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The Dürr Group is one of the world's leading suppliers of products, systems, and services for automobile manufacturing. Its range of products and services covers important stages of vehicle production. As a systems supplier, Dürr plans and builds complete paint shops and final assembly facilities. Dürr also delivers cleaning and filtration systems for the manufacture of engine and transmission components as well as diagnostic and balancing systems for vehicle components. Around 90% of Group sales relate to business with automobile manufacturers and their suppliers. The machinery, chemical, pharmaceutical, coating and aviation industries are also major customers of Dürr.



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1. Advantage powder technology - maintenance expenditure reduced, capacity reserves increased

Truck manufacturer Scania has introduced Dürr *EcoBell2* Powder high speed rotating atomizers at its Oskarshamn facility in Sweden. The results of this move have proven so convincing that more re-equipment measures are now imminent.

At Oskarshamn Scania produces truck cabs made of galvanized steel sheet. This material provides high corrosion resistance and thus makes it possible to eliminate the cathodic dip painting stage usually included for steel. After pre-treatment, a specially developed powder primer is applied as a first paint coat, one that also provides effective stone chip protection. Due to their high susceptibility to failure, the components previously used for powder supply and application caused extensive maintenance work and had a negative influence on productivity.

As a result, Scania decided at the end of 2004 to carry out coating trials at Dürr's Bietigheim-Bissingen Test Center using the latest generation of Dürr high speed rotating atomizers and powder supply systems. The target was to identify reliable components for powder supply and application and to integrate these step by step into the existing installation. The trials were successful and the existing six atomizers on a roof machine were replaced by Dürr *EcoBell2* Powder high speed rotating



Test Center trials at Bietigheim-Bissingen, Germany

atomizers early in 2005. The main needle valve ensures loss-free connection and disconnection of powder flow at the beginning of the application, for instance, in the window area or when the roof machine changes orientation. This also relieves the strain the recycling circuit. *EcoPump* Powder 0.3 and 3.0 DDF (digital dense flow) pumps were installed for powder paint application and supply.

After 2 years of production operation, the introduction of the new equipment is considered a complete success: Today, despite processing strongly abrasive powder paint, the application pumps need preventive maintenance only once every 5 months. Prior to conversion maintenance had to be carried out on a weekly basis. Currently, the pumps operate at approx. 65% of their maximum performance, so there is sufficient reserve capacity to handle increases in supply volume.

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New steps in the conversion project are imminent. There are plans to replace the guns on three robots with high speed rotation atomizers and to convert the powder supply pumps. The robots in question are responsible for painting parts of the interior and of the underbody, the door cut ins and the back wall of the cab. The trials relating to painting of these areas indicated potential material savings, in comparison with current production figures, of 40-50 %.

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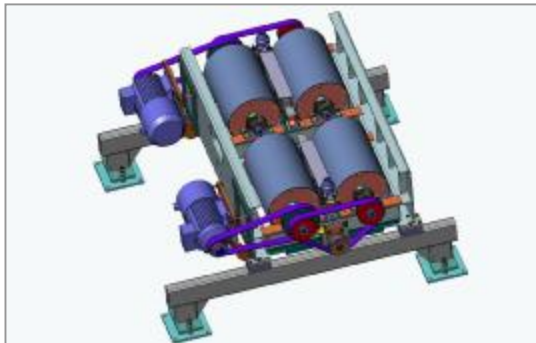
2. CKD Testing Technology – serial production quality for market entry manufacturing

Dürr Assembly Products has launched a new product – x-road-sa – that has been designed especially to meet the needs of CKD plants. This single axle test bed combines high quality testing, a space saving footprint and easy expandability.

CKD, or Completely Knocked Down vehicles, are shipped by vehicle manufacturers to CKD assembly plants where the vehicles are then reassembled. These CKD plants are often located in new markets, where the manufacturers wish to demonstrate an early presence and to introduce production of models for these growth markets quickly, whilst at the same time minimizing their investment.

The plants must be designed to produce to the same high quality standards and to offer the flexibility necessary for easy adaptation later to higher production capacities.

Dürr Assembly Products has developed its single axle x-road-sa multi-function roll test stand especially for such CKD plants. It can be used to carry out a series of checks on the proper function of drive systems, brakes and ABS/ESP sensors on each axle, in turn. This saves space while retaining the same level of quality. As in the case of the two axle x-road machine, brake force can be measured statically at a constant low speed or dynamically at higher speeds. The accuracy of these measurements meets the stringent requirements of China's statutory regulations. Measurement values can also be certified with x-cal, our approved calibration unit for roller test beds.



x-road-sa was developed for the special needs of CKD production facilities; photo (top) and drawing (bottom) of x-road-sa.

x-road-sa is equipped with the latest frequency converter technology and it can be upgraded later to a fully fledged two axle x-road machine. This ensures flexibility to handle future capacity increases, a major advantage because CKD plants are often pioneer ventures that then develop into mass production facilities.

Dürr Assembly Products has already won several orders for this market entry facility testing technology.

