

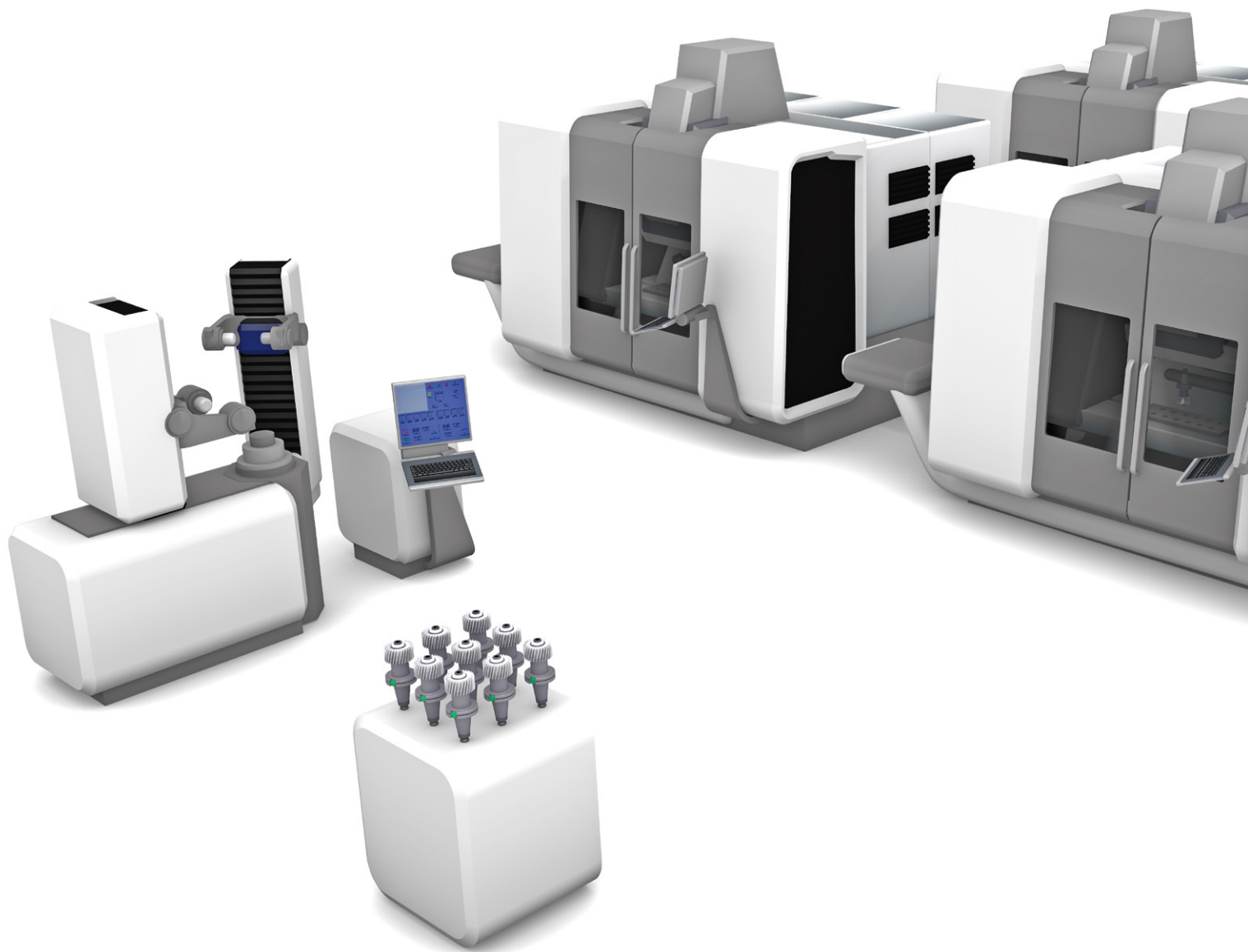
### Well-positioned for modern production

When it comes to machine tools Balluff offers first-class solutions: high-performance sensors and systems as well as the full range of network and connectivity technology. With custom tailored products for individual requirements:

- Object detection and travel measurement sensors for detecting machine movements
- Identification systems for tool management for defect-free production
- Track-and-trace solutions for workpieces
- Sensors for process monitoring

Intelligent combination with the IO-Link communication standard enables reliable information flow. And ensures continuous diagnostics, centralized parameter setting as well as simple, cost-saving installation.

