing assembly and bringing fundamental change to current aircraft assembly concepts. With the 1.2 km (approximately 3,400 ft) long lines, including conveyor and handling equipment in 130 modules, utilizing FASTplant® in their Texas facility will eliminate the need for in-house cranes and enormous automatic guided vehicle systems to transport the wing structures.

Based on a pulse production, the wings on demand are transported via Dürr's Twin Trolley System through each of the individual assembly stations. This process allows an ergonomically optimized assembly and an efficient

high volume material flow. The modularity of FASTplant®, adaptability, low total cost of ownership and speed of installation proved decisive factors for Lockheed in choosing the Dürr technology. The FASTplant® system solution allows Lockheed Martin to transition from System Deployment and Demonstration to Full Rate Production of one wing per day. In addition, the system can be easily extended simply by adding further modules or more transport hangers.

In executing this project Dürr brought into play the advantages of its global network of design and supply resources. Upon completion of the engineering phases and a successful test cell demonstration at Dürr's Auburn Hills (US) facility, the FASTplant® system was installed and commissioned ahead of schedule. The efficiency of the modular system was realized when the first tooling gauge was successfully loaded on to the line, three days before the scheduled start of system check out.

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Dürr gluing technology – Competence in all aspects of automobile production

During the first six months of 2010, two companies, Kleinmichel and Rickert, both specialists in gluing technology, were taken over by Dürr. In addition to its own competence in this field, Dürr is now able to offer a spectrum of cutting edge products covering all gluing technology applications in the field of automobile manufacture

In the automotive industry a great deal of future potential is seen for gluing technology: gluing can, for example, reduce the volume of spot welding required, it is advantageous from a cost point of view and also increases body rigidity. In addition it makes the utilization

of new materials possible and allows greater design freedom. Against this background, the two new acquisitions provide coverage in a variety of fields: the purchase of Kleinmichel strengthens competencies in all aspects of gluing in final assembly, while Rickert concentrates on gluing technology applications for body-in-white production. Previously Rickert and Kleinmichel were mainly active in Germany, now Dürr is making the products and services of both companies available internationally - through Dürr's global sales and service network, with which it is possible to provide optimum customer service with rapid response times on all automotive markets.

In connection with this intensified involvement in gluing technology, this spring Dürr arranged a forum for experts on the topic of "Gluing Technology in Automobile Production". Production planners and specialist buyers from leading European automobile manufacturing companies together with representatives from research institutes and adhesive manufacturers discussed current aims, trends and strategies in gluing technology. In focus were not only the utilization of composite materials such as carbon fibers and plastics but also the technological challenges for plant systems arising from new vehicle concepts in the e-mobility field and from new adhesives. From surface pretreatment right through to quality auditing, Dürr's innovative solutions enable continuous improvements to be made to the joining process in terms of time optimization, quality improvement and resource conservation. Alongside other systems, a fully automatic gluing cell for glass panels was demonstrated at the Dürr Technology Center. High precision – whether in the accuracy of movement reproduction, in handling or in the exactitude of adhesive dosing – characterizes these systems, as does their freedom of programmability throughout.

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EcoCEnergy – A quick analysis for lasting low energy costs

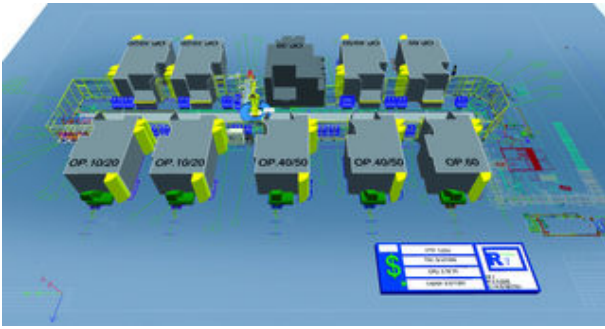
Dürr *Ecoclean* is a global supplier of innovative, standard and customized cleaning systems for many different branches of industry. With its *EcoCEnergy* service Dürr *Ecoclean* is now offering a comprehensive system check to identify savings potential for production cleaning systems so that unit costs can be minimized. In this way energy costs can be cut by between 20 and 35%.

EcoCEnergy optimizes the energy balance sheet for cleaning systems. The service offered represents a detailed assessment of performance under production conditions, operating at full and part capacity as well as on standby. In addition the Dürr *Ecoclean* experts look at the complete cleaning process, cycle times, heating and cooling systems as well as cleaning system machine insulation. The assessment is taken through to equipment sub-assembly level and includes, for example, analysis of high pressure and booster pumps, side channel blowers and individual stations. The system check builds up a comprehensive overview of the current energy efficiency status of the system, including CO2 emission values. This information is utilized to draw up a detailed catalogue of measures, with which a previously identified savings potential level can be tapped. Frequently, it is possible to lower energy consumption significantly by optimizing software, retro-fitting energy saving components or improving processes. Needless to say the system check does not interfere with ongoing production nor does implementation of the recommended measures affect the cleaning process.

