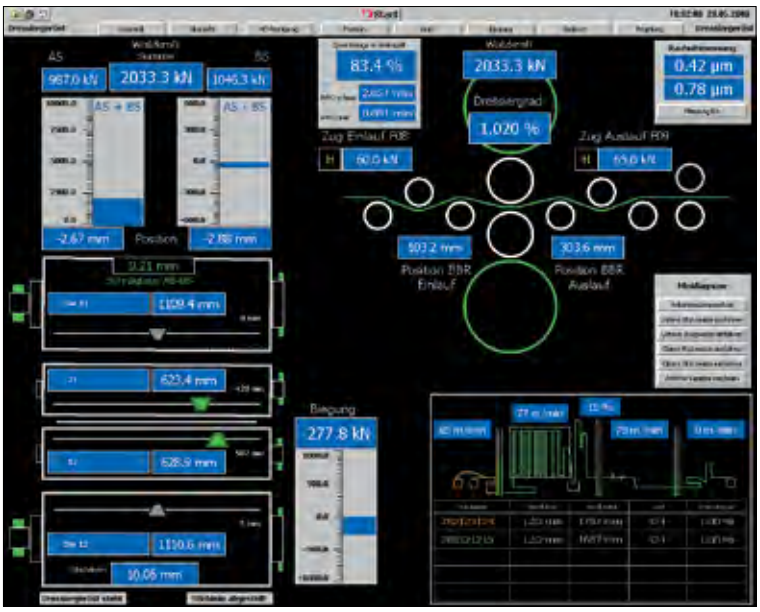
Complex plants clearly visualised.

The world steel market grows on average by just under ten per cent per year, and therefore demand increases accordingly for steel producers like ArcelorMittal. In order for the company to benefit from these positive changes it is all the more important that production should run smoothly and round the clock.

ArcelorMittal is based on a site of around seven square kilometres next to the Weser River in Bremen, where it has been producing steel since 1957. This integrated steelworks includes plants for all production steps from pig-iron production to thin sheet metal. The company produces exclusively sheet-steel products and today includes a blast-furnace plant, an LD steelworks, a continuous casting facility, a hot-rolling plant, a cold-rolling plant and two galvanising plants. At present this Bremen steelworks employs 3,600 people, and the production target for the current year is 3.2 million tonnes of steel slabs. In addition to its steelworks in Germany, this international group is represented in more than 60 countries, employing a total workforce of around 310,000. The company achieves a turnover of around 70 billion Euros and commands a share of around ten percent of the international market.



MODERN GALVANISING PLANT – HOT-DIP GALVANISED STRIPS IN A NEW DIMENSION

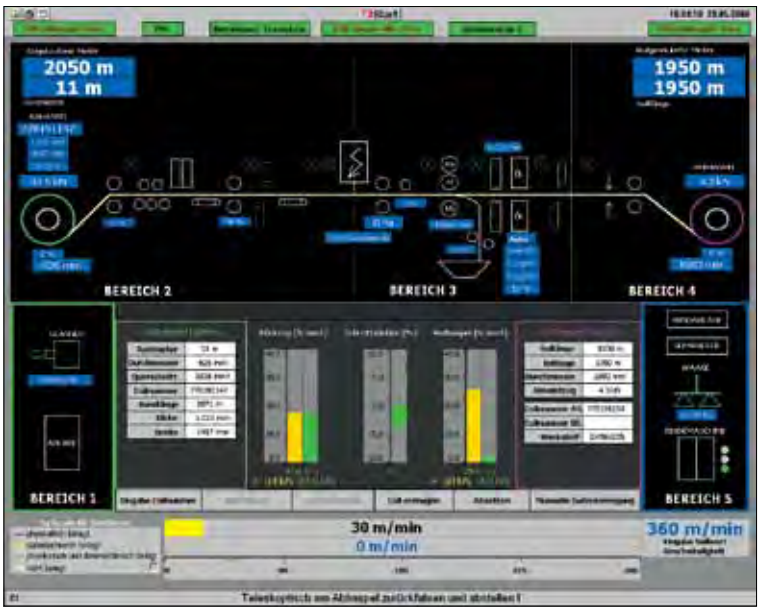
BREGAL (Bremer Galvanierungs GmbH) was founded in 1993, and belongs to the ArcelorMittal Group. It is responsible for hot-dip galvanising the cold-rolled thin sheet. BREGAL is one of the most modern galvanising plants in the world, and all its products are supplied to the automotive industry.

The galvanising procedure is as follows: two decoilers and a welding machine are combined to form an endless belt in order that the plant can be operated continuously. The process section itself comprises a strip cleaning station, a continuous furnace, a melt - a device for adjusting the zinc coating, and a cooling station. The continuous furnace is subdivided into a pre-heat zone (450°C), holding zones (800°C) and a cooling zone. In the cooling zone the strip is cooled down to a temperature close that in the melt. The strip is immersed diagonally into the melt (temperature with zinc is around 460°C), then it is turned in an upward direction by a roller in the melt, and passes out of the melt again. The melt-immersion-refined steel strip is dressed and aligned. After this, the strip is wound back into a coil. Depending on the thickness of the strip, it can reach a speed of up to 180 metres per minute.

The corrosion-resistant sheets are produced in the galvanising plant to a maximum thickness of 2.8 mm and a maximum width of 2,080 mm. As well as products with a conventional zinc coating, significant quantities of material with a 'galvannealed' coating are produced (zinc/iron alloy). Surface quality is monitored continuously by an automatic surface inspection system. The galvanising plant includes an inspection system for checking the material and its quality, and other systems for air conditioning, cooling water, hot water, ventilation flaps in the roof/wall and, last but not least, a waste water system.

