



clever move & lift



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Pro-Kran-Assist

Increased safety using
3D LiDAR technology for Industry 4.0

In partnership with the
**Fraunhofer Institute for Factory
Operation and Automation (IFF)**



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Customer requirements at heart – The assistance system to detect and display safe load pickup

Kranbau Koethen GmbH is a manufacturer of complex turnkey crane systems and a specialist in the field of process cranes. As a long-standing partner of the metal-producing and metal-processing industry, the company develops reliable crane concepts that meet specific requirements. In addition to increasing productivity and efficiency, the safety aspect of our products is becoming increasingly important.



Ladle transport cranes 390/60t x 40m
©Photo: thyssenkrupp Steel Europe AG

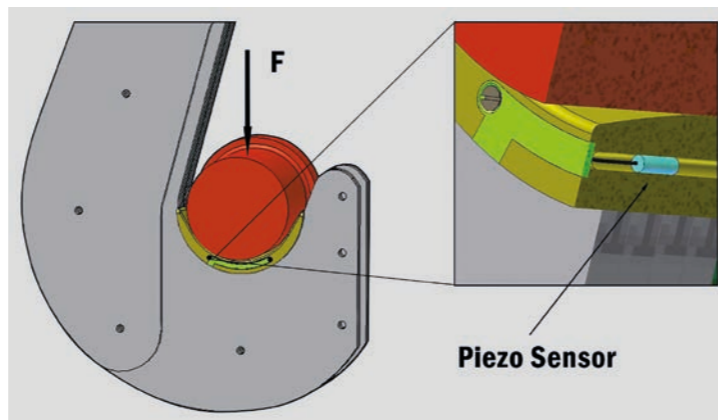
In close collaboration with the Fraunhofer Institute IFF Magdeburg, Kranbau Koethen GmbH has developed **Pro-Kran-Assist** – an assistance system that enables the crane driver to safely pick up the load in real time, and is of particularly benefit in areas where visibility is poor.

At this stage, **Pro-Kran-Assist** is designed for picking up ladles containing liquid steel. Suitability for other applications is being evaluated through a series of tests, these tests are currently in their final stage.

Transport of hazardous materials and previous approaches to reduce the risk of a load falling

Crane systems that transport molten metal pose a number of dangers that are not present in normal industrial environments. Countless related accidents have been documented. In some cases, the pin of the casting ladle was only in contact with the tip of the laminated hook (point load), and soon after the load has been lifted, the ladle has slipped from the hook point resulting in the ladle falling or tilting and molten metal discharge with severe consequences.

Sophisticated assistance systems based on piezo sensors or inductive elements were recently state of the art. With these systems, the transmission of signals is often tethered via a cable reeling drum., This leads to problems, particularly in hot environments and on exposure to flames, and results in enormous maintenance costs. Even camera systems and angle measuring units are not failure-free and, more importantly, are not a reliably safe solution.

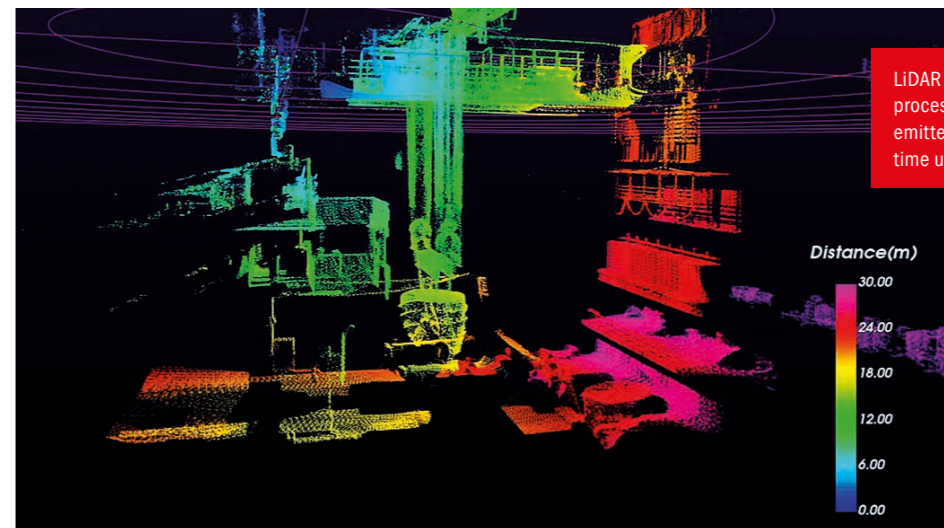


System using piezoelectric sensors to determine the load pickup
Kranbau Koethen in cooperation with the VDEh-Betriebsforschungsinstitut (BFI)

Pro-Kran-Assist: A 3D sensor system as an assistant

The **Pro-Kran-Assist** provides crane drivers with a completely new system based on contactless and wear-free detection of load pick up and put-down processes.