One example of how *EcoCEnergy* can lead to significant savings is the analysis of a high pressure camshaft de-burring system operated by a customer in Germany. The analysis identified potential savings of 34%; after implementation of the proposed catalogue of measures, the actual energy savings made amounted to 35%. Mostly such high levels can only be attained for high pressure cleaning systems with high capacity utilization. Average savings, however, are still impressive. Based on a system with energy consumption costs of 130,000 euros per year, if appropriate measures are taken, energy savings of 20% can be achieved in the three levels of capacity utilization operation. So, here too, the system check pays for itself in a very short time.

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System planning with SnapPlanner – Flexibility in times of shorter life cycles

Dürr Ecoclean plans and builds cleaning, filtration and automation systems as well as assembly and test systems for the automotive and automotive supply industries. In the planning of these systems a very versatile software tool is utilized – SnapPlanner.

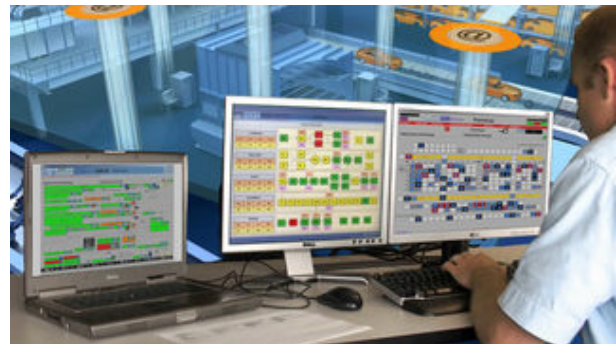
Hardly any other field in automobile manufacture demonstrates such speed of innovation as engine and transmission development. As a result production lines also need to be quickly adaptable to suit new products. This is where Dürr Ecoclean’s planning software tool, SnapPlanner, helps. SnapPlanner is utilized in the planning of complex production lines and is based on Dürr Ecoclean’s many years of experience in cleaning, filtration and automation technology. With this tool, project specific requirements can always be included and defined as a basis for solution proposals: “Key Performance Indicators (KPIs)” can be, for example, the production shop space required and the costs related to it, or unit cost targets or the re-fitting/retro-fitting and/or adaptability requirements of a system. The SnapPlanner makes it possible to identify any interface problems, which might arise in later production operation, and to eliminate them: the tool visualizes in advance all imaginable scenarios and their consequences. Changes to the system can also be made visible on the monitor screen, as can their influence on the project budget, process duration, necessary production equipment and materials and other parameters. The maximum degree of information and transparency is thus available as a basis for investment decisions.

One of the first customers to take up the opportunity of utilizing the flexibility of planning with SnapPlanner in the development of plans for new production locations was Cummins, the world’s largest, independent diesel engine manufacturer. Cummins already began working with Dürr Ecoclean on a variety of projects in 1999. In 2007 Dürr Ecoclean received the order for integration of all cleaning and filtration lines, as well as the associated CNC machines, at the LDD engine factory at Columbus, Indiana (USA). In the same year ZAO Cummins KAMAZ, Cummins JV with Kamaz in Russia, also opted to work with Dürr. The building of a new, highly automated and flexible engine production factory at Jamestown, New York, the most extensive project to date, was completed just a few weeks ago.

With the help of SnapPlanner and the expertise of the Dürr Ecoclean project team it was possible to prepare the best solution for Cummins: flexible production lines, for which requirements for energy efficiency and carbon footprints, as well as in relation to local conditions and unit costs were already taken into account during their planning.

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Improved supervisory control software: EcoEMOS update

The market success of Dürr’s *EcoEMOS* software products has led to the release of a number of updates. *EcoEMOS* production control has now been introduced in Version 8.8.0 offering additional advantages in implementation and operational use.

The Manufacturing Execution System *EcoEMOS* provides the link between the control level of production and business processes within a company. With Version 8.8.0, application has been further improved by including the new SQL server, 2008, for data integration in *EcoEMOS*. In addition, the new version makes coordination/validation coordination possible with other installed MS SQL databases. The new release includes all updates since 2008 and simplifies harmonized user log-ins for “single sign-on” administration, language changes and access to all system modules. Security has been increased throughout the system by adding encryption of passwords.

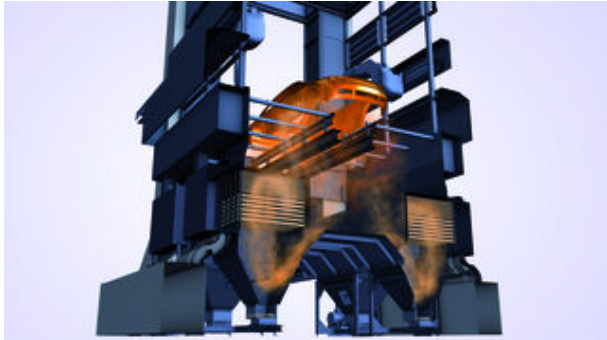
Several new functions have been integrated as standard features in *EcoEMOS* 8.8.0. With immediate effect, “visual management”, for example, and “product tracing” are available with the basic version and are integrated in update administration. *EcoEMOS* 8.8.0 can already be installed on Windows 7 and can be run fully on Windows Server 2008.

