

Bulk/Mining



Position Detection



Distance Measurement



Collision Avoidance



Telemetry

Robust Radar Solutions for the Bulk/Mining Industry

Optimally Suited for all Mining Cranes and Vehicles



High Efficiency in the Bulk/Mining Industry: Innovative Radar Systems from Symeo

Dirt, dust, extreme temperatures and high humidity are typical environmental conditions which can be found in the bulk material and mining industry. Symeo GmbH - one of the world's leading radar and sensor experts for industrial applications - develops and markets highly-robust radar and satellite-based systems that provide precise long-distance measurements, seamless positioning of vehicles, cranes and bulk materials as well as reliable collision avoidance, indoors and outdoors. What sets the Symeo systems apart:

- Highest reliability and performance
- Extremely robust
- Maintenance- and wear-free

-  Position Detection
-  Distance Measurement
-  Collision Avoidance
-  Telemetry

Customer Benefits:

Increased Productivity

Efficient Raw Materials Extraction

High Availability of Cranes & Vehicles

Personnel and Equipment Safety



The Symeo solutions are optimally suited for all types of mining vehicles, cranes and equipment, including:

- ✓ Stackers/Reclaimers
- ✓ Scraper Equipment, i.e. Portal Scrapers
- ✓ Bucket Excavators
- ✓ Wheel Loaders
- ✓ Dump Trucks
- ✓ Tracked Transporters
- ✓ Mining Excavators
- ✓ Process Cranes/Indoor Cranes
- ✓ EOT Cranes/Gantry Cranes
- ✓ Other Transport, Crane and Bulk Material Handling Systems

Symeo sensors for positioning, distance measurement, anti-collision and telemetry applications optimize processes such as:

- ✓ Bulk Material Handling
- ✓ Material Flow Tracking
- ✓ Transport/Logistics Management
- ✓ Loading/Unloading Processes
- ✓ Raw Materials Extraction and Production
- ✓ Protection of Industrial Systems, Bulk Materials & Stockpiles
- ✓ Crane Automation

Position Detection, Distance Measurement,

Collision Avoidance and Telemetry



Long-distance radar measurements of up to 1 kilometer

- ✓ Highly-precise, contactless and robust distance measurement of up to 1.000 m
- ✓ For the exact positioning of mining equipment as well as for continuous material tracking, even at long distances
- ✓ Highest degree of reliability, unaffected by dirt, dust, vibrations, extreme temperatures and high humidity



Stacker/Reclaimer: reliable positioning and anti-collision

- ✓ Exact positioning of stackers and reclaimers
- ✓ Reliable anti-collision between stacker and reclaimer
- ✓ Wireless solution, maintenance-free, wear-and-tear-free, extremely robust
- ✓ For optimal and reliable transport activities without production downtimes



Highly-precise indoor and outdoor positioning of mining vehicles

- ✓ Seamless real-time tracking of vehicle positions in halls and in outdoor areas
- ✓ Identification and tracking of transported bulk materials
- ✓ For efficient and collision-free transport and logistics processes
- ✓ Support for modern warehouse management systems

Robust crane and crane trolley positioning

- ✓ Highly-precise wireless and/or satellite-based positioning of indoor and outdoor cranes and crane trolleys in demanding bulk material environments
- ✓ High availability of the radar system even in environments that are subject to dust and dirt, such as in cement works and production halls
- ✓ Optimization of crane automation processes



Material detection on conveyors

- ✓ Contactless method to determine the absence/presence of bulk materials, such as coal, with a single sensor
- ✓ Simple installation
- ✓ Impervious to dust, dirt, vibrations, strong winds and sunlight



Real-time recording and transmission of telemetry and vehicle data

Supplementary information such as the load status and telemetry data of cranes and vehicles can also be captured and forwarded with various transmission methods (WiFi, mobile radio, wireless modem, LPR® wireless channel). Typical telemetry data includes:

