



DOPAG on course

DOPAG enjoys record sales during 2005

In what was a challenging trading year, it is most gratifying to be able to report the outstanding success of DOPAG during 2005. Compared to 2004, sales rose worldwide by a very healthy 20%, easily surpassing an ambitiously set budget.

This success reflects the tremendous efforts of all the staff at DOPAG, as well as our international subsidiaries and expanding distributor network around the world to

serve our customers to the best of their ability.

Large powerful machines destined for use in the construction of Liquid Natural Gas (LNG) carriers in the Far East proved to be a major market sector during 2005, occupying large areas in our assembly department, eventually alleviated by the acquisition of an additional 700 square metres of working area at DOPAG headquarters in Cham.

As industrial processes become more and more sophisticated, we appreciate the necessity of carefully monitoring developments in the market sectors that we serve so that we can adapt our product range to the needs of the market. It is vitally



DOPAG headquarters, Switzerland



important for us to gather first-rate market intelligence, to enable DOPAG's product marketing team to make the crucial decisions that can result in the new products that will be needed to satisfy our customer's needs well into the future and to keep DOPAG "on course" for an even more successful 2006.

New membrane dispensing valve

Dispensing reactive, abrasive or chemically aggressive fluids by their very nature, can sometimes give rise to unwanted internal fluid leakages within dispensing valves, causing premature failure of the valve.

Now though, DOPAG have developed a valve, which is available in two different sizes, that completely separates the fluid side of the dispensing valve from the pneumatically driven actuating section, by using a flexible diaphragm that forms an impenetrable seal between the fluid passageways and the pneumatic section, making it ideal for use with difficult fluids without the fear of unexpected breakdowns.

The provision of a "snuffer" effect when the valve closes, which induces a vacuum in

the outlet nozzle, is especially useful when the valve is used in automated applications where even the smallest of drips or "strings" can severely affect the quality of the finished products over a period of time.

The valve however, which comes with all wetted parts in stainless steel as standard, is also available as a hand held version, simply by fitting a standard DOPAG handle and trigger mechanism.



Inside

- 2 Encapsulating control instruments in South Africa
- 3 Metering transmission fluid at Borg Warner
- 4 Lubricating BMW engine fuel rails
- 5 Insulating LNG carriers in South Korea
- 6 News & Events



Exact!



Encapsulating quality

DOPAG's South African distributor impresses international supplier



Control Instruments Shurlok, a subsidiary company of Control Instruments Group Ltd., have been designing and manufacturing electronic systems for the automotive industry, both in South Africa and internationally for the last 22 years.

Based in the town of Pietermaritzburg in KwaZulu, Natal, C.I. Shurlok can name many of the world's top automotive brands amongst their customers, including Ford, General Motors, BMW, Renault, Lotus and Toyota, by whom they were awarded the prestigious "Supplier of the Year" award for 2004.

sioned DOPAG's South African distributor, Resin Processing Solutions (RPS) of Cape Town to install dispensing equipment that would meet C.I.Shurlok International's stringent quality standards.

The requirement to encapsulate the electronic modules stems from the need to provide electronic systems for both vehicle security and fleet management that will offer superior protection against water ingress, allowing installation in harsh environments to be made possible. Encapsulation also protects the electronic design, thus ensuring a higher level of security.

RPS suggested the use of a DOPAG ELDO-MIX 101 gear pump driven machine to proportion, mix and precisely dispense the polyurethane into the modules in shots of 40 grams, plus or minus 2 grams.



DOPAG ELDO-MIX 101

100:10 and will take care of all such applications that require an output of up to 1.2 litres per minute.

The Elite Chemicals polyurethane used by C.I.Shurlok, falls well within this range at 100:36 by volume.

The DOPAG ELDO-MIX 101 features separately driven gear pumps whose mixing ratio and output are controlled by a PLC controller, whilst both material components are fed to the gear pumps by means of on-board pressure feed containers.

