Dry Ice Blasting at DaimlerChrysler

Figure 1.

"Ascojet" dry ice blast cleaning at DaimlerChrysler

Nicole Urweider

Nicole Urweider, Marketing Sales, Asco Carbon Dioxide Ltd., Romanshorn, Switzerland

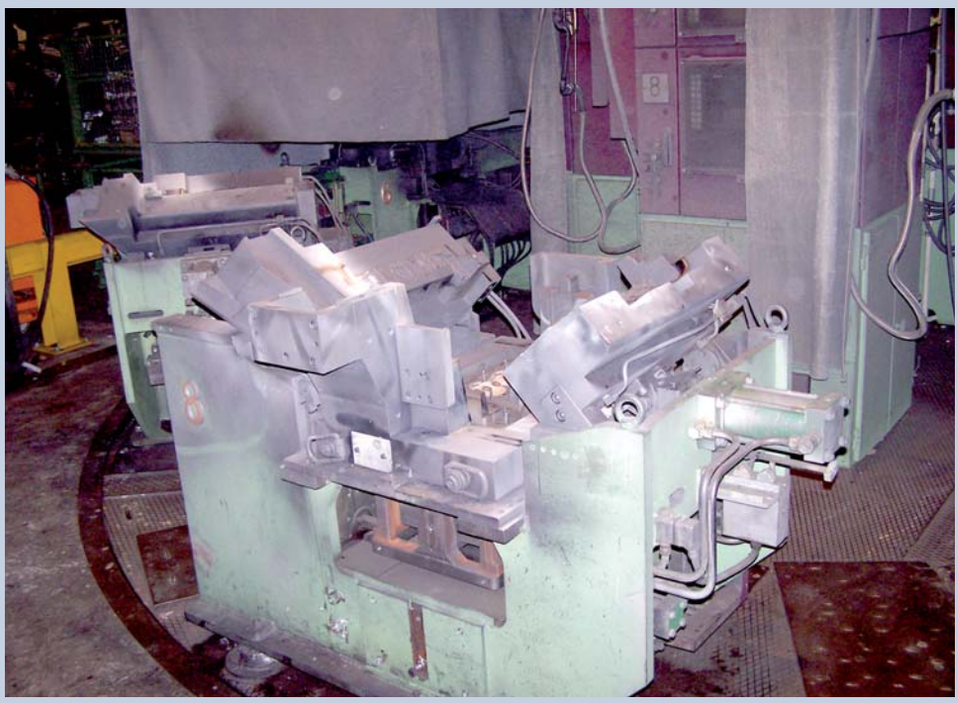
www.Ascojet.com

The plant of DaimlerChrysler, Mettingen, Germany, belongs to the largest and most innovative light metal foundries in Europe. As in many other business areas, also in mould cleaning DaimlerChrysler has played a pioneering part and was one of the first companies in Europe to dry ice blast clean its moulds. In fact for almost ten years DaimlerChrysler has been applying Asco Carbon Dioxide Ltd's "Ascojet" dry ice blasting technology **(figure 1)**.

DaimlerChrysler's production range in Mettingen includes cylinder heads, control housings, crank cases, sumps, integral carriers and gear cases. 7,500 cylinder heads are manufactured daily and over half is produced on the two casting implements K12 and K13 which produce 17 different types of cylinder heads on their rotary casting machines **(figure 2)**. The affiliated core production is in operation 24 hours per day. Specially developed and exactly harmonized automation systems guarantee a smooth process.

