BALLUFF

sensors worldwide

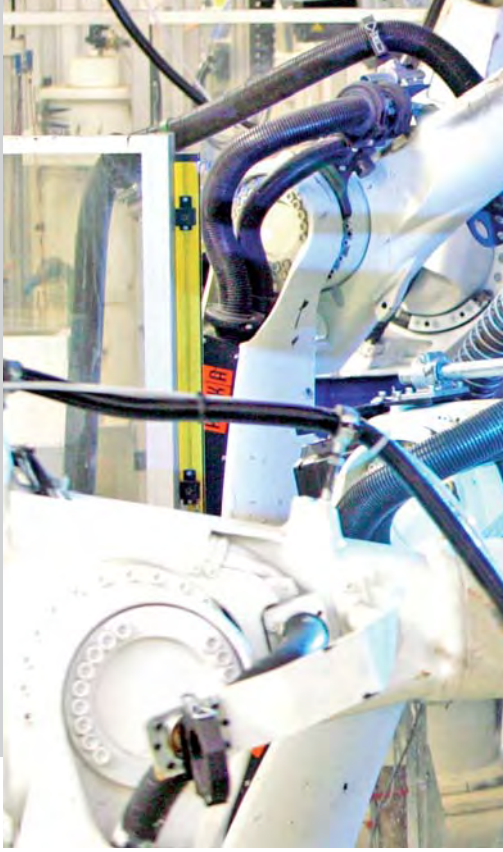
Providing Solutions

... for the automotive industry

We don't leave innovation to chance – we drive it.

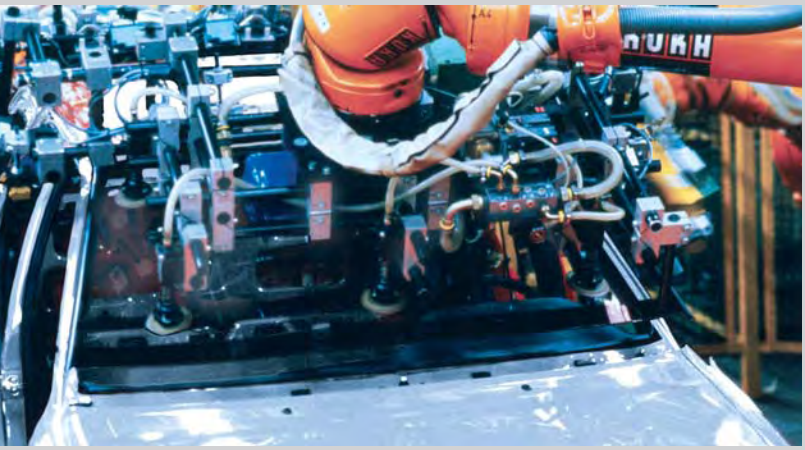
Backed by decades of sensor application expertise and product innovation in a wide range of industries, Balluff is one of the world's leading suppliers of sensor solutions to machine builders, Tier One suppliers, and automotive manufacturers.

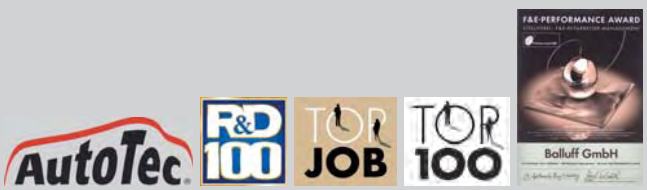
Everyday, throughout the industry, Balluff products increase productivity, drive down costs, and improve product quality, providing productivity to the production line and profitability to the bottom line.

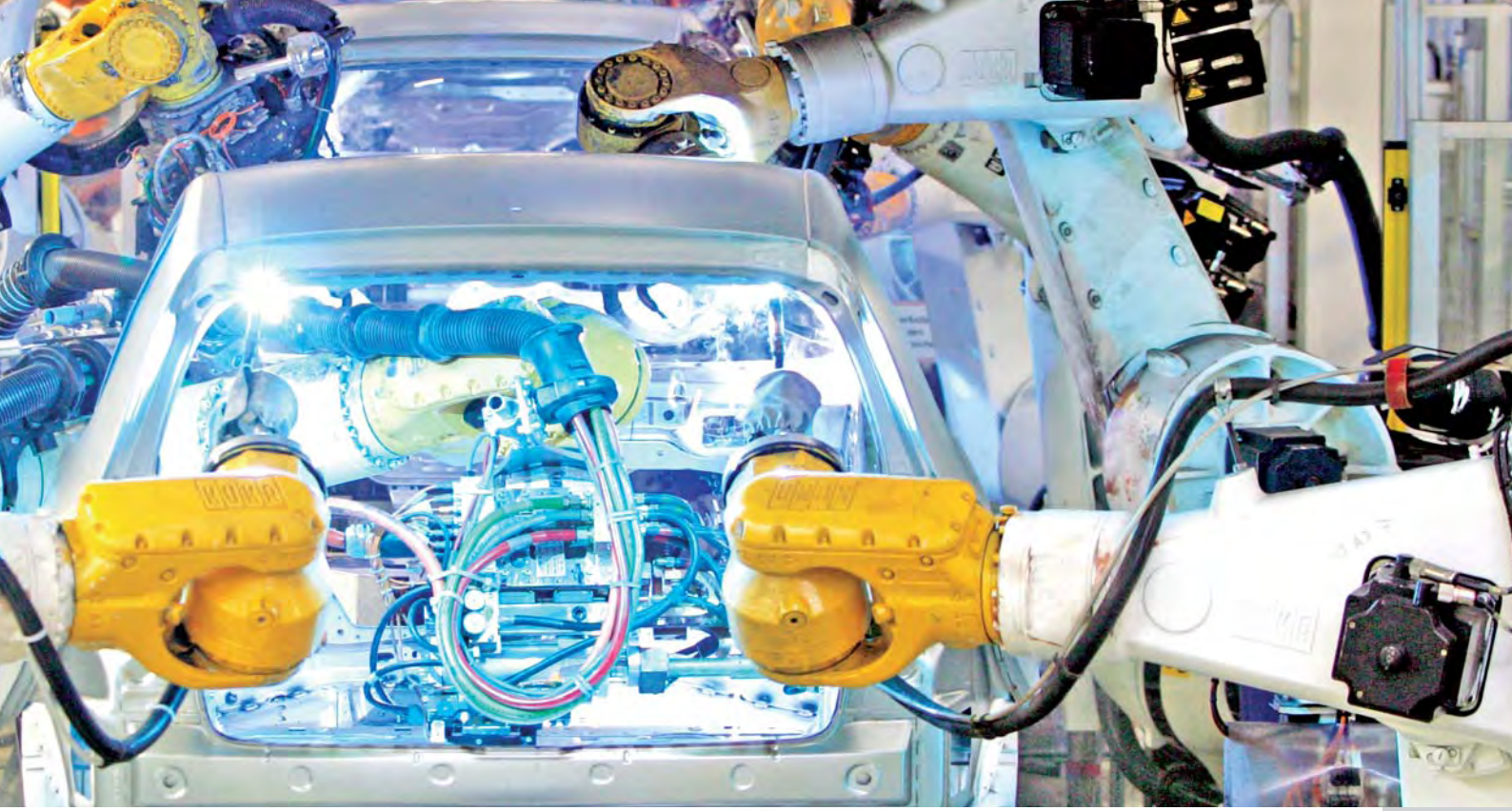


Sensors for the Automotive Industry
Proven expertise

Sensors are at the heart of the manufacturing process



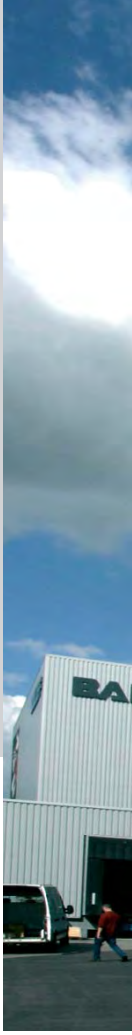




Balluff stands for:

- Constant innovation
- Highest quality standards
- Expert application expertise
- Reliable, on-time delivery
- Consistent customer focus

www.balluff.com



"Worldwide Presence" means what it says. Our entire range of electronic and electromechanical sensors, rotary and linear transducers, and ID systems are available around the globe.