All of which ensures precision and high efficiency for the traditional machine up to the complex, multi-axis machining center. So that the machine tool can be successfully integrated into intelligent manufacturing.



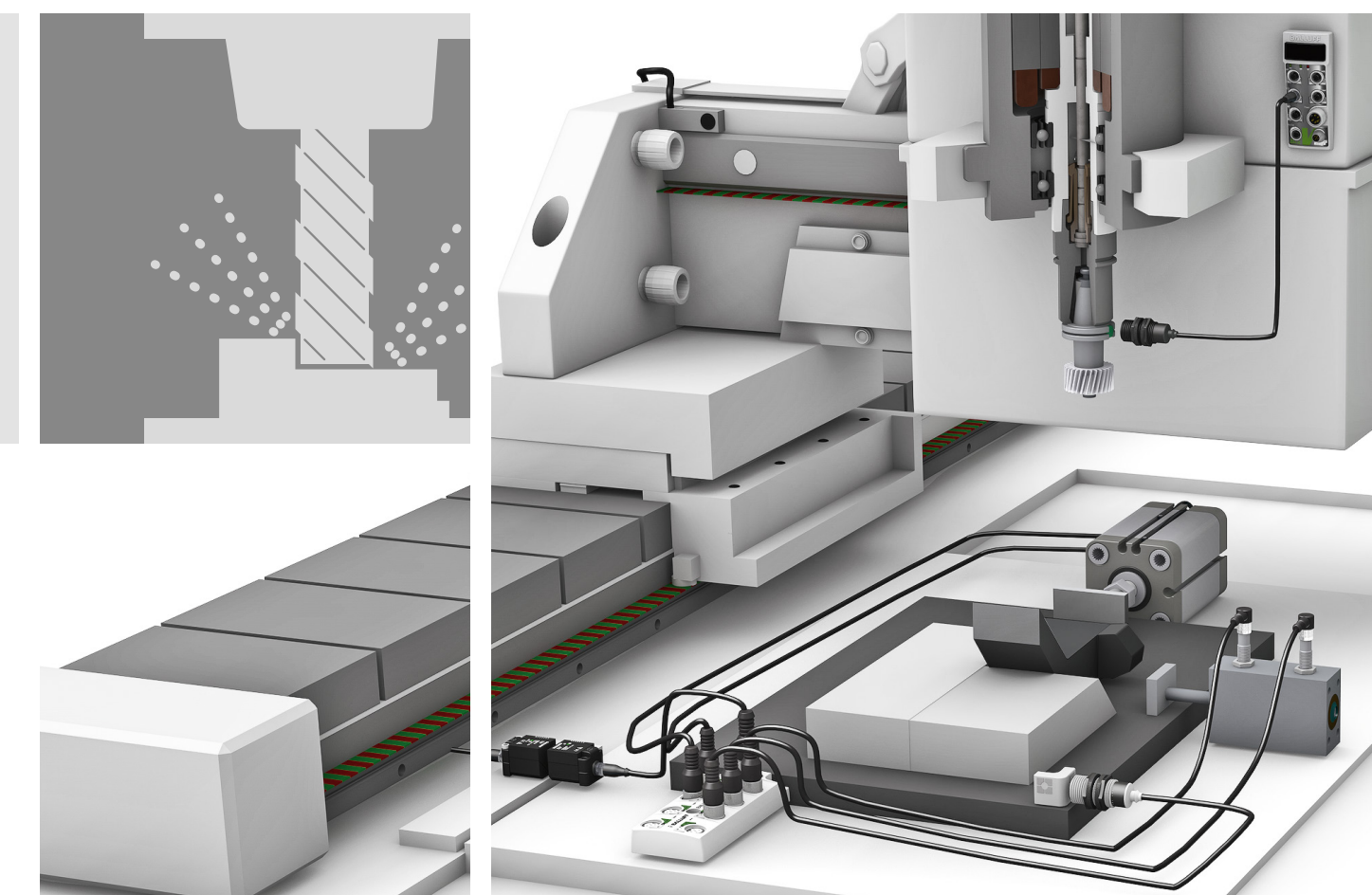
- Systems and Service
- ↻ Industrial Networking and Connectivity
- ↻ Industrial Identification
- ↻ Object Detection
- ↔ Linear Position Sensing and Measurement
- ↻ Condition Monitoring and Fluid Sensors
- ➕ Accessories