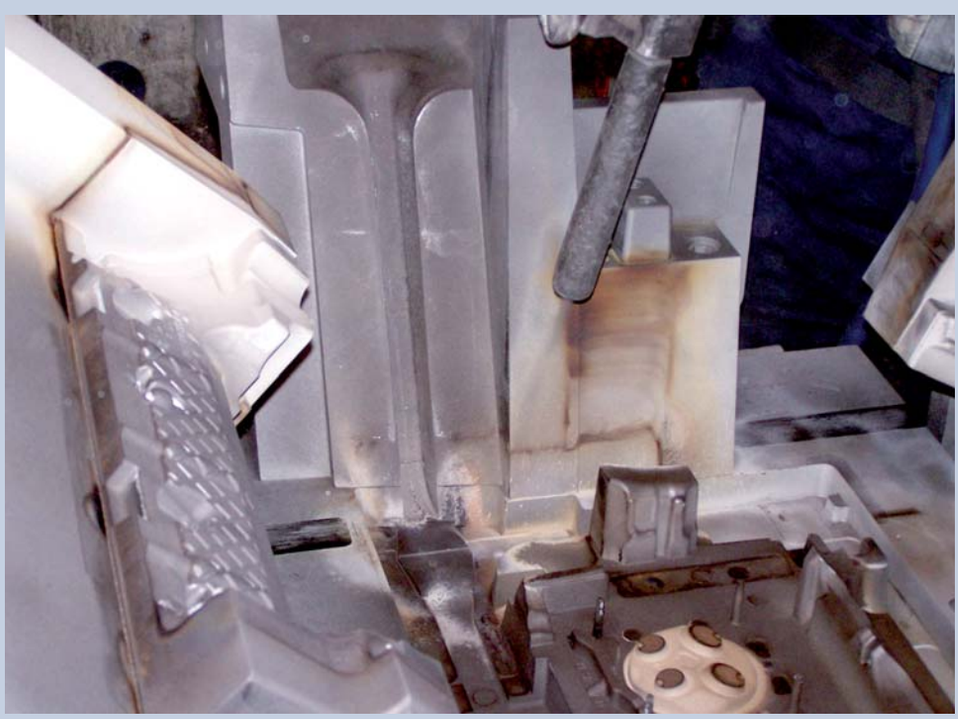
It is self-evident that such a perfected process calls for an optimal integration of the mould cleaning. In this context DaimlerChrysler decided for the dry ice blasting technology of Asco Carbon Dioxide Ltd, because they were able to supply a total solution package – now DaimlerChrysler has more than 20 "Ascojet" dry ice blasting machines in action.

Figure 2.



One of the robotized rotary casting machines for cylinder head production

Figure 3.

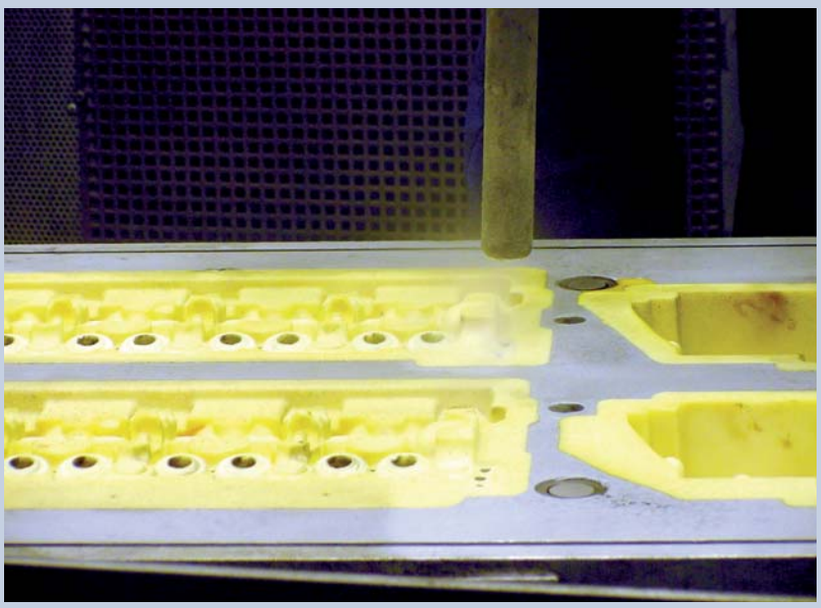


The ingot moulds are cleaned online without being dismantled.