Supported by continuous R&D investment, we create a constant flow of leading edge sensor solutions, production-qualified in our cutting edge Balluff Testing Laboratory. Our sales organizations are located around the world to ensure fast availability and expert application assistance for our customers. We assure product availability and close customer interaction by manufacturing products in Germany, Hungary, Switzerland, Japan, Brazil, China, and the USA.

Worldwide Presence

A global partner for all your manufacturing locations

Corporate Headquarters
Germany

Subsidiaries and Representatives

Argentina
Australia
Austria
Belarus
Belgium
Brazil
Bulgaria
Canada
Chile
China
Columbia
Croatia
Czech Republic
Denmark
Finland
France
Great Britain
Greece
Hong Kong
Hungary
India
Indonesia
Iran
Israel
Italy
Japan
Korea
Malaysia
Mexico
Netherlands
Norway
Philippines
Poland
Portugal
Rumania
Russia
Serbia
Singapore
Slovak Republic
Slovenia
South Africa
Spain
Sweden
Switzerland
Taiwan
Thailand
Turkey
Ukraine
USA
Venezuela

1800 employees
53 subsidiaries and representatives
7 production plants

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Balluff focuses on production-oriented sensor solutions. As a recognized long time member of the automotive manufacturing community, Balluff understands the unique and complex requirements of global automotive production processes. Our sensors have all the required approvals and are specified by most major automotive manufacturers.

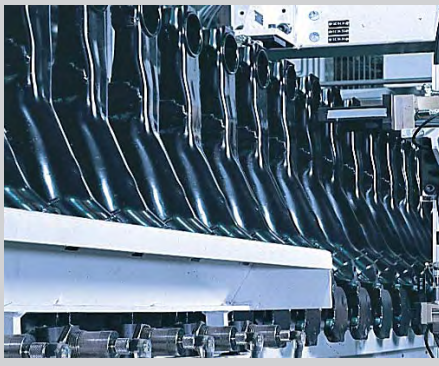
Outstanding products deserve outstanding support. That‘s why custom-tailored application assistance is always avail able from Balluff. We know that the productivity and service life of production equipment are determined by basic sensor selection decisions. That’s why, whenever possible, we prefer to assist our automotive customers from the beginning of a project through installation, start up, and ongoing production support.

We are the right partner when it comes to cost reduction and optimizing maintenance, warehousing, and quality management within the supply chain.

Balluff Production-Oriented Solutions

An essential element of automotive production

IEC VDE 0113



Dependable MRO Support

Automotive MRO operations require a continuous flow of replacement parts from absolutely dependable sources. Balluff provides its automotive customers flexible restock plans designed to fit the specific needs of each location. We also provide the application support necessary to lower the consumption rate of sensors in the first place, plus the associated installation products to ensure the fastest possible replacement and the lowest possible downtime.

Deutscher Akkreditierungs Rat
DAR

Quality Management
Our strict quality requirements allow no compromises. That‘s why for years we have operated our own accredited, extensively equipped testing laboratory. Internal test standards with enhanced specifications ensure that all products tested operate to customer specifications under the harshest conditions.

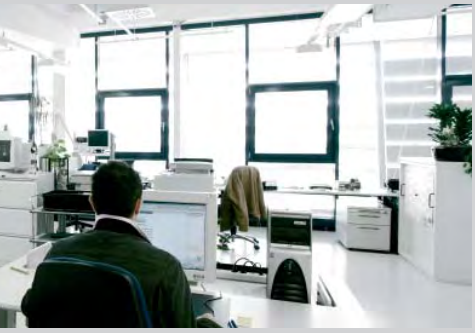
www.balluff.com

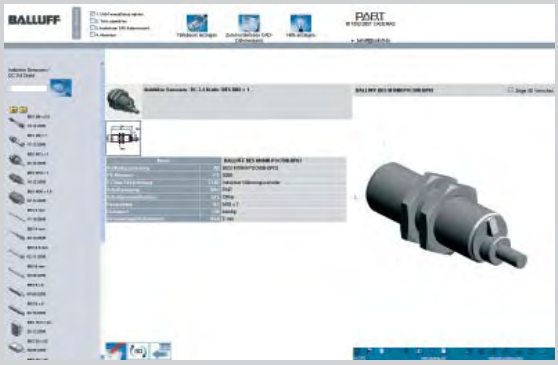
Our comprehensive multilingual website contains extensive product information including data sheets, catalogs, and brochures, plus application information, support documentation, and much more.

We believe in rapid business processes. Electronic data exchange with our customers and suppliers has been a mainstay at Balluff for years, eliminating time-consuming multiple entry.

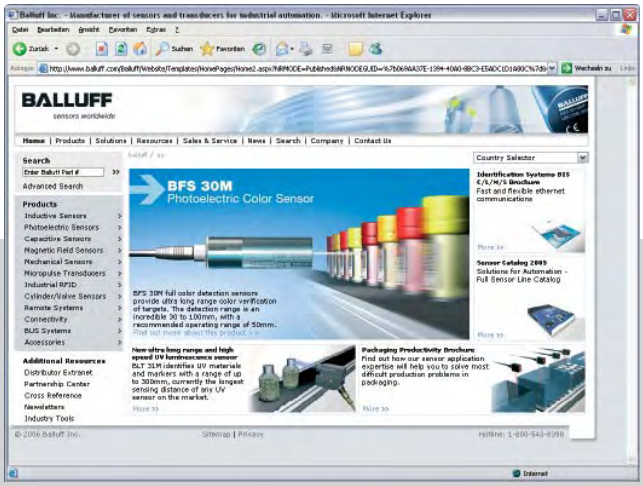
We provide designers with 2D and 3D data from our part server for every Balluff product in all commonly used CAD formats. In addition, authorized persons can receive product approvals online for individual automobile plants. Access to our Intranet portal provides details found in the project handbooks of our automotive partners.

Balluff e-Business
An essential tool for global information flow





Balluff 3D CAD Parts Files
Balluff can supply OEM's, Tier One suppliers, and primary automotive customers 3D CAD files of all our catalog products, including inductive, photoelectric, and capacitive sensors, plus Micropulse transducers. The files are available at www.balluff.de in their respective product areas on the Balluff site. Files can be transferred via e-mail.