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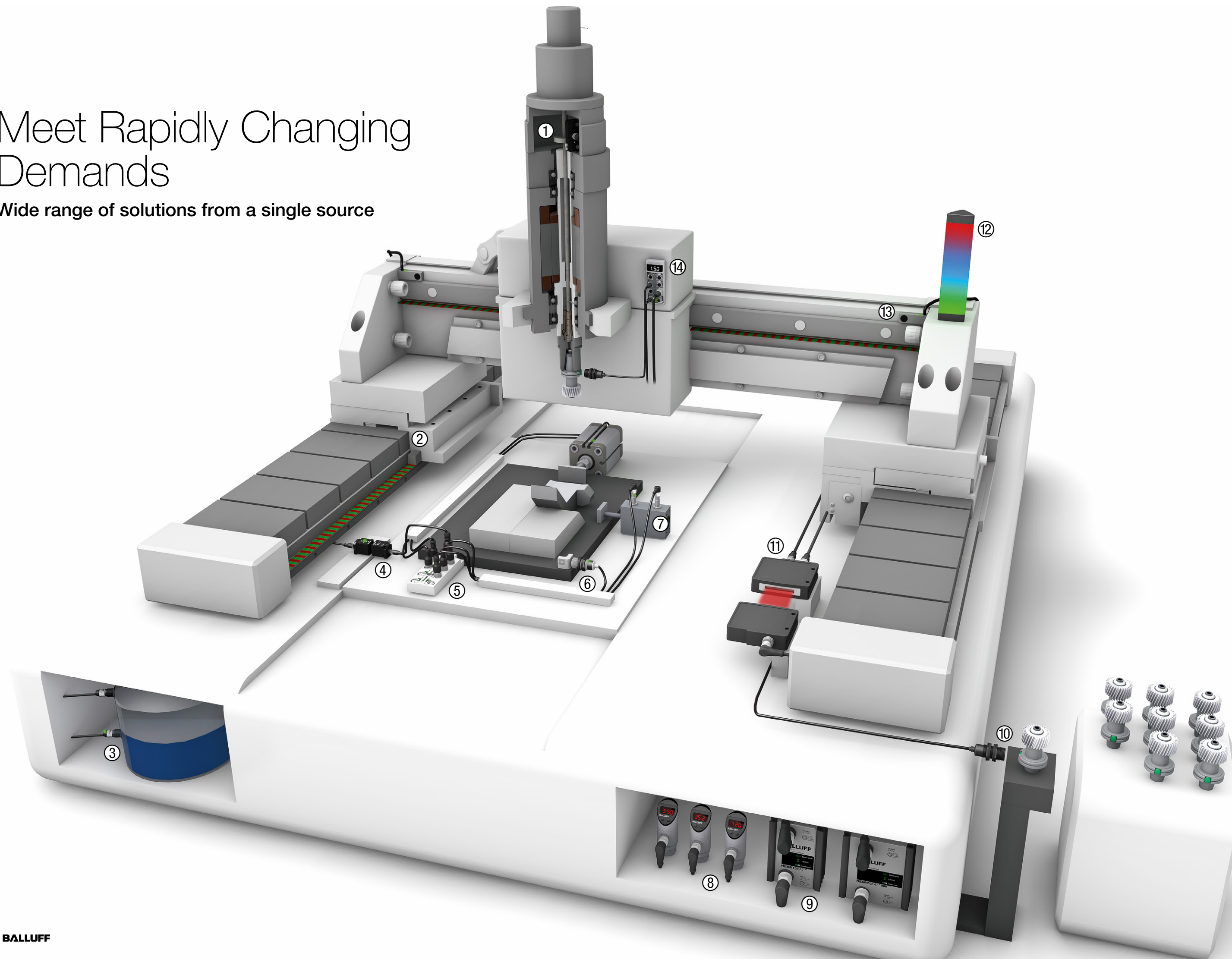
## Flexibility for Machine Tools