The hot ingot moulds are cleaned on-line without being dismantled **(figure 3)**. "Ascojet" dry ice blasting has minimal effect on mould temperature allowing virtually continuous production thus avoiding costly production stoppages. As this cleaning method is non-abrasive and the moulds are not damaged or altered in any way, there is no need for a subsequent mechanical treatment. After impact, the dry ice pellets immediately sublimate leaving behind a clean, dry surface and no blasting media to be disposed of.

Also the core boxes are cleaned gently with the "Ascojet" dry ice blasting technology **(figure 4)**. As there are no production stoppages in the core pro-

Figure 4.



Also core boxes are cleaned with dry ice without any damages.

Figure 5.

The in-house dry ice production provides an increase in flexibility and quality in the daily working process.

duction, the core boxes are dismantled after approximately every 400 injections and cleaned by a service company in special noise control booths.

Two pioneers on ice-cold paths

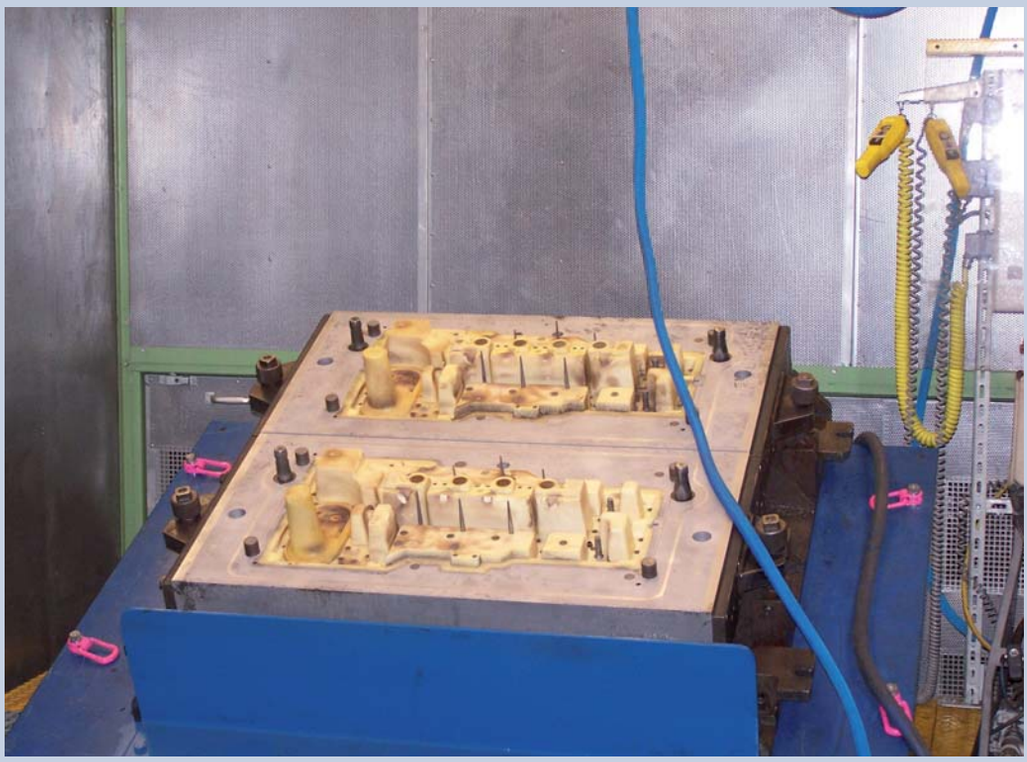
In the beginnings of the dry ice blasting era in the early nineties DaimlerChrysler was one of the first companies to use the dry ice blasting technology. In those days, dry ice blasting machines were of an enormous size and the consumption of dry ice was extremely high. With the arrival of the first transportable machines from the American market, DaimlerChrysler tried to integrate this cleaning method into the foundry, because it clearly saw the advantages of this cleaning method. "The actual upswing only came when the equipment technology finally allowed integration into the daily working process", explains the team-leader of DaimlerChrysler's cylinder head production. "Among others especially Asco contributed to this step." For nearly ten years now DaimlerChrysler has been working with Asco.