Project Management and Coordination
After consultation with our partners, we can develop an individualized solution for all project phases if desired. We ensure smooth information flow between systems, machine builders, and planning departments. We manage individual processes all the way to on-time handoff of the system.

Project Manuals and Approval Lists
Our clearly organized and easy to use project manuals and approval lists are of use to everyone involved from project design to on-time final acceptance. They serve as a guide and indispensable source of information on products and their technical details. Suppliers and products are carefully selected and defined, which promotes low warehousing costs and spare parts procurement.

e-Business
We process available data electronically to speed up not only the flow of information, but also the associated business processes.

www.balluff.com

Balluff offers worldwide 24 hour delivery service through dependable shipping companies such as UPS. Stocked products include the option of direct pick up from a Balluff logistic center.

We offer far more than high quality sensors. We coordinate with project managers throughout the automotive industry, interfacing with planning offices, systems suppliers, and vendors to provide innovative supply chain process improvements and inventory savings.

Balluff Supply Chain Expertise

On-time delivery, flexible logistics, customized inventory options ...

Consigned Inventory
By offering consigned inventory on-site with quality-inspected products, we can assure our partners of optimal supply security and reliability. We handle inventory management and procurement logistics, and our customers profit from part number-optimized inventory at low costs. Products are invoiced only when they are taken from stock.

24h

Balluff provides significant cost savings through optimizing logistical processes and initiating inventory consolidation programs. We also offer a broad range of supplementary services, including application-specific training courses and inventory control programs using our own personnel.

For Balluff, responsive, on location worldwide support is a matter of course. Whether it involves application engineering assistance, implementation of a customer-specific solution, or resolution of a technical problem, we focus on finding the best practical solution for the task at hand.

For especially urgent shipments from stock products, Balluff offers Super Express service. Call-in orders placed by 4:30 p.m. will still be shipped the same day. Express orders with delivery by 10:00 a.m. or 12:00 p.m. as well as pick-up at a Balluff logistic center are also available.

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Electromechanical, inductive, photoelectric, capacitive, magnetic, magnetoresistive, magnetostrictive, magneto-inductive, ID Systems. Balluff provides one of the broadest lines of sensors available for more technological and application-driven solutions than any other competitor. All Balluff lines reflect the latest in high technology, such as laser, long range capability, miniaturization, and the ability to survive in the toughest environments.

Intelligent Balluff Sensor Solutions

A sensor for every application

OBJECT DETECTION

SENSOR LINE

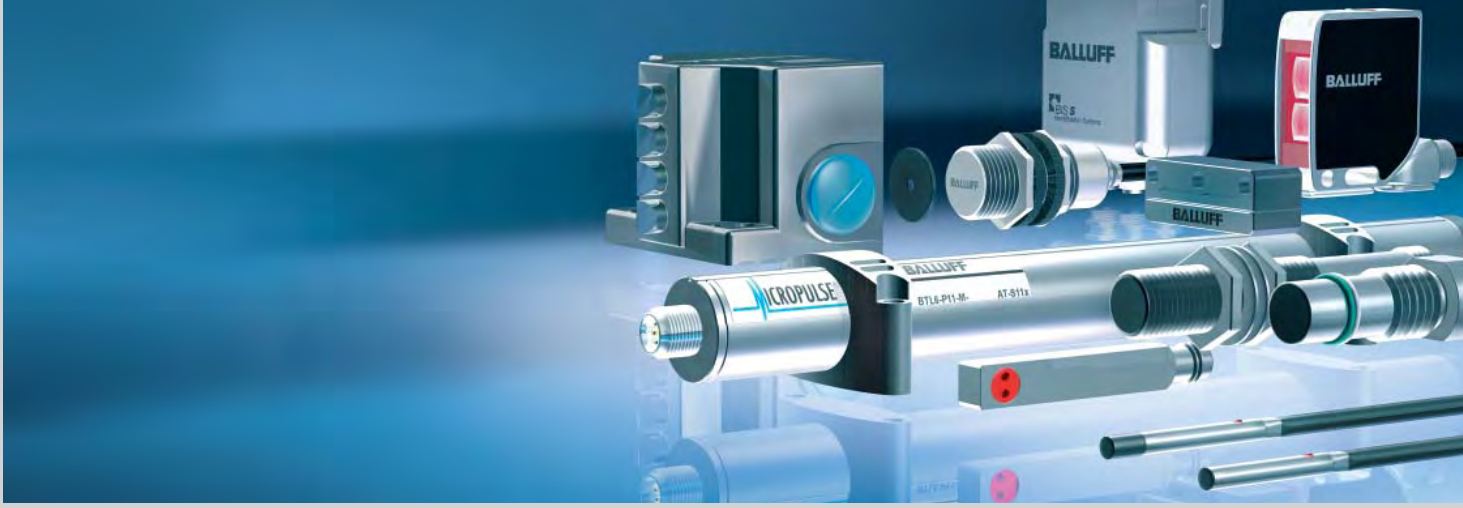
- Inductive Sensors: DC 3-/4-Wire
- Inductive Sensors: DC 2-Wire
- Inductive Sensors: AC/DC
- Inductive Sensors: Special Properties
  – Factor 1
  – Weld Immune
  – Magnetic Field Immune
  – Diagnostic
  – Pressure rated
  – Temperature Rated
  – PROXINOX
  – Ring Sensors
  – Extended Switching Distance
- Sensors for Pneumatic Cylinders
- Magnetic Field Sensors
- Capacitive Sensors

PHOTOELECTRIC LINE

- Diffuse Photoelectrics with Background Suppression
- Retroreflectives
- Thru-beams: Emitter/Receiver
- Fiber Optic Systems
- Slot Sensors
- Optical Window Sensors
- Light Grids
- Contrast Sensors
- Luminescence Sensors
- Colour Sensors
- Photoelectric Distance Sensors

MECHANICAL LINE

- Mechanical Multiple and Single Position Switches
- Mechanical Multiple and Single Position Switches per DIN EN 60204-1/VDE 0113
- Mechanical Multiple and Single Position Switches with safety switch positions
- Mechanical Multiple Position Switches with quick-change plunger block
- Inductive Multiple and Single Position Switches
- Inductive Multiple Position Switches with extended switching distance
- Mechanical Multiple and Single Position Switches with wireless technology
- Multiple Position Switches with Mixed Assembly



Ruggedness
Micropulse transducers withstand shock up to 100 g and provide repeatability of a few µm even under this load. Their IP 67 enclosure rating means they are also extremely insensitive to environmental effects.

Dynamics
Our new BIW inductive linear position sensor works at a sampling rate of 20 kHz, which makes it ideal for sensing highly dynamic fast moving processes.

Long Range
Whether you need longer range with the same housing, or the same range with a smaller housing, Balluff provides 2×, 3×, and 4× sensors for longer range sensing from smaller packages, and/or installation away from hot, caustic, or dangerous impact environments.

Miniaturization
Balluff leads the world when it comes to mini solutions. Some examples: Flip-chip technology enables us to pioneer 3 mm inductive sensors. Balluff's BMF 303 magnetic field sensor is small enough to allow multiple installations to fit into the tiniest slots on one inch cylinders. Our BIS C-121 is the smallest data carrier design; perfect for tracking micro electronic components during production.

