

# Case Study

## MCE Industrietechnik Holding GmbH & Co / voestalpine Stahl Donawitz GmbH & Co KG

Internationale Fachmesse für industrielle Instandhaltung

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## Efficient Repair of a Blast Furnace Cooling Water Line by Pipe Freezing within a Very Short Time, Generating Low Costs

- Categories**
1. Maintenance services
  2. Workshop service
  3. Equipment and spare parts

**Market Sector** Metallurgy

- Brief Description**
- Plant maintenance through custom-made solution for changing a malfunctioning back draft damper in the main cooling water line of a blast furnace without shutting down the plant.
  - Manufacturing of a special freezing box for pipe freezing.
  - Completing the repairs on the pipe line DN 300 within 48 hours.

**Task** Maintenance repair of a malfunctioning back draft damper between the main cooling water line and the pump system at voestalpine's blast furnace in Donawitz, and installation of an additional slide valve without interrupting the steel production.

**Preparation** The malfunctioning back draft damper was to be serviced without shutting down the blast furnace triggering time-consuming repair works and leading to costly production losses. After investigating the possibilities of employing hot-tapping and line-stopping methods the experts from MCE Industrietechnik offered an efficient solution: the changing of the check valve was to undergo reconstruction by initially freezing the pipe. Chemserv Industrie Service, a subsidiary of MCE Industrietechnik, had used this method before, although never on a pipe of the dimension DN 300. Usually in Austria, pipes with standard dimensions of DN 65, 80, and 100 are frozen to decommission them for maintenance repairs. Only in Burghausen / Germany MCE Industrietechnik has had the opportunity of working on pipes of similar dimensions, i.e. a standard of DN 200. After MCE Industrietechnik had been commissioned by voestalpine Stahl Donawitz the Chemserv workshops manufactured the custom-made freezing box. All necessary materials, tools, and checking devices were compiled and the essential liquid nitrogen was ordered at LINDE Gas GmbH.

**Implementation** *To repair a damaged back draft damper inserted at the end of a main cooling water pipe line of the blast furnace in Donawitz, voestalpine Stahl Donawitz commissioned MCE Industrietechnik Holding GmbH & Co:*

The main cooling water pipe line of the blast furnace of voestalpine Stahl Donawitz is served by four to five cooling water pumps. Right on top of the cooling water pipe nozzle, where all pipe lines coming from the cooling pumps converge, a back draft damper had been embedded, which suddenly started to malfunction. The problem: should the barrier against back draft no longer work, the cooling process would no longer be under control. Repair of the back draft damper requires a standstill of water flow. Shutting down the blast furnace was out of question, because this would have implied a considerable down time for the blast furnace causing high production losses and consequential financial losses. Therefore only two alternatives for

maintenance repairs seemed feasible: Shutting off the pipeline through hot-tapping and line-stopping or by the pipe freezing method offered by Chemserv. Hot-tapping and line-stopping are rather complicated methods, whereby water is blocked in the pipe section to undergo maintenance repairs. These methods are quite costly and need much time to be implemented, because the necessary equipment would have had to be procured from the U.K., wherefore pipe freezing was the cheaper and more efficient method at hand.

#### **Pipe freezing: Cryogenic method ice-plugs the steel pipe at $-195^{\circ}\text{C}$**

Pipe freezing involves subjecting the contents of a pipe at a specific point to cryogenic temperatures using liquid nitrogen and thus forming an ice plug to isolate the pipe at  $-195^{\circ}\text{C}$ . Chemserv specialists' have been using this method for the last 20 years. Originally, a special procedure developed by Linde Gas and protected by law, it is nowadays relinquished to partner companies working with Linde after passing a special training. Today, Linde only delivers the necessary liquid nitrogen.



#### **Custom-made freezing box for standard DN 300**

The necessary freezing for the blast furnace pipeline at Donawitz had to be specially designed as steel piping of dimension DN 300 had never been frozen by employing pipe freezing methods before in Austria. After receiving the commission, the Chemserv workshops manufactured the custom-made freezing box within two days. During this phase all the necessary support materials, tools, and measuring devices were compiled. Also, the order for liquid nitrogen was placed at LINDE Gas.



#### **Maintenance repairs within 48 hours**

On the third day, works started on setting-up the freezing box in the voestalpine Stahl Donawitz plant. All necessary equipment for the action was pre-positioned. Then the freezing box was flooded with liquid nitrogen reaching a temperature of  $-195^{\circ}\text{C}$ . Twelve hours further on during the freezing process the remaining water was taken from the blocked bough of the cooling pipeline. After that the dismantling of the damaged back draft damper took place. The exchange for the new part was rather easy on account of the perfect preparations up front. Also, an additional slide valve

was installed and two smaller valves were refitted – all within just one hour of work. During the night the pipeline was defrosted and was put on stream on the next day. Thus, after only 48 hours of maintenance repairs on site the biggest freezing action of its kind ever to have taken place in Austria was completed successfully by Chemserv's specialists.

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|---------------------------|--|
| <b>Customer's Benefit</b> | <ul style="list-style-type: none"> <li>➤ High cost and time savings through application of pipe freezing method.</li> <li>➤ Prevention of production losses.</li> <li>➤ One-stop manufacturing and installation of spare parts.</li> </ul> |
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### Ordering Party

**voestalpine Stahl Donawitz GmbH & Co KG** is a subsidiary of voestalpine AG, founded in 1938. voestalpine AG is Austria's largest steel manufacturer and is organised in four divisions: *Automotive* (car chassis contractor), *Profilform* (tubes, sectional steel), *Railway Systems* (rails, rail engineering, track switches) and *Steel* (high quality steel, mainly for automobile and tin ware industry). End of 2005 the Group featured a world-wide staff of 23.000 and maintained production and R&D-facilities in 30 countries on 5 continents, posting sales of approximately € 6,5 billion.

Internet: <http://www.voestalpine.com>

### Contractor

**MCE Industrietechnik Holding GmbH & Co** is the largest division of MCE AG by volume of sales. MCE AG is a leading, manufacturer-independent service group and life-cycle partner for the set-up and servicing of industrial plants, buildings and infrastructure facilities in Central Europe with approximately 7,800 employees and a turnover of approximately € 960 million. MCE is a portfolio company of Andlinger & Company, Inc., a private investment firm founded by Gerhard Andlinger in 1976. In the year 2005, MCE Industrietechnik employed a staff of 3.100 and generated sales of approximately € 467 million. The MCE Group is active on the market as a service partner for design, production, assembly and maintenance of plants and machinery for the oil and gas industry, chemical and petrochemical business, biotechnology, fine chemicals and pharmaceutical manufacturers, the metallurgical branch, paper and pulp producers and power generators and distributors. Chemserv Industrie Service, a subsidiary of MCE Industrietechnik Group, has its headquarters in Linz and also has offices in Krems, Schwechat, Ebensee and Burghausen (D). More than 500 employees and sales of approximately € 60 million have turned Chemserv into a viable service partner for the international industry.

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### Maintain 2006

The 2<sup>nd</sup> International Trade Fair for Industrial Maintenance will be staged from October 17th to 19th, 2006 at the M,O,C, trade fair centre in Munich. As MAINTAIN is the only specialized international trade fair for industrial maintenance in the world, it gives visitors a look at the latest trends in all sectors and furnishes them with information about state-of-the-art solutions that can be used to repair, maintain, inspect and improve their production facilities. For decision-makers and experts, that makes it the most important business gathering that deals with all aspects of industrial maintenance. Special fora on maintenance as a core factor for production and up-to-date information on MAINTAIN's web pages add to the event itself.

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