

“PM steels need salt bath hardening”



Reactivated salt bath hardening plants at Diehl Metall Schmiedetechnik give tools a longer service life and make extra capacity available in the heat treating facilities

At the end of the 1990s a decision had already been taken at Diehl Metall not to have in-house heat treating facilities. Various production processes were reorganized and investments in salt bath hardening had no place in the new concept. In future, vacuum hardening was to replace all salt bath processes involved in tool making. Tests, however, were disappointing – the results did not come up to expectations. Consequently, together with the specialists from Durferrit, the existing facilities were modernized.

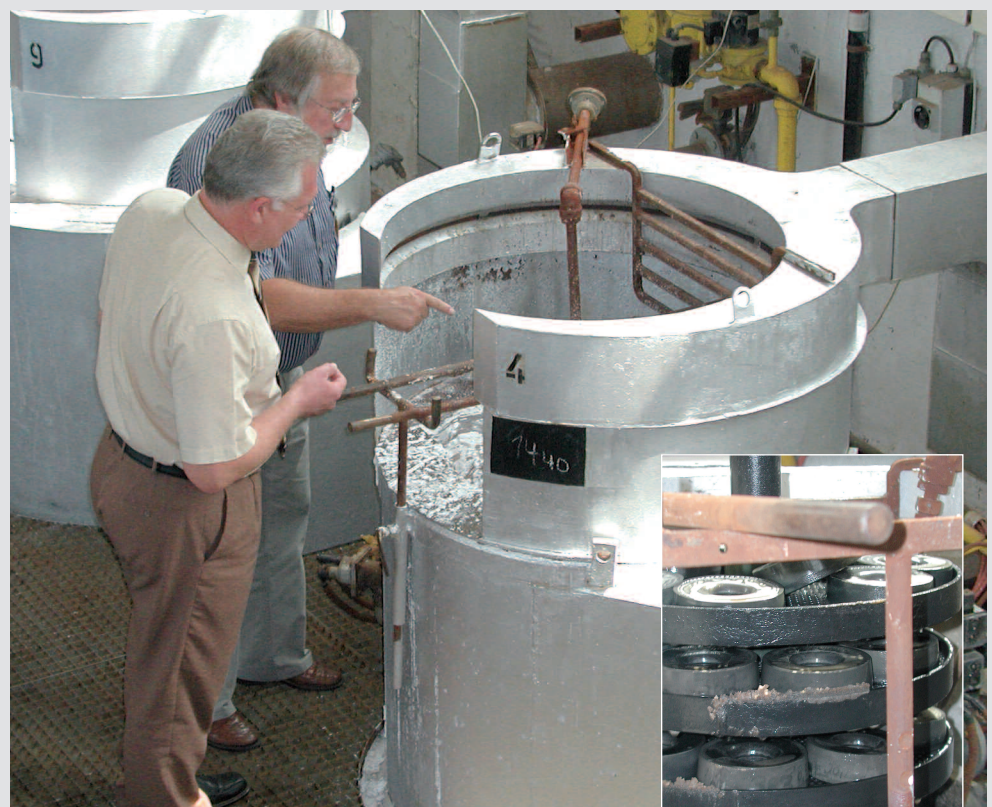
dened tools was not acceptable.” After being hardened under vacuum, considerable difficulties were encountered, particularly with PM tools. The hardness was up to standard but, not only the service life but also the fracture risk was not acceptable. Vacuum hardening did not fulfil the expectations of the forging technology department.

Diehl Metall Schmiedetechnik has one of the largest forging capacities in Europe and is a valuable partner of the automotive, sanitary appliances, electrical, building and engineering industries. The forged parts feature through high consistency, dimensional stability and high quality surface. For example, every year about 7 million forgings are produced for the sanitary appliances and electrical industries as well as over 45 million synchronizing discs for the automotive industry worldwide.