Standardization
Standard configuration sensors and mounting solutions can substantially increase productivity and lower supply chain costs. Balluff provides a complete range of sensing solutions within your choice of just one sensor configuration. And we provide a range of standardized quick-change mounting solutions that dramatically lowers replacement and installation time right where it's needed – on the production line.

DISPLACEMENT

TRANSDUCER LINE

- Micropulse® Profile Transducer Series
- Micropulse® AT Transducer Series
- Micropulse® Rod Transducer Series
- Micropulse® Compact Rod Transducer Series
- Micropulse® BUS Interface Processors
- Magnet Band Linear Encoders
- Incremental and Absolute Encoders
- Inductive Position Feedback System
- Inductive Linear Position Sensor
- Magneto-Inductive Position Sensors
- Photoelectric Distance Sensors

INDUSTRIAL RFID

IDENTIFICATION LINE

- BIS C Industrial RFID Systems
- BIS L Industrial RFID Systems
- BIS M Industrial RFID Systems
- BIS S Industrial RFID Systems

CONNECTIVITY

CONNECTIVITY LINE

- Connectors
- Splitter Boxes
- Active Boxes
- IO-Link
- Inductive Transmission Systems Remote
- Sensor-Systems AS-Interface®
- BUS Systems
- Wireless
- Electrical Devices

ACCESSORIES

ACCESSORIES LINE

- Clamps and Brackets
- Mounting Systems

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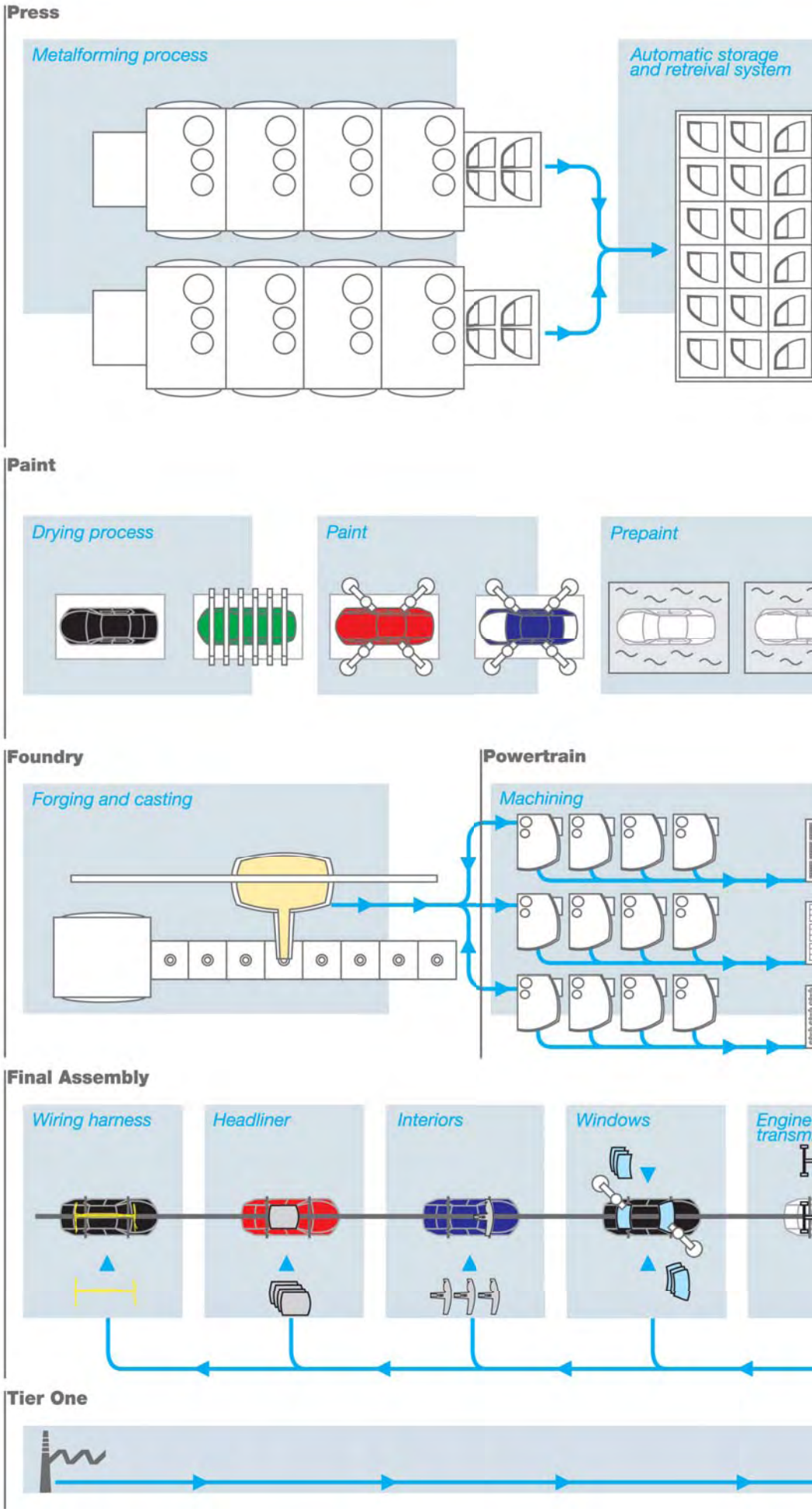
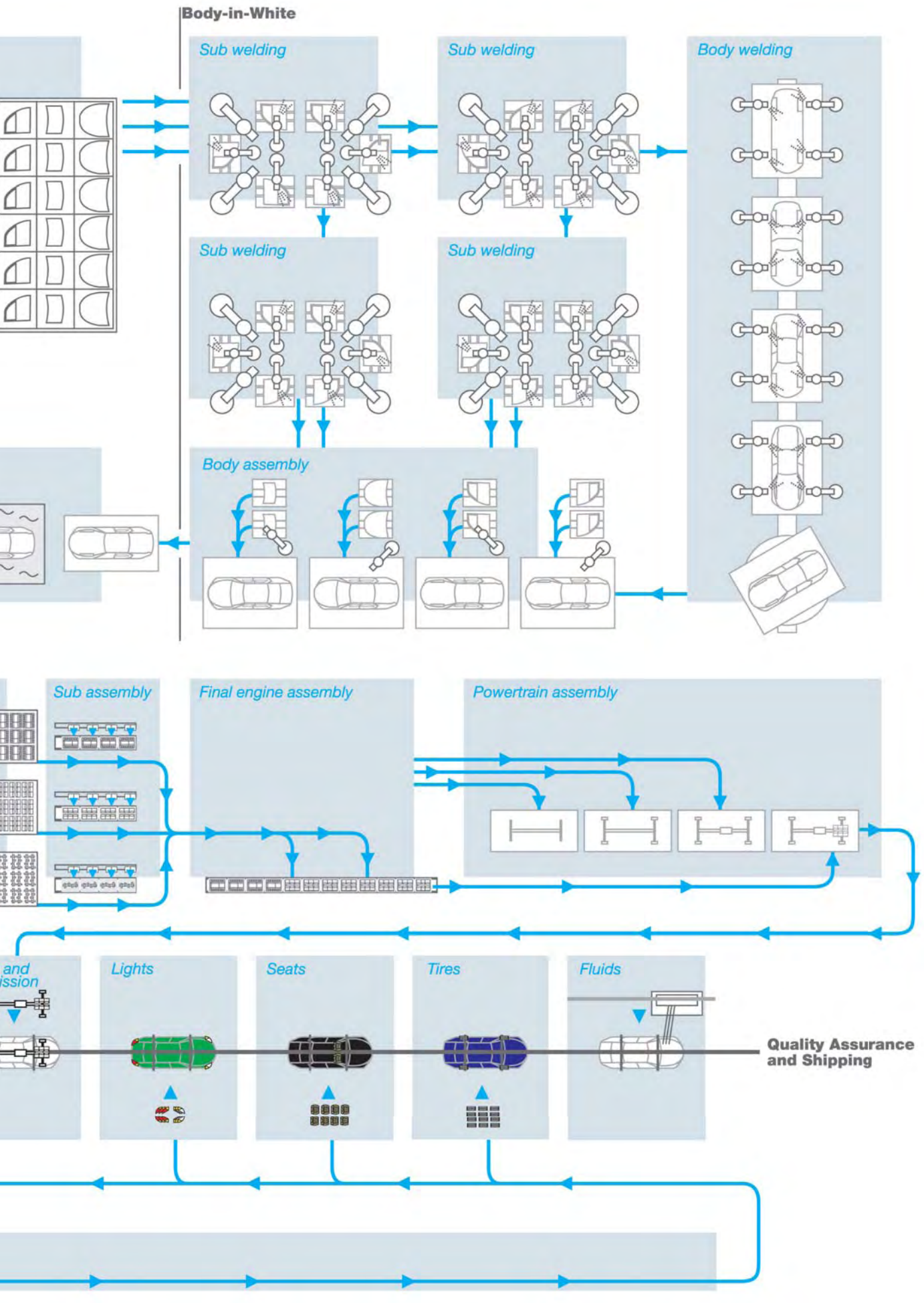
From initial die stamping to final assembly, Balluff provides sensor solutions for virtually every aspect of an automotive manufacturing operation. Beyond the actual manufacturing and assembly, Balluff sensors provide 100 % component inspection and parts flow control to make sure that all parts meet customer spec at every step of the process.