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3. Real all-rounders – RTO plants for low emission furniture production

Air pollution control through regenerative thermal oxidation (RTO) is highly efficient and suitable for almost all branches of industry. An *Ecopure*® RTO plant has been in operation at furniture manufacturer Interlübke's Rheda-Wiedenbrück factory since March 2007.

With the new equipment Interlübke is assured not only of compliance with the statutory emission limits for volatile hydrocarbons, as defined in the 31st German VOC Directive (Bundes-Immissionsschutzverordnung or BImSchV), but also of efficient use of the heating energy generated.

Dürr supplied the RTO plant, complete with fan and pure gas exhaust stack and designed for the purification of a potential exhaust air volume of up to 110,000 Nm³/hr, as well as state of the art energy saving equipment. At Interlübke the concentration of 0.7 g/Nm³ of pollutant gases on entry to the RTO plant is comparatively low so additional fuel is needed to ensure an optimal combustion process.

The shortfall in energy supply is made up partly with natural gas fed direct into the exhaust air stream and partly by incorporating a multi-fuel burner capable of handling both liquid and gas fuels. The liquid solvents used in painting and cleaning processes at the German Rheda-Wiedenbrück factory are collected after use, distilled and then injected via atomizers straight



Ecopure® RTO-Anlage at Interlübke in Rheda-Wiedenbrück, Germany.

into the RTO's combustion chamber thus also providing energy for the incineration process. This reduces consumption of primary gas fuel whilst, at the same time, taking care of the disposal of liquid waste, for which charges are usually made. As a further energy saving measure both of the RTO's gas burners are switched off once operating temperature has been reached and the need to heat up the air required for stoichiometrical combustion is eliminated. Electrical energy is saved by running the combustion fan at slower speed.

The plant at Interlübke is an example demonstrating that operating costs can be reduced by approx. 10% through intelligent energy management and the use of available resources – in this case liquid solvents. It also shows that even when, as for instance in the furniture manufacturing industry, low solvent coating systems are in use, the RTO process remains an effective and attractively priced method of air pollution control.

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4. Saving energy through modernization – IVECO at Brescia, Italy

Dürr's Italian Group company Olpidürr partnered IVECO, one of the world's leading truck manufacturers, in examining possibilities to reduce energy needs for all IVECO plants. Their joint study identified significant savings potential on the top coat line at the Brescia facility.

The revamp project focused on a spray booth that had been installed more than 10 years previously and its two robot assisted and two manual application zones. Due to improvements made in robotic application in recent years, IVECO were no longer using the two manual zones. These were however still being flushed with air at a downdraft velocity of 0.5 m/sec.

Revamping of the spray booth, in order to reduce the air volume in the two manual zones, was carried out by Olpidürr during the summer shutdown in 2006.

Just by reducing this volume to nil, savings were made of 30% of the operating costs for heating and cooling as well as all of the electrical power needed to operate the fans. Once the ducts and burner had been modified, valves and regulation instruments were also replaced.

Exactly in line with IVECO's production schedule the system was then successfully restarted under its



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IVECO's wallpaper shows the truck cabin of a commercial vehicle painted at the Brescia plant.

new operating conditions: total air supply volume had been reduced from 230,000 m³/hr to 160,000 m³/hr without affecting the high level of process and application quality. A new feature of the equipment is that three operating modes are now available: maximum flow, which equates to the previous 230,000 m³/hr, the energy saving modus supplying 160,000 m³/hr and a booth cleaning modus supplying 100,000 m³/hr of air.

IVECO's investment will pay for itself very quickly: Estimated savings represent a pay-back period of less than 20 months. With rising electricity and gas prices, savings potential will increase – making amortization time even faster.

IVECO commended the success of this modernization project by issuing a certificate citing Olpidürr as a qualified partner for energy saving activities.

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5. Cost effective final assembly – FAStplant® arrives in North America

In the wake of orders from Europe, India and Russia Dürr has now also sold the modular final assembly concept FAStplant® to North America. Recently Dürr Systems, Inc. of Plymouth, USA received an order for an assembly facility in this region.

After successful presentation of the FAStplant® concept to all levels of the customer's management, as well as discussions and visits to sites in Europe and the Americas the decision was taken in favor of FAStplant®. This choice was driven by recognition of the system's long term cost efficiency, an advantage demonstrated most clearly by the flexibility it offers to alter production capacities with little additional cost and effort. FAStplant® represents minimal downtime during plant modification phases.

The FAStplant® system purchased will be used for large volume production. It includes the low wear-and-tear, minimum maintenance Twin Trolley System® (TTS), Dürr 's patented conveyor system with the integral vertically adjusting carriers.

TTS combines the benefits of an overhead conveyor with those of a skilnet system - fixed positions in the workstations and fast travel between them. The fully automatic vertically adjusting carrier (VAC) adds to the high level of flexibility necessary for modern processes.



à Production of the R8 with FAStplant® at Audi in Neckarsulm, Germany.

It also eliminates the need for pits or platforms in the assembly area as the VAC adjusts automatically to the vehicle height defined to suit the job the operator has to carry out at each process workstation.