- ✓ Speed
- ✓ Driver ID
- ✓ Load status, such as weight
- ✓ Energy consumption



Typical Fields of Application

Symeo Product Features

| Selected Symeo Products | | | | | | | |
|--|-----------|-------------|-----------|-----------|---------|-------------------|-----|
| Applications | LPR®-1DHP | LPR®-1DHP-R | LPR®-1DXi | LPR®-1D24 | LPR®-2D | SAT(-D); LPR®-SAT | STU |
| Position Detection and Distance Measurement Systems | | | | | | | |
| • Stacker/Reclaimer | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| • Scrapers | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| • Mining Vehicles | | | | | ✓ | ✓ | |
| • EOT/Gantry Cranes | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| • Indoor Cranes | ✓ | ✓ | ✓ | ✓ | ✓ | | |
| Collision Avoidance Systems | | | | | | | |
| • Stacker/Reclaimer | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| • Scrapers | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| • Mining Vehicles | | | | | ✓ | ✓ | |
| • EOT/Gantry Cranes | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| • Indoor Cranes | ✓ | ✓ | ✓ | ✓ | ✓ | | |
| Material Detection Systems (Conveyor) | | ✓ | | | | | |
| Telemetry Systems | | | | | | | |
| • Stacker/Reclaimer | | | | | | | ✓ |
| • Mining Vehicles | | | | | | | ✓ |
| • Mining Cranes | | | | | | | ✓ |



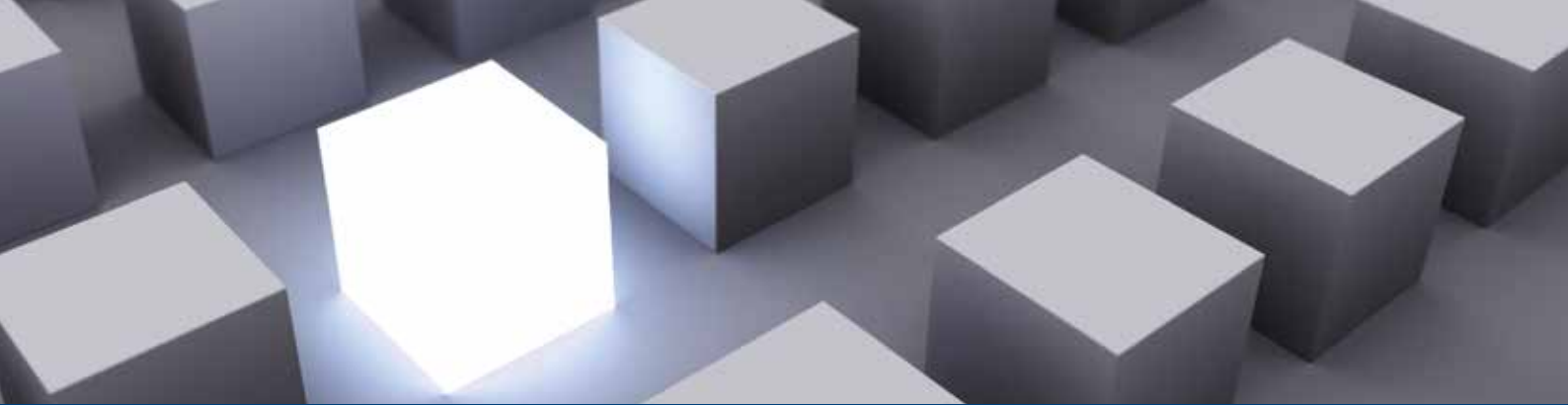
- Patented LPR® radar technology for contactless radar measurements, both indoors and outdoors
- Seamless, centimeter-precise positioning
- Highly-precise distance measurements of up to 1 kilometer
- Reliable anti-collision solutions for cranes, vehicles and other mining/bulk equipment
- Real-time capture and wireless transmission of telemetry data
- Extremely robust (IP65 housing)
- Impervious to weather, dust, dirt, vibrations, sunlight and high humidity
- High degree of reliability even at extreme temperatures
- Maintenance- and wear-free
- Simple installation and commissioning
- Easy to retrofit
- Standard interfaces



Symeo GmbH is an ISO 9001 certified company.

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Syмео GmbH

Syмео GmbH develops and markets systems for precise and contact-free distance and position measurement, as well as anti-collision solutions for cranes, industrial vehicles and fixed objects. Furthermore, the company develops certified, customer-specific telemetry solutions with mobile data transmission.

Syмео products are robustly designed and well-suited for applications in harsh industrial environments indoors and outdoors. The products are easy to retrofit and can be used regardless of vehicle or crane type. The LPR[®] sensors with unique patented radio technology are equipped with industry standard interfaces. The com-

pany also provides industrial GNSS (Global Navigation Satellite Systems GPS, Glonass and Galileo) receivers that can be combined with LPR[®] and other movement sensors like encoders and inertial measurement units (IMU). This combination enables highly available and precise positioning, even under the most adverse conditions and in areas with limited satellite availability.

An international network of Syмео affiliates and partners ensures local support for customers worldwide. Syмео offers a 24/7/365 technical support hotline for subscribers to avoid any downtimes.

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