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Engine blocks, cylinder heads, and other critical automotive components are cast from molten metals poured into specialized sand molds or other casting processes. Here, metal alloys are created through specific recipes and are typically melted in an electric furnace. Molten metal is transferred into a movable ladle and then precision poured into molds that shape a specific component. In sand cast manufacturing, mold tracking functions and pour processes are accomplished with Balluff identification systems, robust enough to withstand the rigors of shock and vibration found in the foundry environment.

Foundry

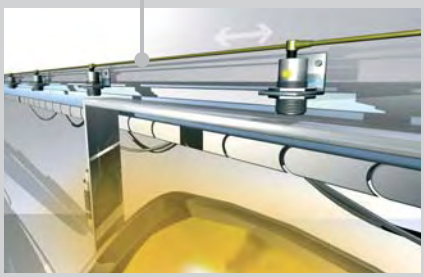
Precision sensing for casting and forging environments

Inductive Sensors

Photoelectric Sensors and Distance Sensors

Mold Tracking with BIS Industrial RFID Systems

RFID BIS M sensors in conjunction with ID tagged molds can assure that all molds are properly stored ready for use. Proper storage procedures are crucial in complex foundry operations where many molds need to be available for immediate use. When a mold is transferred to the foundry operation, it can be checked again prior to use to verify correct selection.



Rack Position with BES Inductive Sensors

Pour ladles that travel on a track or overhead rack are positioned strategically to precisely pour molten metal into molds without spilling onto the floor or overflowing – all on a highly controlled, timed basis. Balluff non-contact, long-range inductive proximity sensors can be incorporated on the rack system to sense the stationary ladle position just prior to pouring.

Ladle Position with BTL Micropulse Transducers

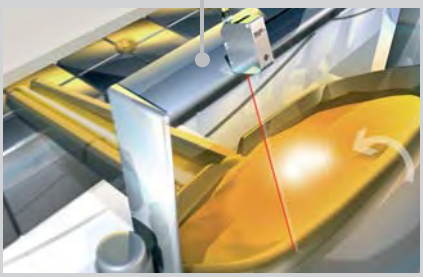
When extremely high precision in pour point ladle positioning is required, Balluff Micropulse magnetostrictive linear positioning transducers can be integrated into the process. Multiple set points for stationary ladle position can be programmed into the control system to provide micron-level accuracy for precision ladle positioning.

The foundry environment requires precision tracking excellence, but poses formidable heat and impact challenges. Balluff's robust sensor designs are up to the task.

Mechanical Multiple Limit Switches

Micropulse Transducers and Inductive Linear Position Sensor

Industrial RFID Systems



Tilt Angle Measurement with BOD Photoelectric Distance Sensors
To regulate the amount of metal that is poured from the ladle, it is necessary to exactly measure the pouring angle of the ladle. A Balluff BOD 63M analog photoelectric sensor can be used to precisely measure in real time the exact angle the ladle is in, both at rest and during the pouring operation.

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Just as the powertrain is the center of every vehicle, Balluff's sensor expertise lies at the heart of every manufacturing process. Here is where the heart of the vehicle – engine, transmission, axle and steering in a wide variety of configurations – comes together. This area is a particular strength of Balluff. We are involved in major powertrain projects throughout the world.

We prove our unique flexibility and performance capability each and every day. We are a comprehensive, single source of innovative sensors used in every stage of powertrain production. If a standard sensor solution does not meet a specific application, we can quickly develop a custom-tailored individual solution.

Powertrain

Precision sensing for machining environments

Inductive Sensors

Sensors for Pneumatic Cylinders

Photoelectric Sensors and Distance Sensors

Automatic Tool Identification and Tool Management with BIS Industrial RFID Systems
A quantum leap over outmoded manual tool ID and tracking methods, automatic sensor-driven ID systems remove error prone manual steps from the tool selection and loading process, as well as provide a complete record of tool use. With automatic tool tracking methodologies, misleading or potentially erroneous data is eliminated, which removes the issues of tool crashes, broken tools, operator setup errors, excessive wear, and lost tool tracking.

BES Inductive *Steel*face™ Sensors for rugged applications
A major reason sensors fail is repeated or excessive physical contact with heavy or fast moving metal objects. The Balluff Steelface sensor series combines a rugged single-piece stainless steel housing with 2 to 3 times the sensing range of standard inductive proximity sensors. This allows the sensor to be mounted further away from the target, to lessen or eliminate sensor contact. Steelface sensors sense ferrous or non-ferrous metals at virtually the same sensing distance.

Pallet Identification with BIS Industrial RFID Sytems
RFID pallet data tracking should be an integral part of any complex manufacturing operation. By using strategically placed RFID read/write heads coding data carriers located either on the products or their production pallets, RFID sensors keep track of parts and process steps from original source to final customer delivery. They can track multiple products produced on the same flexible production line, and control build to suit custom production or concurrent multiple part assembly on the same production line.