Critical to the success of the project was the essential requirement for accuracy, repeatability and reliability. To ensure that the machine performed to these exacting standards, C.I.Shurlok undertook a capability study following installation, which resulted with the ELDO-MIX producing a CPk of 3.52.

Since those studies were made, the machine has now supplied in excess of 40,000 electronic modules with an impressive zero PPM defect rate. The machine has subsequently been fitted with an optional selective shot switch facility, which allows it to be used with other products without losing time for machine set-up.

C.I.Shurlok were just as impressed with the sales and service offered by RPS, who supplied and commissioned the entire system in just 4 weeks following order placement, as well as the excellent back-up service RPS pride themselves on.



Dispensing mixed polyurethane

When they were required to dispense a two part polyurethane encapsulation material, supplied by Elite Chemicals, into one of their electronic modules, they commis-

The DOPAG ELDO-MIX 101 machine will process low to medium viscosity two component media that has a volumetric mixing ratio of between 100:100 and



A suitable case for treatment



Automotive transfer cases filled by DOPAG metering system



When Dan Wheldon accepted the BorgWarner driver's championship trophy from BorgWarner chairman and CEO Tim Manganello in May 2005, he became the first Englishman to do so after winning the world famous Indianapolis 500 race, since Graham Hill in 1966.

In 1935, The Borg-Warner Automotive Company specially commissioned the solid silver trophy, at a cost of \$10,000. It was subsequently declared the annual prize for Indianapolis 500 victors. Today, the gleaming trophy is estimated to be worth over \$1,000,000.

BorgWarner was however, founded a few years earlier, in 1928 and ever since, it has been synonymous with pioneering innovation in the automotive industry.

Today, BorgWarner is a trusted supplier to virtually every automotive transmission manufacturer in the world and a leading global designer and producer of torque distribution and management systems, including rear wheel four wheel drive transfer cases.

in the metered volume that falls outside the acceptable tolerance programmed into the MR20 computer, caused for instance by a ruptured hose or a line blockage, then the system would immediately inform the master controller



which would alarm and take the appropriate actions to isolate the case.

At their TorqTransfer Systems facility at Port Talbot in South Wales, BorgWarner has recently commissioned an automated assembly line to produce transfer cases for a newly launched SUV.

A crucial part of the process involves automatically metering 800 ml of transmission fluid into each transfer case.

Because the process is entirely automatic, it is essential that the volume of fluid metered into each case be automatically verified before the case moves to the next station.

Fortunately, DOPAG's LECTRO-FLO electronic metering system was designed with exactly this requirement in mind, making use of electronically controlled gear type flowmeter technology.

The flowmeter, which is controlled by a DOPAG MR20 computer, ensures that the exact volume of fluid is dispensed into the case on every occasion. Should however, an error occur



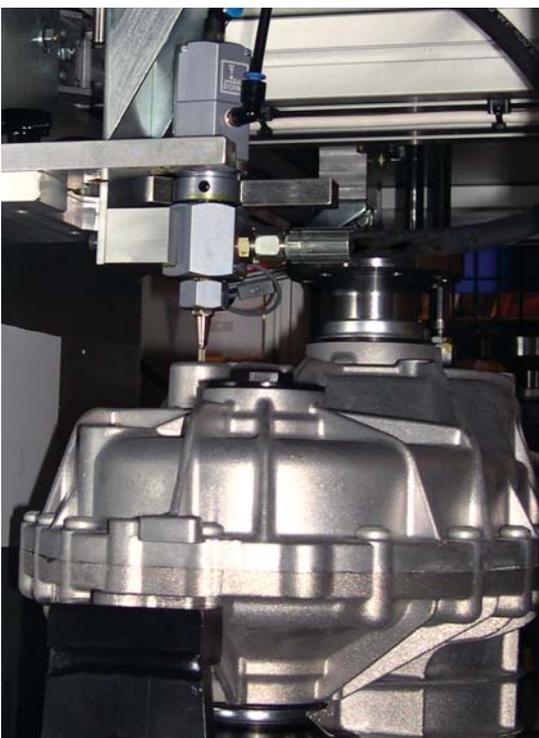
DOPAG LECTRO-FLO module

The fluid is fed to the LECTRO-FLO system by an integrated DOPAG transfer pump and fluid pressure regulator.