In 1994 ASCO started actively in the dry ice blasting field and witnessed many development steps of this technology. Back then, for example, dry ice blasting machines were driven pneumatically. "Many users had problems with this feature. The machines froze up with the consequence of frequent production stoppages", explains Marco Pellegrino, Manager of Asco's dry ice blasting division. "Our actual starting shot was in 1996 when we changed to electrically driven units. At that time we had the reputation of daring pioneers; today this feature is mostly the standard." Indeed, the early collaboration with DaimlerChrysler led Asco to specialise in integrating dry ice blasting systems into foundries. "We depend on the feedback from our customers. Only this way we can advance our technology steadily. This is the reason why the lively dialogue with DaimlerChrysler is so important for us", says Marco Pellegrino. For example Asco's most powerful blasting machine, the "Ascojet" 2001RS, has been developed and optimised on this basis.

Flexibility and independence thanks to in-house dry ice production

Over the years the dry ice blasting technology has become more and more established in DaimlerChrysler's foundry. Today it is spreading to more and more processes. "A lot of persuasive effort was necessary but in the meantime the advantages of dry ice cleaning have been recognized", tells the team leader of the cylinder head production. "An impeding effect was the purchase of dry ice: one day we had too little dry ice, the next too much. This way the cleaning

Figure 6.



The core boxes are prepared for cleaning in special noise control booths.

could not be planned because sometimes there was no dry ice left when we would have needed it or the cleaning took at least twice as long as the dry ice was already 4-5 days old." For these reasons DaimlerChrysler decided to make its own dry ice **(figure 5)**.

DaimlerChrysler owns two Asco dry ice pelletizers with a production capacity of approx. 180 kg/hour each and is now able to produce its dry ice demand-oriented and just in time. Today the foundry also acts as in-plant dry ice supplier. With a yearly demand of approx. 1 000 t dry ice DaimlerChrysler is probably the largest dry ice producer for own requirements in Germany. "A fact that pays", says Marco Pellegrino, "as due to storage difficulties when purchasing the dry ice and due to the fast aging process of dry ice, in-house production reduces the dry ice demand and thus cost by at least 30 %".

A major leap ahead

Shortest possible blasting times and fixed cycles are DaimlerChrysler's policy when it comes to mould cleaning. Before changing to dry ice, the ingot moulds had been cleaned daily and abrasively with glass granulate, nowadays they are cleaned twice a week with dry ice and once a week with glass granulate. "This change meant a quantum leap for us", states the team leader of the cylinder head production. "The fact that the moulds are cleaned additionally once a week abrasively has nothing to do with the quality of the dry ice cleaning but ensures that the roughness of the moulds remains the same. This is important for the flow of the aluminium. The calculation if dry ice blasting pays is very easy: for example, project 30 minutes times saving per day to the whole year. Or take the advantage that dry ice cleaning does not damage the moulds at all: if you have to scrap an ingot mould in the value of EUR 50,000 to EUR 190,000 already after 70,000 or only after 120,000 shots makes a big difference. Also the working conditions became better. When the moulds were cleaned daily with glass granulate the blasting media could even be found in the socks of the employees!"

Besides all the advantages of dry ice blasting, some disadvantages can not be denied: This cleaning method is not the quietest one. For this reason the core boxes are cleaned in noise control booths **(figure 6)**. The ingot moulds are cleaned at night at shift end, as it was already done with abrasive cleaning. "Another disadvantage at first glance is the initial investment required if you want to implement dry ice blasting all the way through from A to Z, which means including in-house dry ice production. But such investment pays, believe me!" assures the team leader of the cylinder head production.

What made DaimlerChrysler choose the "Ascojet" dry ice blasting technology? "Because Asco is a provider of complete solutions knowing what he is talking about as the dry ice blasting technology is embedded in the whole CO_2 background. Also because Asco always approaches problems in an uncomplicated way and works directly with us for the best solution", is DaimlerChrysler's argument. "Dry ice blasting systems are not bought off the peg. In this field we expect professionalism, service and contact people who are available and dedicated to work with us for optimum solutions."