From fine machining, lapping, and honing, to assembly of finished engine, transmission and driveline powertrain components, Balluff sensors, ID systems, and mechanical limit switches play a vital role in starting, stopping, and controlling CNC machine and assembly functions in automotive factories.

Mechanical Multiple Limit Switches

Industrial RFID Systems

Precise Positioning with BNS Mechanical Limit Switches

Mechanical limit switches have played an important role in precision machining processes for years in global automotive facilities. High-precision switches with extremely tight tolerances used in conjunction with nitrite-hardened trip cams, assure that critical metal cutting, boring, lapping, and honing processes meet critical manufacturing specifications.

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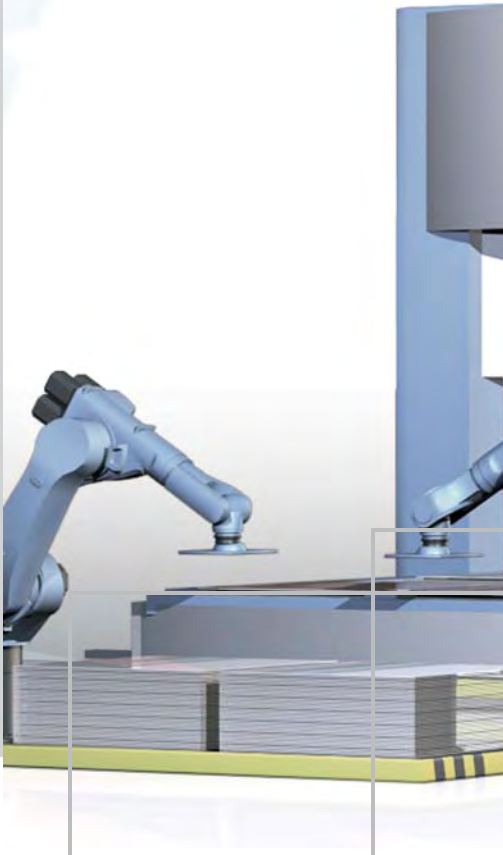
The production of body panels such as doors, hood, roof, and other components in the press shop is work that demands precision stamping and metal positioning in order to protect expensive dies and stamping equipment, and to ensure each part is a perfect part.

Steel or aluminum is formed in progressive die stamping operations into body parts in a highly automated process using powerful presses and press lines. Balluff sensors are designed for the harshest ambient conditions, where they position, control, and identify dies and assorted work pieces in press shops around the world. They provide feedback for automated processes while ensuring high product quality even in the tightest mounting locations.



Press
Sensors for die protection and press control

Inductive Sensors

Photoelectric Sensors

Inductive Transmission Systems Remote

Gripper Sensing with BWL Photoelectric Angle Sensors
Positioning sheets of metal in large presses is a key step in the production of automotive body panels. Balluff sensors can indicate when grippers are fully closed correctly around a part, and also indicate that a part is in exactly the correct position within the gripper jaws. This prevents potentially catastrophic double sheet feeds, blank cycling, and a range of system malfunctions, and assures that material is picked up with safety to operators and equipment and without damage to material being moved.

Press Parallelism and Shut Height with BTL Micropulse Transducers
It is necessary to know exactly the amount of shut height needed with every set up so that dies and presses will produce more precision-stamped pieces with longer die life, more controlled press operation, and shorter set up time. Unfortunately, many existing stamping presses do not have any form of shut height measurement device to reference the ram position. A Balluff magnetostrictive transducer installed on a press measures and reports the exact position of the press ram down to 5 µm.

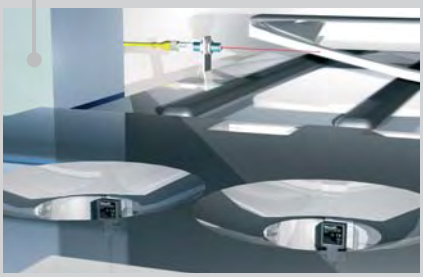
Die Tracking with BIS Industrial RFID Systems
Specific information about die identification, modification, and usage is critical to the overall metal stamping quality process. Paper-based solutions are obsolete. Hard-wired solutions are prone to breakage when dies are installed. Balluff's family of BIS RFID systems tracks, measures, and characterizes die use, eliminates many cables and connectors, and records and stores die information without resorting to additional hard wiring – a quantum leap in the die stamping quality process.

Balluff sensors monitor a wide variety of metal forming and error proofing processes. For example, press shut height is controlled with Balluff transducers while hydraulic power systems are monitored with high-pressure inductive sensors. Parts stacking and de-stacking functions are all monitored with Balluff sensor systems.

Micropulse Transducers and Magneto-inductive Position Sensors

Industrial RFID Systems

Accessories, Connectors



Slug-Out and Part-Out Monitoring with BES Inductive and BOS Photoelectric Sensors

Stamping dies continuously eject finished parts and slugs. To avoid costly damage to the die and to finished parts, it is imperative that all slugs and parts be verified as having been successfully ejected. Balluff offers a range of sensor solutions to ensure that slugs have correctly cleared the die, scrap material has been deposited into the correct receptacle, and finished parts have been ejected cleanly and transferred correctly to onto conveyors or into bins.

www.balluff.com

Industrial robots join individual components together into self-supporting body shells using a variety of fastening technologies such as spot and track welding, gluing, and pressure assembling. Here not only the highest degree of precision is required, but also the greatest possible repeat accuracy, especially to achieve optimum welding results.

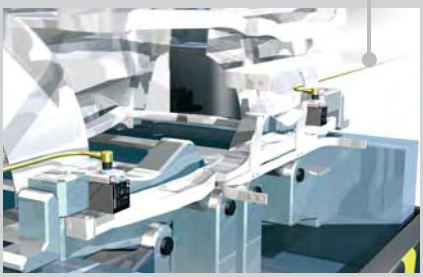
Our customers also rely on our custom-tailored range of especially rugged weld field immune sensors. These can withstand not only high temperatures, but also weld splatter and powerful welding currents. Balluff also provides proven solutions for end-of-travel monitoring on welding robots as well as Balluff inductive coupler systems. The latter help give robots complete freedom of movement by replacing cumbersome hard wiring with wireless data and energy transmission.

Body-in-White
Precision sensing in body transfer and weld

Inductive Sensors

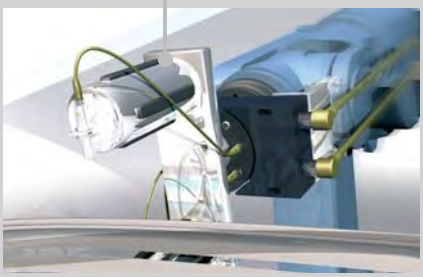
Sensors for Pneumatic Cylinders

Inductive Transmission Systems Remote



Part-in-Clamp Detection with BES Factor 1 Inductive Sensors
Balluff Factor 1 inductive proximity sensors play an important role in automotive body manufacturing. These devices are inherently weld field immune (WFI), important in certain welding applications. They also have the capability of sensing all metal materials at the same rated sensing distances. There is no need for readjusting or compensating for differences in metal targets, something standard inductive sensors cannot accomplish.