In use, as each case arrives at the filling station, a DOPAG "SNUFFER" valve is automatically positioned above the filling hole, which then opens to allow the metered volume to be dispensed into the case.

The "SNUFFER" valve is particularly useful in automated applications such as this, since when dispensing has been completed, it creates a vacuum in the dispensing nozzle that has the effect of making certain that fluid does not drip from the nozzle onto the outside of the case.

The DOPAG LECTRO-FLO electronic metering system has proved to be the ideal solution for filling transfer cases with transmission fluid. Indeed, it really has proved to be a suitable case for treatment!



DOPAG "Snuffer" valve dispensing fluid



From power station to power plant

DOPAG precision metering systems aid BMW engine production



petrol engine built at Hams Hall came off the production line.

Currently employing 680 people, the Hams Hall factory will in future assemble the new generation of four-cylinder petrol engines for future MINI variants that will be built at the company's UK assembly plant at Oxford, leading to a substantial increase in volume output and the creation of new job opportunities.

As part of this programme, DOPAG (UK) Ltd. has recently supplied systems to BMW Hams Hall through Nottingham based machine building company TQC, to lubricate the fuel

discharge the lubricant evenly around the inside bores of the fuel rail, when placed onto the fixture.

It is the downward force exerted by the operator when placing the fuel rail onto the fixture that signals the metering valves to automatically discharge the metered shots of lubricant, thus ensuring that the fuel rail is always positioned correctly before dispensing takes place.

The lubricant allows the fuel injector to be placed into the fuel rail smoothly and easily without any fear of damaging the "O" rings during the assembly process, which might potentially lead to leakage, causing unwanted quality problems.

Following assembly of the injector, the finished assembly is clamped into a second fixture and tested for any leakages as proof of acceptability.

During the past five years, Hams Hall has established itself as an increasingly important player in BMW's international production network and plans to make an even bigger contribution to the company's development in the future by building many more engines in the years ahead for both the BMW and MINI brands.

Once the site of Europe's largest power station, BMW's Hams Hall facility situated close to Birmingham in the industrial West Midlands, is the first BMW engine plant to be built outside Germany and Austria, recognising the importance of the UK as a major world economy.

The UK is also BMW's third largest market, after Germany and the USA and is also the only country in which all three of BMW Group's premium brands - BMW, MINI and

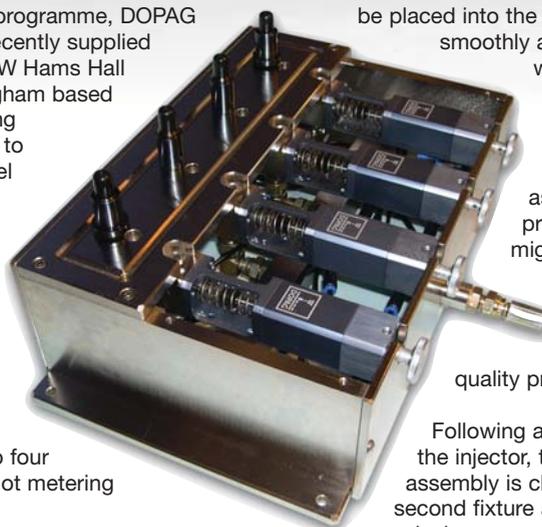
rails of the MINI variable valve engine during the assembly process.

Each DOPAG system uses a 12 litre size pressure feed container to feed the light viscosity lubricant to four DOPAG precision shot metering valves.

