

# Safety first

## in die-casting facility

**Machine safety inspections have helped BMW to identify potential workforce safety issues in its die casting plant and to put the right protection equipment in place.**

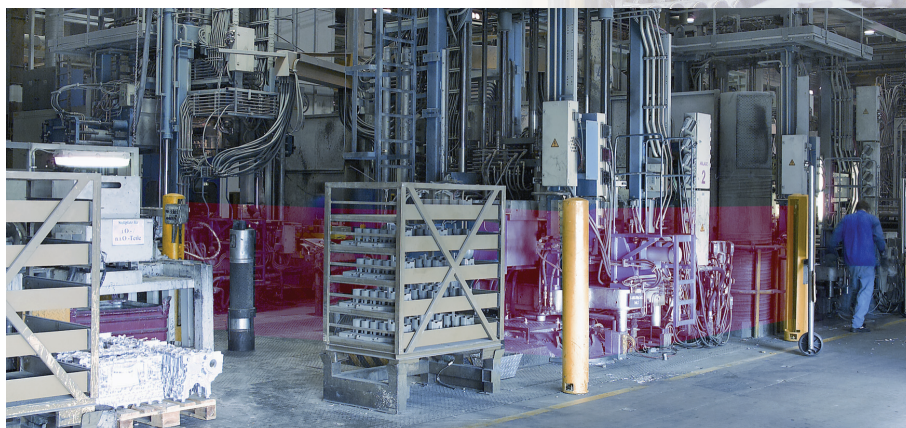
BMW's 300,000 m<sup>2</sup> plant, near Munich, is key to the production of cylinder heads and other light-metal cast components for most BMW Group vehicles.

The die-casting process consists of 30 die casting systems which run in a 3-shift pattern, where a 2m high furnace for each system heats the melt on the ground floor of the production hall. On the first floor, there is a 6m high die casting system with the inlet for the molten aluminium close to the floor.

Forklifts transport the 'ladles', which each hold 600kg of liquid metal. This is emptied into the inlet and flows down into the furnace beneath. Compressed air, at 0.6 Bar, causes the liquid aluminium or other light metal to rise through the immersion pipe, which is located at the bottom end of the melt, rising to a chilled mould, which is a reusable casting, where the metal solidifies.

After the sides of the chill mould have been driven out by the ejection cylinders, the cast component can be removed. A deflection arm then removes the hot cast component - which can weigh between 20 to 40kg - from the mould. An operator uses lifting grips to take the piece from the deflection arm, makes a visual inspection and then places it on a palette to be transported away.

Two particular danger points during this process are the horizontal movement of the ejection cylinders when releasing the mould, which could crush the operator, and when the deflection arm swivels as it takes the cast component from the machine to the unload position.



### Identifying risks

Identifying such risks and inspecting to ensure physical or opto-electronic protection is in place to prevent such injuries is the purpose of Leuze electronic's machine safety inspections.

The operator starts the casting process by pressing a button outside the die-casting area, which is guarded by Leuze electronic's COMPACT light curtains. During the cycle time, nobody is allowed into the casting system area.

The light curtains, along with the machine safety inspections, have provided an integrated safety solution that meets all the relevant requirements and guarantees reliable protection.

The entire die casting area is now guarded with COMPACT safety light curtains. Horizontal danger zone guarding, on welding and assembly lines or robot cells is also widely used at the plant, plus 14mm resolution curtains providing hand and finger protection on presses and punches.

Safety considerations and manufacturing conditions, such as transportation corridors or stillage loading positions, resulted in the guarding floor-plan for the chill mould being trapezoidal in shape. A COMPACT transmitter, a COMPACT receiver and two UMC deflecting mirror columns, with one having a reflection angle of over 90 degrees and the other having a reflection

angle of less than 90 degrees have been used here. The mirrors guard the area between the chill mould and the transport lane across a distance of 3m. Both the transmitter and the receiver are positioned 4m across from the mirrors on the other side of the casting system, close to the control cabinet, providing access guarding for the trapezoidal area.

On its way, via the mirror, to the receiver, the light beam must travel 12m and therefore to speed alignment over this distance, when even a tiny deviation in the angle would cause the light beam to miss the receiver, Leuze electronic's Laser Alignment Aids were used. Mounted directly on the transmitter it clearly marks the target point of the sensor beams with a red laser light, enabling one person to commission the perimeter guard easily and efficiently.

Transmitters, receivers and deflecting mirrors are positioned in free-standing UDC device columns, which are anchored in the floor. This enables precise vertical and axial alignment and anti-vibration mounts in the base of the column, providing isolation from the vibrations caused by passing forklifts.

The UDC device columns are enclosed by a solid steel column to guarantee protection against melt splashes, even with a direct impact.



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