With this North American *FASTplant®* line it will also be possible to demonstrate to potential customers not only the operation of *FASTplant®* but also all the advantages the system offers in terms of flexibility and real project savings.

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6. Environmentally sound – compliments from Volvo Trucks for Dürr paint systems

“The world’s most up to date paint shop and one that satisfies all our requirements” is how Volvo Trucks describe the top coat line that Dürr has installed at the company’s Umeå facility in Sweden. The fully automatic paint shop features lower energy consumption and the use of environmentally compatible water-based paints.

Production on the 28 unit per hour top coat line supplied by Dürr started officially on May 9. The plant is arranged on three floors with air supply and exhaust air handling equipment and a filter system for solvent-based lines located on the fourth floor. The spray booths for a total of three lines – using one water-based line – form a closed loop system and this has a positive effect on the plant’s energy footprint. Energy consumption for the complete paint plant is reduced by recovering heating energy from all exhaust air streams using a loop of water/glycol media heat à



The new topcoat paint shop at Volvo Trucks in Umeå, Sweden, is an advanced and fully automated facility.

exchangers - in the climatic conditions prevailing in North Sweden this is proving to be an especially efficient and effective choice.

The energy saving, low temperature drying process applied throughout for the two-component, water-based paint is another outstanding feature of the plant. As a result of Volvo's co-operation with Dürr and paint supplier DuPont this paint line for Volvo FH series trucks represents the first time, worldwide, that this kind of drying process has been introduced for truck cabs. The drying temperature of 80° C makes it possible for plastic parts and metal components to be painted and dried together.

With the help of Dürr's state of the art systems Volvo Trucks can successfully apply its principles of commitment to quality, safety and the environment.

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7. 6th Dürr Open House in September – Innovations for more efficiency, quality and environmental compatibility in the painting process

At the company's 6th "Open House" commencing on September 21 Dürr Systems GmbH will introduce innovative technologies for the painting of vehicle bodies and plastic parts.

The presentation of Dürr's *EcoRP* second generation painting robot will be one of the highlights of the in-house exhibition at the Bietigheim-Bissingen site. Alongside a robot station for interior painting, Dürr will also show the *EcoRP* handling devices that complete the spectrum of products for fully automatic paint application.

Another innovative Application Technology product, which Dürr will introduce in September, is the new piston dosing system for direct charging of water based paints on the robot arm.

On the dryer technology side, Dürr will demonstrate developments in the field of ultraviolet clearcoat curing. Visitors will also have the opportunity to learn more about RoDip4, the latest generation of rotational dip-coating processes. A shuttle bus connection will operate between Bietigheim-Bissingen and Dürr's Stuttgart Zuffenhausen site, where a RoDip4 pilot plant has been set up.



Lectures and product presentations are core of the 'Open House'.

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Summarizing the aim of the Open House Dr. Hans Schumacher, Director of the Application Technology business unit at Dürr said, "Our customers will be presented with innovative solutions which are aligned to the core demands made on the modern painting process: more efficiency, quality and environmental compatibility. For this, we offer a mix of completely new products, developments and visions for the future."



PlasmaCure – demonstration of procedure for securing UV paints at the Open House 2005.

The Open House that Dürr hosts every two years will begin on September 21 with a symposium for factory, planning and paint shop managers. From September 24 to 28 guests will be invited to pay one-day visits to the in-house exhibition with lectures and product demonstrations.

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8. In brief

Successful market launch for x-3Dprofile

This new development has been very well received on the market: two auto manufacturers have already placed orders with Dürr Assembly Products for x-3Dprofile wheel geometry measurement – for new stands and for upgrade modifications.

New systems have been ordered by sports car manufacturer Aston Martin for the company's Gaydon (GB) facility and by Audi for Ingolstadt (Germany). Dürr Assembly Products will complete the modifications at Audi within a very short time frame – the upgraded stands will be ready for production at the end of the 2007 summer shutdown.



x-3Dprofile stands for higher efficiency in wheel geometry measurement.

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106,783 consecutive hours without a single incident

For this outstanding safety record during construction of a paint shop at General Motors Lansing Delta Township plant, Dürr and partner Walbridge Aldinger were presented with GM's 2006 Safety Prestige Award on May 1, 2007. The duration of build for this facility spanned over 28 months and consumed over 1.3 million man-hours. Dürr is the sixth recipient of this award since its inception 3 years ago and the first process supplier to be honored in this way.

Along with paint shops for Oshawa and Lordstown, the Lansing Delta Township project was part of the GM Bundled Paint Shop order that Dürr carried out together with Walbridge Aldinger, a leading US general construction company. The Lansing Delta Township plant is the first paint shop in North America utilizing 100% Dürr Technology. Now completely launched, it is producing the "Lambda platform" – GM Acadia, Saturn Outlook, and Buick Enclave – crossover vehicles.



GM Safety Award 2006

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We hope that this newsletter is of interest to you. However, if this is not the case, simply write us an email and put "unsubscribe" in the subject line. We are looking forward to hearing your ideas, suggestions and requests.

Thank you very much for your attention!