The metering valves can be infinitely adjusted between the minimum and maximum shot size and in this case, the exact volume of lubricant that is

required to be dispensed into each bore of the fuel rail amounts to a tiny 0.025 ml.

The four metering valves form part of a fixture that directs each separate shot of lubricant to one of four spigots that



Placing the fuel rail in the lubricating fixture

Rolls-Royce has a manufacturing presence.

Built at a cost of £400 million, production began at Hams Hall in January 2001 producing all BMW four-cylinder petrol engines between 1.6 and 2.0 litres capacity for export to BMW vehicle plants in Germany, USA, South Africa and Austria, powering the BMW 1 Series, 3 Series, Z4 Roadster and X3 models.

A significant milestone had been reached by early 2005 when the 500,000th BMW



Assembling the injector into the fuel rail



Testing the assembled fuel rail for leaks



Showing Korean shipyards the ropes

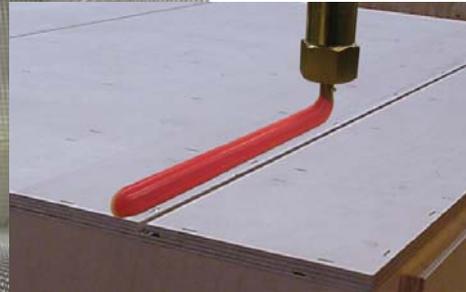
New DOPAG D610-200/H machine designed for LNG carriers



In order to achieve these high dispensing rates, DOPAG have designed and developed the D610-200/H especially for this application.

Dispensing what are highly abrasive and thixotropic ropes at high flow rates requires a machine that is both robust in design and construction and who's wetted

parts are specially treated to handle these demanding materials.



Dispensing the "rope"

The DOPAG D610-200/H has been designed to feed directly from standard 200 litre size drums and uniquely features two completely separate hydro-

lically driven precision metering piston pumps that both pump and meter the two components, whilst the desired mixing ratio and flow rates are easily controlled by an on-board touch screen controller.

Such has been the outstanding success of the D610-200/H that record sales have ensued by DOPAG Far East in South Korean shipyards.

These membrane type ships have a more conventional appearance than the Moss type that pressurise the gas.

The membrane concept uses a cryogenic liner that is directly supported by the ship's double hull.

This lining comprises of a primary metallic membrane and a complete secondary barrier incorporated in a compact insulation system.

The LNG (Liquified Natural Gas) carrier is a product of the late 20th century, prompted by the needs of many countries to import large quantities of natural gas for industrial and domestic purposes.

However, LNG is not the easiest of cargoes to be transported by sea. In its natural state, LNG is of course a gas, so in order to be able to transport it, it needs to be either pressurised into liquid form or kept as a liquid by substantially lowering it's temperature. A simple application of Charles's Law, as I'm sure you can remember from your physics lessons. ($V1/T1 = V2/T2$)