Pallet Positioning with BOS Photoelectric Thru-Beam Sensors
Positioning of each vehicle pallet at each assembly station is critical to the overall build quality of a vehicle. By exactly locating the front edge of a pallet with high repeatability, long range high precision Balluff BOS photoelectric laser sensors can precisely supply the position of the pallet, reliably starting the assembly process for each assembly station.

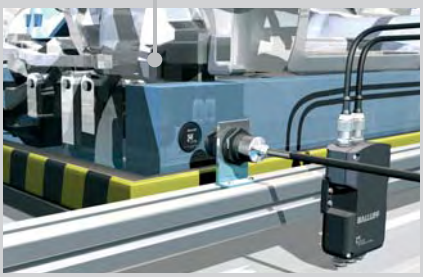


Flexible Power and Automation Transfer with Inductive Transmission Systems Remote
Welding and assembly robots with sensors located on end effectors are continuously moving in multiple axes. Hard wiring these sensors expose their cables to continuous flexing that inevitably leads to wire fatigue and system downtime. Unique non-contact Balluff Power Remotes pass power and information to and from the sensors across an air gap, totally eliminating wire fatigue while leaving the robot 360° of movement.

Body weld and transfer of automotive sub-assemblies are accomplished with Balluff sensors integrated into conveyor systems. Pallet position is tracked with ID systems; photoelectric sensors monitor both leading edge and trailing edge of pallets.

Photoelectric Sensors and Distance Sensors

Industrial RFID Systems

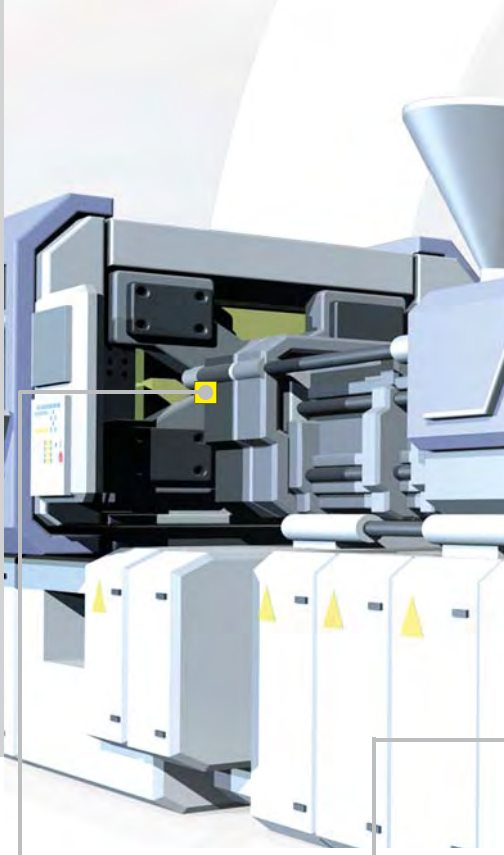


High Speed Information Tracking with BIS Industrial RFID Systems
For efficient body assembly operations, it is essential that all body assembly pallets be identified – plus all assembly operations that relate to each pallet be recorded as to when and what took place, and on which shift.
Balluff BIS L RFID Systems have the read/write capability to identify all relevant tag information and to record complete build information for each vehicle.

Redundant Zone Limit Safety with BNS Mechanical Limit Switch
Balluff redundant zone limit safety systems were created to protect human operators when they work in the same area as the robot. Zone limit safety systems control three axis of robot movement and provide an extra bonus. When integrated, the amount of floor area a robot consumes is reduced, thus making best use of valuable factory floor manufacturing space.

www.balluff.com

Today, many aspects of motor vehicle production are outsourced from automobile manufacturers to outside sources such as Tier One suppliers. Components like interiors, HVAC controls, wheels, tires, suspensions, bumpers, fascias, and braking systems to name a few, are outsourced to Tier One suppliers. Balluff sensors play an important role in the manufacturing process to enhance productivity, guarantee JIT (Just In Time) delivery, monitor ILVS (In-Line Vehicle Sequencing), and increase machine up time.



Tier One

Sensor-driven solutions for automotive suppliers

Inductive Sensors

Sensors for Pneumatic Cylinders

Photoelectric Sensors

Inductive Transmission Systems Remote

Instrument Panel Production
Instrument panels are molded in injection molding machines using Balluff Micropulse Magnetostrictive transducers for clamp/unclamp and eject control. Balluff long range laser systems are used to validate the presence of specific product features relating to options relating to specific vehicle models. BES sensors are used to ensure attachment flange presence, while the entire process is tracked using Balluff RFID systems.

Tire Mounting
In many automotive supplier assembly plants, tires are mounted to wheels using automated machinery prior to installation of the vehicle under construction. Wheel position, valve stems presence, and wheel trim presence is verified with diffuse-reflective photoelectric sensors. Balluff BES inductive proximity sensors are used to indicate proper wheel orientation and valve presence.

Seat Manufacturing
Automotive seat frame stamping, welding, and assembly functions are all monitored with Balluff inductive proximity sensors to validate rivet presence and nesting of components in presses and in welding fixtures. Seat fabrics are color matched using Balluff color sensors, and seats on pallets in sequence (ILVS) are monitored and tracked using Balluff ID systems. Error proofing functions are validated using Balluff photoelectric sensors.

Plastic injection molding processes, assembly and automation disciplines, tire and wheel mounting, metal forming and welding, and automotive interior component production are all driven by Balluff sensing technologies.

Micropulse Transducers, Inductive Linear Position Sensor and Magneto-inductive Position Sensors

Industrial RFID Systems

Clamps, Brackets, Mounting system

Stamped and Welded Sub Components

Structural automotive components such as impact bars, gas cap flaps, hoods, doors, hatch backs, floor pans, instrument panel frames, steering boxes, and suspension components are stamped and welded using Balluff inductive sensors for clamp/unclamped detection, die protection, nesting validation, and load/unload functions.

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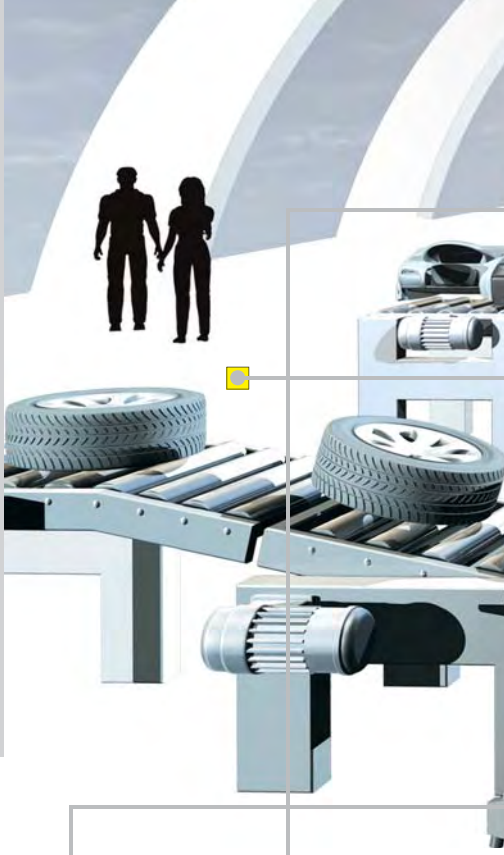
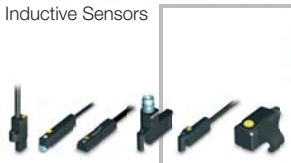
Final assembly is where finished bodies meet all subassemblies and parts remaining to be added. Conveyor lines and specialized handling equipment bring these components to arrive on the line as the last step in an extensive just-in-time supply chain sequence. Wiring harnesses are installed while individual assemblies such as engines, transmissions, and axles arrive. Final assembly calls for a host of different sensor technologies and configurations. Whether the requirement is for range, motion control, small target tracking, or reliable sensing in harsh environments, our automotive partners find that with Balluff they have the right solution for virtually any assembly application.



