



Engine blocks being produced at BMW's light metal foundry in Landshut. The sand cores are produced with environmentally friendly, inorganic binding agents. Modern vibration conveying technology has now been installed for the sand processing system.

Sustainable Sand Regeneration

Effective vibration technology for an emission-free engine casting facility

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Around 5 million casting components are produced each year at the world's first emission-free engine casting-facility of the BMW group in Landshut. Included in the scope of production are engine components such as cylinder heads and crankcases, structural components and chassis parts such as strut bearings, tailgate frames, corner castings and cast nodes for the front and rear axle. Some 120 t of sand are required for this every working day. As part of a conversion to

environmentally friendly, inorganic sand core production, the sand processing system was modernised and equipped with vibration conveying technology from Cyrus GmbH Schwingtechnik, Recklinghausen (Image 1). The main components are around 140 m of vibrating conveyors (Image 2), vibrating screens and lump breakers.

Background

As a component location of the BMW group, the plant at Landshut focusses on innovations. It is therefore only right that it is here that the world's first emission-free foundry is in production with inorganic core

sand. Using this innovative production process, the light metal foundry reduces the air pollution by 98%. Around 120 t of sand with a recycling ratio of 90% are in circulation every working day. For this purpose, an inorganic binding agent was developed together with ASK Chemicals, Hilden, which is used for shaping and core manufacture in the foundry.

The downstream process systems play an equally decisive role in the foundry's efficiency. Thus, the groundbreaking took place for a new core-making facility in 2012, into which a new system

was integrated for sustainable sand regeneration. Since then, roughly 5 million castings have been produced there annually, which have to be freed from foundry sand following casting. The vibration-related systems and components required for this were supplied by Cyrus GmbH Schwingtechnik.

The following requirements had to be factored in when developing the sand processing system.

- > Maximum system availability
- > Maintenance-friendly access to all components
- > Process-safe sand handling
- > Automatic foreign body removal
- > Professional project management

Vibration conveying technology made by Cyrus

In the core-making facility, cores recognised as being defective are separated and taken for sand processing through a shake-out grid and downstream vibration conveyor. The shake-out grid is subjected to vertical vibration movements through unbalanced motors and crushes the sand cores down to a maximum size of 200 x 200 mm. The sand is then taken to the main conveyor lines through the chute distributor (Image 3). Here the sand which has already been separated following the casting process and the defective cores pre-crushed in the shake-out grid are brought together. The sand, which is still hot, is fed to three vibrating lump crushers over vibrating conveyors with a total length of around 140 m. The total mass flow of core sand is 12 t/h. With a maximum output of 7 t/h per vibrating lump crushers, the conveyed material is pulverised to grain size. Any metals, slag residue and other foreign bodies still present are automatically removed. Any impurities still adhering are removed in the subsequent linearly vibrating screen. A stationary 'control screen'



PHOTOS: CYRUS

Fig. 1: Overview of the entire system

monitors the maximum permitted grain size of < 3 mm. This ensures that no larger particles can reach the processing stage through the sand conveyor and damage the system. After going through the system, the supplied material obtains 'new sand' quality.

The overall design included a comprehensive testing phase of the components, including measurement of the vibration data, prior to installation and commissioning.

Competence confirmed: effective project and installation plans

The highest level of failure safety was a key criterion for the BMW group when designing the sand processing system, resulting in the decision for a redundant arrangement with two parallel conveyor lines. The vibration conveying technology permanently demonstrates operational reliability in operation; meaning redundancy is therefore not required. The systems now run in regular alternation and have a considerably longer service life

due to the parallel use, whilst also featuring reliability simultaneously.

The secure availability of the entire system is the result of the technical and efficient design from Cyrus. This is usually developed individually, from scratch for each customer, because each customer places different requirements on a regeneration system. "Every sand processing system has its own requirements and needs different concepts which are analysed, planned and implemented with the highest levels of accuracy by Cyrus as a supplier of vibration conveying technology all the way through to complete systems. In addition to professional engineering, objectives are always selecting ideal components for the product-friendly conveying of sensitive castings, a high degree of operational safety and low-maintenance operation of the system", summarises Sven Borghoff, Head of Sales and Marketing at Cyrus.

www.cyrus-germany.com

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Image 2 (left):
Resonance conveyor as a main conveyor line in the tunnel.



Image 3 (right):
Chute distributor at the transfer point to the two main conveyor lines.