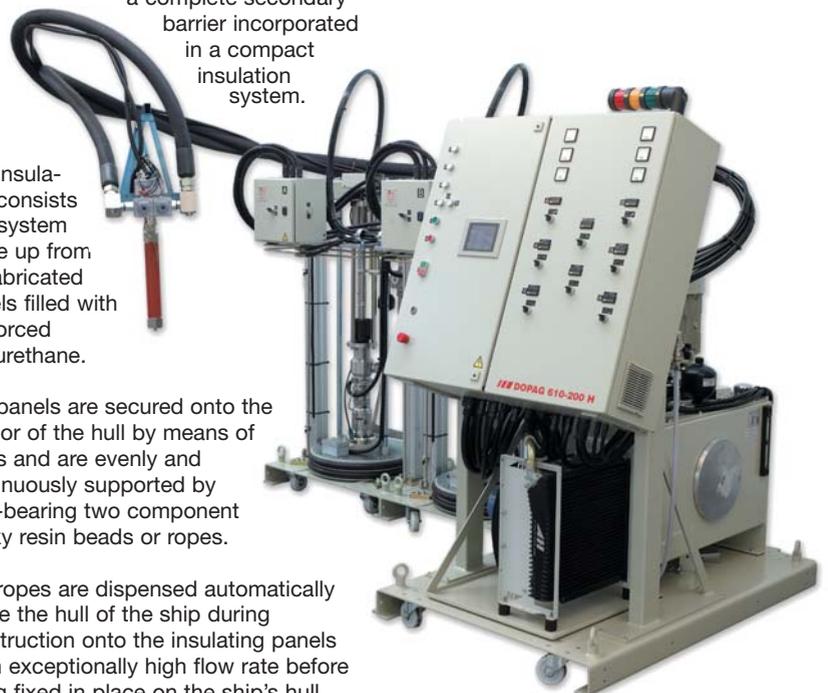
Two types of carrier have therefore been developed, the "Moss" type for transporting pressurised gas or the "membrane" type for transporting gas that has been lowered to a temperature well below freezing.

In the South Korean shipyards, the latest versions of cryogenic vessels that keep the temperature of the gas below freezing are being built.

The insulation consists of a system made up from prefabricated panels filled with reinforced polyurethane.

The panels are secured onto the interior of the hull by means of studs and are evenly and continuously supported by load-bearing two component epoxy resin beads or ropes.

The ropes are dispensed automatically inside the hull of the ship during construction onto the insulating panels at an exceptionally high flow rate before being fixed in place on the ship's hull.



Marketing support

A very warm welcome to Martin Sidler who has joined the staff at DOPAG headquarters in Cham as Marketing Assistant.

Martin, who holds a National Diploma in Marketing, is involved in both internal and external communications as well as media planning. He is also responsible for the production of printed media such as machine flyers as well as organising the translation of the Exact! newsletter into many languages.



Recently, Martin spent almost a whole year travelling around the world before deciding to join DOPAG.

Barcelona exhibition

Taking place every three years at the Fira de Barcelona, Expoqimia is a major showcase for the world's chemical industry, bringing together chemical producers and application equipment experts under a single roof, providing a total solution for many potential users.

Representing DOPAG at the latest exhibition held in November 2005, was Spanish distributor Autotecn Industrial Trading Centre S.L. who exhibited a whole range of DOPAG products used in this industry, including MICRO-MIX, ECONO-MIX, VARIO-MIX and ELDO-MIX machines as well as the entire drum pump range exhibited in combination with both 3 and 6 axis robots.

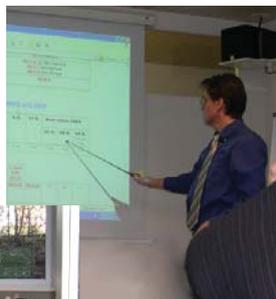


Product training

Delegates from DOPAG distributors and subsidiaries representing seven countries as far away as Finland and Mexico attended a week long product training course in Cham towards the end of November 2005.

Held at regular intervals, the courses aim to provide an understanding of basic technologies and methods for the application of liquid polymer and lubrication products using DOPAG industrial metering and mixing systems.

Market development, component functionality, system design and aspects of after sales service were amongst the many topics covered by the training.



Fastening News LIVE! Roadshow 2006

Following the success of last September's regional Fastening News Live! Roadshow in Southampton, DOPAG (UK) Ltd. will again be exhibiting at this narrowly focussed exhibition in 2006.

This time however, the roadshow has gone national, moving its venue to the Royal Airforce Museum at Cosford, near Wolverhampton in the heart of the industrial Midlands, which is centrally located and well served by the Midlands motorway network.

This one day event takes place on 23rd March 2006 and admission, refreshments and parking are all free. For more information, you can visit www.fasteningnews.com.

We hope to see you there.



Editor

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