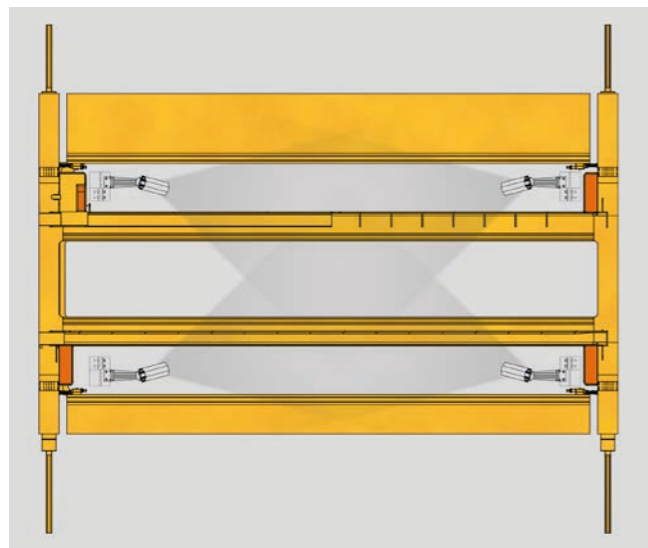
Pro-Kran-Assist is a laser-based system that comprehensively monitors the working area of a ladle crane using special 3D-LiDAR sensors. In particular, the system analyses the load lifting system which is comprised of the traverse, the crane hook and casting ladle concerning the motion dynamics in real time.



LiDAR stands for Light Detection and Ranging, and refers to the process where a ray of light (typically with 905nm wavelength) is emitted and reflected -and a range can be calculated using the time until receipt of the reflection and speed of light.

Point cloud from the 3D-LiDAR sensor system,
Georgsmarienhütte steelworks
©Photo: Fraunhofer Institute for Factory Operation and Automation (IFF)

To make this possible, 4 LiDAR cameras are installed at suitable points, and their signals are processed by the **Pro-Kran-Assist** computer in the electrical control room. **Pro-Kran-Assist** records a high-precision, three-dimensional picture of the surrounding space and depicts it in a 3D point cloud. Rule-based algorithms assess the 3D point cloud and enable a safe interpretation of the specific reloading operations of a process crane when it comes to picking up and putting down the load. The results are depicted in a VR model in real time, and shown to the crane driver on a monitor (see display).



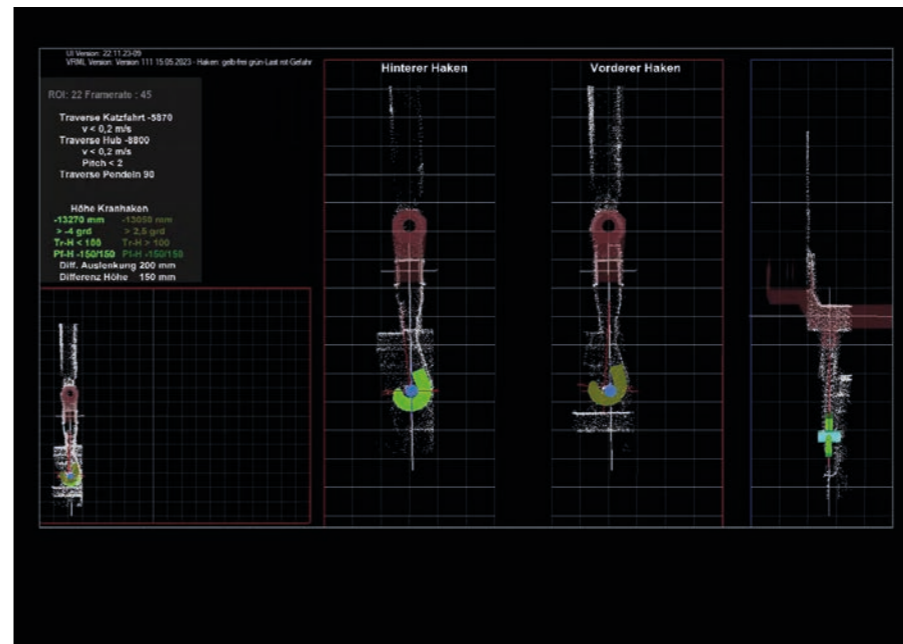
The system works absolutely autonomously and does not interfere with the control system of the crane. The necessary hardware is individually pre-assembled and can be quickly installed.

Pro-Kran-Assist has been tested for several months under harsh ambient conditions in a casting bay and has performed brilliantly. Neither flames and heat, nor smoke, dust or vibrations affected its functioning and reliability.

Four cameras provide a spatial picture for the assistance system



Recording and analysis are carried out in real time in a VR model



Assistance systems for crane drivers
Representation of the point cloud

Pro-Kran-Assist is available immediately as an assistance system.

For more information, please contact:

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Your benefits

- Tested and proven under real ambient conditions in a casting bay
- Safe interpretation of several local positions in 3D-coordinates
- Real-time depiction of reloading operations
- The system operates entirely autonomously
- Installation and commissioning can be performed in a very short amount of time
- Reliable detection of incorrect use of the hook
 - **Pro-Kran-Assist** is resistant to:
 - High vibration / shock stress
 - High temperatures
 - Considerable deposits of dust, pig iron spatters, pieces of slag etc.
 - Deformations Variation in relative mechanical dimensions which may occur due to deformation