Final Assembly
Where it all comes together

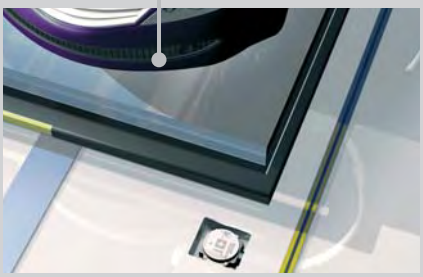
Inductive Sensors



Sensors for Pneumatic Cylinders

Inductive Coupler Systems

Photoelectric Sensors and Distance Sensors



Floor Mounted Pallet Positioning with Long Range BES Inductive Sensors
Balluff Maxisensors, conveniently mounted in the floor, provide stop locations for automotive assembly pallets. Pancake style sensors have the sensing range and the configuration to be recess mounted out of harm's way while retaining full positioning accuracy.

Instrument Panel Color Confirmation with BFS Color Sensors
Balluff BFS 27K full color sensors guard against supply chain and operator errors by making sure that the right color instrument panel goes into each vehicle. These sensors can detect up to three colors at a time – at ten tolerance levels. Because they are able to detect subtle differences in color while remaining insensitive to changing ambient light conditions, they are perfect for insuring error-free installation of interior components.

Part Configuration and Positioning with BLG Light Grids
Balluff BLG dimensional light grids offer an economical solution to large part detection, sizing, and configuration. They require only simple aligning to set them up. Their long range sensing distance and large coverage area make them perfect to use when prepping large subassemblies for installation into vehicles.

Many functions occur during final automotive assembly. Tire mounting, interior seat installation, laminated headliners, instrument panels, steering and molded carpeting, fluid filling, trim, and fascia installation, to name just a few, are all controlled using Balluff sensing technologies.

Mechanical Multiple Limit Switches

Micropulse Transducers, Magneto-inductive Position Sensors, Inductive Linear Position Sensor

Industrial RFID Systems

Window Seal Detection with BOD Photoelectric Distance Sensor
To seal a car windshield, often the inner parameter of the windshield is “primed” with a liquid activator prior to installation. Then a viscous sealant is robotically applied. Often, Balluff BOD 26K sensors are used to measure bead height of the sealant to guarantee that the sealant bead is present and there is enough sealant to ensure the windshield is weather tight, yet still can be removed in the event it becomes damaged in use.

AGV Control with BIS Industrial RFID System
Automated guided vehicles (AGV‘s) can be controlled using Balluff ID systems. Tags are imbedded in the floor to track deliveries and guide carts to and from assigned work stations as they deliver parts throughout the plant. Balluff photoelectric sensors are also often used to precisely position AGV’s to the requirements of each work station.

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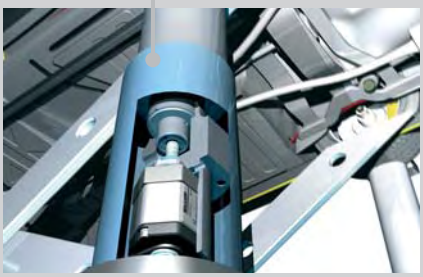
The global automotive industry is one of the most competitive markets imaginable. Customers demand longevity, years of trouble-free operation, economy of ownership and overall vehicle quality.

Not so very long ago in the automotive industry, the term regarding defects was “PPM” or parts per million. Now automotive manufacturers expect “PPB” or parts per billion. Customers expect flawless components to be integrated into the motor vehicles they purchase. Components such as exhaust systems are expected to last in excess of 100,000 miles and engines and transmissions to function in excess of 250,000 miles without a failure. Automotive fabrics and carpeting must last for nearly a decade without appreciable fatigue.

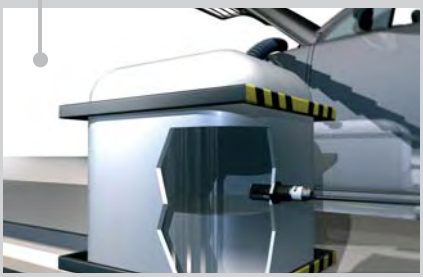
Quality Production
Sensor-driven error proofing

Inductive Sensors

Photoelectric Sensors



Cylinder Position Tracking with BTL Micropulse Transducers
Cylinders are often used to move heavy automotive subassemblies into exact position. Balluff Micropulse transducers provide the positioning information necessary for these critical assembly steps. Built into the cylinder or mounted externally, Micropulse transducers provide absolute, reliable non-contact position feedback even under the most extreme ambient conditions.



Fluid Level Control with BCS Capacitive Sensors
Various fluids must be added to vehicles as part of the overall assembly process. Balluff BCS capacitive sensors are able to detect the level of virtually any material, making them the perfect choice to monitor fluid levels in non-metallic containers. Adjustable sensitivity potentiometers enables differentiation between materials, allowing BCS sensors to ignore container, barrier, or mounting hardware.

Part Gauge Verification with BGL Slot Sensors
Laser thru-beams are the latest style of easy-to-use high precision photoelectric sensors. Because they have rigid self-contained one piece housings, they are perfect for integrated assembly error proofing tasks such as detecting minute variations in parts or subassemblies as well as misalignment of parts before or after assembly. For example, they can easily detect the absence or presence of piston rings on pistons.

Balluff sensors play a vital role in all dimensions of automotive quality through error proofing automated manufacturing functions and measuring critical specifications, profiles, and dimensions of components and sub-components. They are also used in quality testing of the finished motor vehicle.

Capacitive Sensors

Micropulse Transducers, Magneto-inductive Position Sensors, Inductive Linear Position Sensor

Industrial RFID Systems

Color Contrast Sensing with BKT Contrast Sensors

Balluff color contrast detection sensors can error proof a host of assembly steps and parts quality issues. For example, verifying Teflon presence on pistons, weld quality on exhaust pipes, dissimilar material color matching of fabric, and vinyl surfaces on floor mats. These versatile sensors can be set to eliminate color variation or incorporate a range of color within the process.

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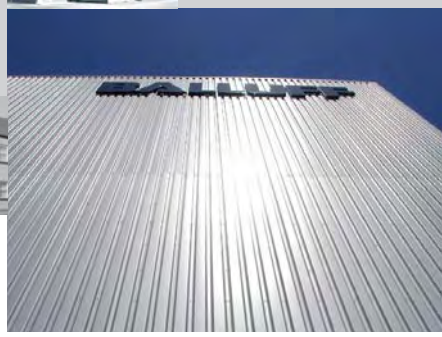

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