ZENON HAS BEEN LEADING THE FIELD

Since 2003 ArcelorMittal has been converting its steel galvanising plant step-by-step for visualisation, and zenon is the software it has been using for this purpose. The software that had been used for visualisation on these plants up to 2003 was withdrawn as no successor product was announced. What's more, the repair costs that were incurred as a result of using this software were huge and its design was inflexible – no longer capable of further development and costly to modify. This fell a long way short of the criteria set by the management team at ArcelorMittal Bremen for stability, compatibility and future viability. At the end of a thorough evaluation process Josef Vallant from the electrical maintenance team consulted with his colleagues, and the decision was taken to opt for zenon software. This team was hoping to find a system that would be neat and compact, easy to integrate and straightforward to operate. "zenon (version 6.22) is a server/standby system that has been carefully designed and is easy to configure. It is also quite intuitive to program", explains Josef Vallant. Vallant talks about its impressive flexibility thanks to the integration of VBA, and also stresses its excellent driver interface via an Applicom card



and OPC server/client. Another important issue for the team from ArcelorMittal Bremen is that there is a well thought out and, above all, customer-oriented upgrade strategy. Josef Vallant explains: "We don't change our software version every time there's a new release or update. The compatibility of the latest version with all earlier versions is therefore vitally important to us. It is every bit as important as the facility to incorporate all kinds of different control components, some of which may be quite old, into the overall solution."

COMPLEX PROCESSES VISUALISED IN A WAY THAT IS THOROUGH AND WELL THOUGHT THROUGH

The inspection system with its two servers (standby and duty) and three clients was the first to begin operation with zenon back in 2003. Later the same year the galvanising plant, which also had two servers (duty and standby) plus 18 clients, was visualised. ArcelorMittal Bremen uses both Simatic S5 and Simatic S7 PLCs, which are linked either via an H1 bus or TCP/IP. The galvanising plant, comprising eight projects plus an umbrella project, is visualised on more than 250 displays containing approx. 33,200 variables. The team at ArcelorMittal Bremen has defined the visualisation of the strip cleaning, the zinc stripping device and the data from the process control system as projects. There were further projects for secondary systems such as water circuits, ventilation flaps, a temper pass agent conditioning system, a project for the waste water system plus the overall galvanising plant, and a mini diagnostic tool. Other projects are the central control module for switching control, the visualisation of error messages, and the inspection system. The visualisation now provides the operator with an extremely detailed view of all the components in the system at all times. This applies across the board, from the production sequence in the infeed and continuous tracing of the coils (strip rolls) to the plant and transfer to the high-bay warehouse. All the requisite target and actual data for each coil is always available such as, for instance, which components (welded sheet metals) it contains. At a more detailed level, the user or maintenance engineer can also organise the display of the flushing circuits or even the speed of the individual brushes in the pre-cleaning or main cleaning cycles. At the same time target and actual values are shown at all manner of different locations in the systems, for instance values for the degree of temper rolling (percentage thickness reduction of the sheet). Values can also be adjusted following the input diagnosis. For example: in zinc stripping, if the coating is too high or too low, then the pressure target values must be corrected in order to control the amount of zinc on the metal sheets. The whole system is extremely carefully thought out, with finishing touches like a built-in Wiki for operators. A Wiki is a public-access page or website that can be modified by any user or visitor,

or by a pre-defined set of users or visitors. "Wiki" is a term derived from the Hawaiian word meaning "quick" – a place where information is made available and updated quickly. The best-known Wiki is the online encyclopaedia Wikipedia. "Since the systems and the visualisation software are both extensive and complex, we believe there is a need to provide a knowledgebase for staff to ensure that everyone can obtain information about the system components and the processes at any point in the system", explains Josef Vallant. The Wiki encompasses not only background information and basic explanations, but also news, for instance on all aspects of waste water disposal.

EXCELLENT LEVEL OF SECURITY IN MULTI-LAYER OPERATION

Since operation in the galvanising plant needs to be safeguarded 24 hours a day and 365 days a year, it was decided to bring zenon in and run the test phase in parallel with the preceding solution from statten. The integration phase went smoothly, just as operation now runs; thanks to the redundant configuration operation is now comprehensively safeguarded. The electrical maintenance team has implemented the system with no assistance of any kind, but nonetheless Josef Vallant is extremely positive about the cooperative working relationship with COPA-DATA: "Along with the technical solution itself, support from the company was equally important to us, both in the course of configuration and in everyday operation. COPA-DATA is one-hundred percent dependable in this respect. Any query – be it directed to the managers in Munich or Cologne – receives an immediate and professional response, and every problem is solved."

GALVANISATION MADE TRANSPARENT

Another advantage to the zenon automation system: ArcelorMittal benefits, thanks to the visualisation module, not only from a consistent, uniform presentation of all processes, but at the same time has the opportunity to request diagnostics for the system with all its components to enable it to respond rapidly to all manner of events. For ArcelorMittal this includes the so-called "mini diagnosis", which indicates amongst other states whether the plant is ready to start up, whether a roller or roller cleaning device is out of position, or whether a light barrier is not working. In addition there are the conventional error messages that are sent to zenon with a time stamp from the S7 PLCs via TCP/IP. Josef Vallant stresses: "The diagnostic possibilities – including remote diagnosis – automatically reduce the maintenance costs. But it is not only diagnostic facilities and error messages that provide greater transparency, there is also the Extended Trend. This zenon module takes advantage of ArcelorMittal to gain a detailed overview of the information whilst the system is operational, for instance in order to check the fill level in the zinc pot."