Jacob Heller, head of tool manufacture, describes his experience with vacuum hardening as follows: “The service life of many har-

Tools for “in-house” use

Parts ranging in weight between 5-35,000 grams are manufactured by robot-controlled forging systems which have a pressing force of between 1,000-11,000 kN. Modern CNC-controlled processing centres equipped with modular transfer systems and integrated measuring technique are also used. The tool-making division within the Diehl Metall Schmiedetechnik organization produces tools for the cutting and non cutting shaping as well as gages and devices. Inhouse know-how enables Diehl Metall Schmiedetechnik to manufacture their own forging dies.

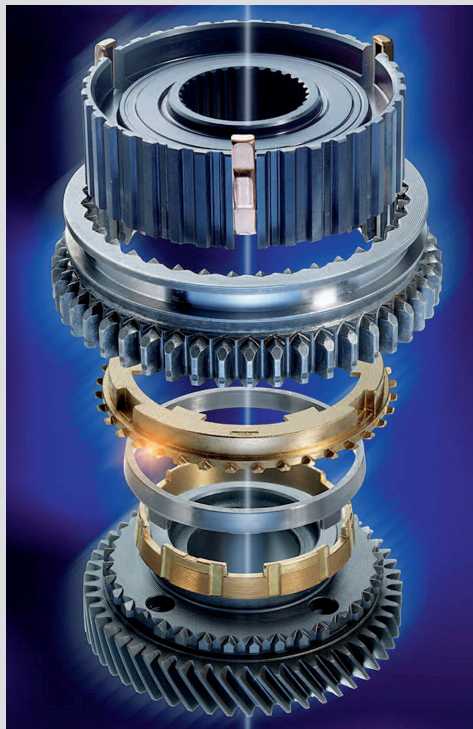


Work pieces of 400 mm in diameter can be salt bath hardened at Diehl Metall Schmiedetechnik.

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Extra hardening capacity - also for external customers

After these disappointing results, at the beginning of the year 2000, the company returned to the reliable salt bath technology. In co-operation with Durferrit GmbH the heat treating facilities were redeveloped, the processes optimized and the operators given extensive training. The investment soon paid off. “The high quality of the tools hardened in salt baths has given them a longer service life and our internal customers the very best quality. This has, of course, had an effect on the load factor of our plant. We now have a considerably greater capacity which we would like to offer to other companies in future. This means that companies experiencing difficulties with the hardening of PM steels can profit from our know-how. In addition, we are also in a position to harden all other products



For a wide range of hardening tasks, Durferrit supplies salt bath plants to suit individual customer's requirements, ranging from standard pot furnaces to fully automated large computer-controlled plants.

in salt baths. However, the work pieces should not be more than 400 mm in diameter.”

Jacob Heller summarized the positive results – “...we can now offer the same complete range as a commercial heat treater”.

“In-house” customers ensure quick exchange of experience

At present there are not many heat treaters in Germany which are able to harden up to 1,200 °C as it is possible at Diehl Metall Schmiedetechnik. Parts treated in special salts from Durferrit set standards, for example with regard to distortion behaviour and uniformity of component properties. Martempering is of particular benefit in the case of cutting tools because it gives great hardness, extreme elevated temperature hardness (red hardness), very good wear resistance and high durability. Apart from the technology, the experience of the operators is of critical importance to the success of the heat treatment. Experience with the retention period in the high temperature annealing bath is as equally important as controlling the cooling phases at around 500 °C. Jakob Heller and his team have a wide range of experience in this field and the big advantage of having an immediate exchange of experience with their own “in-house customers”. This is of great benefit to the end-users. Due to the integrated production of their own tools for the product processing, from the blanks, to the semi-finished product to the delivery of the finished part Diehl Metall Schmiedetechnik is able to monitor the production process completely.

A 3-step rinsing cascade is used to free the work pieces from the adhering salt. Problems with effluents are avoided by using the integrated radiation evaporator, thereby complying with the strict environmental regulations. The close co-operation between Durferrit, the plant constructor and salt supplier, and Diehl Metall Schmiedetechnik, the user, has proved very successful in that significant improvements have been achieved in quality.



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