Since the beginning of 2010, *EcoEMOS* 8.8.0 has been integrated into all current Dürr software projects. As a result process visualization and production control within

the industrial environment have become simpler than ever.

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Dry separation is in demand: EcoDryScrubber for Nissan in China

Dürr is the general contractor in building a new paint shop for bumpers at the Nissan, Huadu facility in southern China. The contract awarded by Dong Feng Nissan is a further demonstration of Dürr's well established position in the Chinese market and is, in fact, the second bumper paint line for Dürr at that location.

Dürr is responsible for the planning through the installation and commissioning for this line. The highlight is the *EcoDryScrubber*, the new system for dry separation of wet paint overspray. This is already the 25th application of the *EcoDryScrubber*. The dry separation system from Dürr has already come into operation in 12 paint shops on four continents. Nissan is also convinced of the benefits of this simple and robust technology in terms of its energy efficiency, cost savings and environmental friendliness. In Huadu, twelve Dürr type *EcoRP L033* painting robots provide paint application in three zones: primer, base coat and clear coat. The paint spraying is done with the *EcoBell2 HX* rotation atomizer.

Nissan is minimizing its ecological footprint with exhaust air purification from Dürr. The regenerative thermal oxidation (RTO) used here is characterized by superior clean gas values with minimal use of primary energy and low operating costs. Nissan awarded this third painting line for bumpers in Huadu to Dürr based on good experiences with the second line. The line is designed for a production volume of 240,000 sets of bumpers per year. The plant should start operations in October 2011. With this expansion of its manufacturing Nissan is accommodating the Chinese market's growing demand.

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In brief

- Dürr celebrates 20 years in Poland
- AchemAsia 2010 – Dürr systems for optimum emission control
- Fourth award for *EcoDryScrubber*

Dürr celebrates 20 years in Poland

On June 19, 2010 Dürr celebrated its 20th anniversary in Poland. Starting as a small team of 10 people in 1990, this subsidiary has developed into a successful production work shop and engineering center with 116 employees today. Located at Radóm, near Warsaw, Dürr Poland designs, manufactures and supplies conveyor systems for projects all over the world – in the automotive industry and also in other vital industries such as aircraft production. The jubilee was celebrated by employees and business partners as well as representatives of local authorities. With very satisfactory capacity utilization levels, Dürr Poland can face the challenges of the next few years with confidence.

AchemAsia 2010 – Dürr systems for optimum emission control

In June 2010, Dürr's Environmental and Energy Systems business unit (EES) took part in the 8th AchemAsia in Shanghai. This international congress on Chemical Engineering and Biotechnology takes place every three years. On this occasion more than 400 exhibitors came to the China National Convention Centre to present the latest technologies and products. As a leading supplier of air pollution control technology, EES took the opportunity to present its wide range of state-of-the-art technologies for exhaust air and waste gas purification.

Fourth award for EcoDryScrubber

In April, *EcoDryScrubber* received the prestigious 2010 Automotive News PACE Award in the "Manufacturing Process and Capital Equipment" category. The accolades for Dürr's game-changing technology continue as the *EcoDryScrubber* was selected from among the PACE Award winners to receive an additional award, the 2010 Automotive News PACE Environmental Award. This award honors innovations that contribute to environmental sustainability and/or solve environmental problems.

The jury gave the following reasons for their decision, "One of the key benefits of the *EcoDryScrubber* is that because of its extremely efficient filtration capability, up to 95 percent of paint booth process air is recirculated. By re-circulating air, energy consumption in the paint spray booth is reduced by 60 percent and in the entire

paint shop by 30 percent. The paint spray absorptive agent is inexpensive, powdered limestone, which is recycled after use as a commodity in other industries such as cement making."

EcoDryScrubber, first introduced at the end of 2008, has now received four awards. It was selected earlier for the SURCAR Innovation Award 2009 and the German State of Baden-Württemberg's 2009 Environmental Technology Prize.

Personalisation

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Dürr is a mechanical and plant engineering group that holds leading positions in the world market in its areas of operation. It generates a good 80% of its sales in business with the automotive industry. It furthermore supplies the aircraft, machinery, chemical, and pharmaceutical industries with innovative production and environmental technology. The Dürr Group operates in the market with two divisions. The Paint and Assembly Systems division supplies production and painting technology, especially for car bodies. Machinery and systems from the Measuring and Process Systems division are used in engine and transmission manufacturing and in final vehicle assembly, among other areas. Dürr has 48 business locations in 21 countries worldwide. The Group achieved sales of € 1.1 billion with approximately 5,700 employees in 2009.

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