Sensors and systems for modern manufacturing



# Meet Rapidly Changing Demands

Wide range of solutions from a single source



## ① Clamping stroke monitoring on the tool spindle

- BIP inductive position measuring system: compact and simple to install – for optimal workpiece clamping
- BAW and BES inductive sensors: the classics for clamping stroke monitoring

## ② Optimal position feedback for the motion axes

- BML incremental or absolute linear measuring systems determine measurement values fast and with high precision. Their magnetic tape can be custom trimmed in place.

## ③ Level detection of process media

- BCS capacitive sensors are the ideal limit status sensors for conductive and non-conductive media. Whether contactless or in direct contact – they deliver precise results. SmartLevel versions monitor fill levels of hydraulic tanks or coolant/lubricant containers. Foam and buildup are reliably masked out.

## ④ Reliable interfaces for linking to controllers

- BIC inductive couplers: the non-contact connector for automated workpiece changing
- Wide range of BCC connectors for virtually any requirement, e.g. connection cables with protective metal braid

## ⑤ Decentralized installation technology for a variety of bus systems

- BNI fieldbus modules provide high performance in all commonly used networks.

## ⑥ Unambiguous association of each workpiece and each pallet

- RFID BIS M/VM (13.56 MHz HF) systems document the entire production sequence: from material delivery to shipping of the finished workpieces. The wide range of tags (corner data carriers, data screws, etc.) solves the most varied tasks.

## ⑦ In the clamping cylinder: checking clamping position

- BHS high-pressure rated inductive sensors for up to 500 bar – for precise checking of the clamping position. Also available with analog output
- BMF magnetic sensors for reliable, economical results
- BMF V-Twin: the connector that combines two magnetic sensors on one slot. Saves costs, simplifies installation

## ⑧ Reliable process monitoring

- BSP pressure sensors are flexible to install and simple to operate. They measure process media such as compressed air, coolants and lubricants or hydraulic fluid. While ensuring consistently high surface quality of the workpieces.

## ⑨ Reliable supply voltage

- Compact power supplies offer long service life and can be installed remotely. Indicators for load, load intensity and life expectancy enable simple monitoring and high system up-time.

## ⑩ Condition-based tool maintenance

- RFID BIS C (433/70 kHz LF): the tool ID standard. All the data (location, cutting time, type and wear) are stored directly on the tool and are available in real-time
- BAM clamps for fast, economical sensor mounting

## ⑪ Cutting tool monitoring

- BLA high-resolution light array: with numerous measuring modes, intuitive operation. Detects tool damage and checks the mill width
- BGL slot sensor: dependable and simple to adjust. Detects mill breakage. Also available with analog output

## ⑫ Machine status indication

- The SmartLight light stack with individually configurable colors enables simple, flexible indication for virtually any task. The various warning and informational signals provide feedback for status as well as process events.

## ⑬ End-of-travel monitoring for the linear slide

- BES inductive sensors: non-contacting and wear-free. Reliably monitor all end positions
- Rugged BNS mechanical multiple position switches: with positive-opening contacts for reliable limit switching (E-stop chain) – for machine concepts proven over many years

## ⑭ Optimal tool usage with RFID

- The dual-frequency BIS for HF and LF is ideal when multiple read/write heads are connected or you need to automate the link between production and logistics.