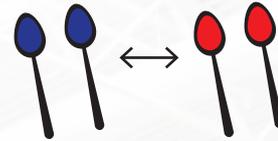

FROM MOONLIGHT BLUE TO MISANO RED IN UNDER 10 ML

A painting robot can switch from one paint colour to another in 10 seconds with minimal material wastage. Dürr has managed to reduce the inevitable paint loss to around 10 ml per colour change – just 2 teaspoons or a half-full shot glass.



THE EFFICIENCY QUOTIENT

INDIANA RED, MISANO RED, TORNADO RED – ALL AUTOMOTIVE MANUFACTURERS HAVE THEIR OWN SPECIFIC COLOURS. MANY OF THESE HAVE SOMETHING IN COMMON, NAMELY THAT THE VEHICLES ARE OFTEN PAINTED BY ROBOTS SUPPLIED BY THE SOUTHERN GERMAN COMPANY DÜRR. WE VISITED DÜRR HEADQUARTERS IN BIETIGHEIM-BISSINGEN TO FIND OUT HOW ARTIFICIAL INTELLIGENCE CAN BE DEPLOYED TO INCREASE EFFICIENCY.

Long bright corridors, well lit manufacturing halls and a noticeably high number of young employees – the laboratory of the future certainly looks futuristic. Dürr is a system provider supplying cleaning systems for production of engine and gearbox components, as well as balancing systems and products for final assembly. However, Dürr's main role is in planning and building paint shops for the automotive industry. In other words, this means workstations for robots.

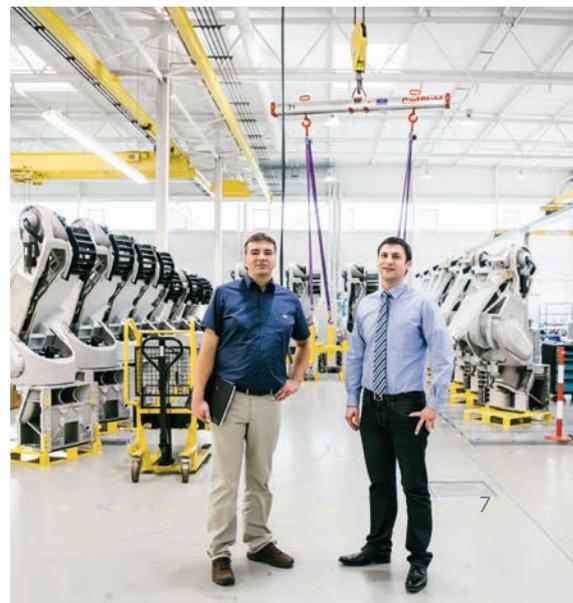
A whole football team of 6-axis robots is lined up, ready for their functional test and nearly ready for use. The robots' destinations are already decided – Melfi, Dingolfing, Shanghai. Many of them are going on a world trip, as Dürr has a significant international focus. One of them is marked RPL: Robot Paint Low. Its taller colleague has the code RPE. The E stands for elevated, as some painting robots are built higher. Dürr robots not only paint cars throughout the world, but also their big brothers – commercial vehicles.

HIGH-TECH-HELPERS

When it comes to painting vehicles, both drivers and car manufacturers alike have very specific expectations. Frequent changes of model, innovative vehicle designs and new paint systems demand a high level of flexibility and innovation from Dürr. These days, painting is very much a high-tech sector.

A painting robot has the job of moving the nozzle during painting, at a constant vertical distance from the body surface, thus ensuring an even application of paint. To achieve this, Dürr constructs and programs not only moving and stationary painting robots for exterior and interior painting, but also so-called handling robots, which are small, intelligent helpers that can open, hold and close car doors and bonnets.

PAGE 6 – 7 In the fast lane: In the last 3 years alone, the number of Dürr robots installed worldwide has risen from 4,400 to 7,300.



THE ART OF REDUCTION

Under Dürr's logo you will find the phrase "Leading in production efficiency", while their flag shows a simple formula: less is more. Less time and distance, less material required and less energy consumption. Wherever Dürr can reduce colour changeover times or minimise paint and solvent losses, the global market leader is increasing its customers' production efficiency. This is their claim, but is also the reality.

Dürr is experiencing significant growth, as there is always a high demand for efficiency. To ensure that things stay that way, systems and products are continuously being developed, including their internal components.

"Our robots use cables that are subjected to huge loads. There are torsional movements that the cable simply has to be able to cope with", says Heiko Kamp from Dürr control engineering product development. "Not just twice, but millions of times. We know we can rely on Lapp to deliver this".

"Coping with" in this case means that the cable needs to have a dynamic bending radius equivalent to 10 times its outer diameter, capable of $\pm 180^\circ/m$ of torsion. Ultimately, Dürr can rely on Lapp because our cables are all tested for 10 million bending and torsion cycles.

THE IDEAS FACTORY NEVER STOPS

The extreme mechanical and chemical loads or even the demanding technical requirements are not the only challenges. Because no two robot applications are ever the same, every cable is a special solution to a certain extent.

"We rely on Lapp's expertise to produce special cables for us for these applications", says Heiko Kamp. This is true even when it comes to breaking new ground, as the Dürr ideas factory never stops. "We are always coming up with new ideas. Putting them into practice often calls for special solutions, cables and connectors that are simply not available off the shelf. But we're always confident that Lapp can come up with the goods."

PAGE 8 - 9 High tech in tiny spaces The technical requirements in terms of bending radius and torsion demand a great deal of know-how and design skill from Lapp.



DÜRR PROFILE

Dürr is a global system partner to the automotive and supplier industry, and is the global market leader in painting, balancing and cleaning technology. The company has 8,200 employees at its 52 locations in 23 countries. In the last 3 years alone, the number of Dürr robots installed worldwide has risen from 4,400 to 7,300.

