Factory automation
Plastics processing machines already feature an extremely high degree of automation. If they’re going to further optimize their production processes, manufacturers in the plastics industry have to look for solutions that improve overall plant efficiency across the board. This means including auxiliary buildings, media supply and the entire plant infrastructure in the equation. Better than any other system on the market, integrated automation technology from B&R does precisely that. With a system that reaches from the I/O level up to the process control system for the entire plant, B&R offers a complete solution cast from a single mold. A solution for every automation requirement. A solution for more productivity.
Production of plastic parts is highly automated with extremely fast cycle times. The various production methods – such as injection molding, deep-drawing, compression molding and blow molding – place intense demands on speed, precision and repeat precision.

Access to information about the capacity utilization and availability of individual machines is essential to optimizing productivity. This data provides the foundation that allows the various machines in a production line to be coordinated. Machines with a high level of availability are crucial for ensuring maximum productivity. Considerable improvements in maintenance can be made with a condition monitoring solution.

**Condition monitoring raises quality and lowers costs**
Continuous condition monitoring increases the quality of products and the availability of machines and plants, while at the same time reducing maintenance costs. B&R’s APROL ConMon solution provides vibration monitoring and analysis based on key condition parameters calculated from acquired measurement data.

With individual machines already fully automated, the next frontier is increasing the level of automation in the plant as a whole – including not only the individual machines but also the in-house logistics systems and building services technology. Effective automation at this level demands a system whose abilities go beyond those of a conventional SCADA system.

Individual machine controllers must be grouped together into a network without sacrificing their autonomy in the process. In addition, this networked system must be capable of directly controlling and querying sensors and actuators so that no gaps in the process occur between individually controlled devices.

**Energy monitoring sheds light on real energy costs**
Production costs will never be completely optimized until energy consumption has been optimized as well. Before this can be done, one must first know the exact energy costs involved – both primary (forming processes) and secondary (machine and plant). B&R’s APROL EnMon solution makes it easy for plant operators to acquire all the relevant energy data and generate comprehensive reports for evaluation and interpretation.

Comparing the efficiency of each machine is the first step. What is more difficult however, is collecting data for entire production lines and the plant itself. This demands a sophisticated process data acquisition system that spans the entire production chain and plant infrastructure: B&R’s APROL PDA.

UNIWELL Rohrsysteme GmbH & Co KG, German manufacturer of air and fluid lines for automobile production, uses APROL PDA for quality assurance. “Fluctuations in production parameters can have a negative impact on quality that may otherwise go unnoticed until it is too late,” explains UNIWELL’s technical manager Lutz Goldhammer.

“Since we’ve had APROL collecting process data across the entire production line and making it available to automation processes, our machines are now able to quickly compensate for any deviations, or stop production entirely if necessary,” Goldhammer continues.

**POWERLINK integrates proprietary systems**
I/O modules connected via POWERLINK permit sensor data to be queried directly. This allows UNIWELL to monitor every step in production seamlessly and to take action when necessary to avoid unnecessary costs.
A significantly higher level of process optimization can be attained by monitoring not just a single production line, but rather an entire plant along with all of its auxiliary equipment. Manufacturers can make the necessary adjustments to the production processes and substantially improve the overall energy balance of their products.

**APROL process control system**

APROL is a full-fledged process control system whose comprehensive features go far beyond process data acquisition to include supervisory level control and process visualization tasks. Customers enjoy process automation with a uniform experience and performance, from the field level up to the management level. APROL covers all applications, whether they are oriented toward processing or production. Integrated functions provide data exchange with production planning, simulation and control systems via a database interface, web interface or OPC.

**Uniform platform – From the management level to the field**

Regardless of their make and model, the controllers on the individual production machines can be connected directly to the network using standard fieldbus technologies. With B&R controllers, the integration goes even deeper. For configuring the hardware and fieldbus network, the APROL process control system contains Automation Studio, the same development environment used for machine automation.

Together with the APROL system’s process data acquisition functions, integration of this familiar engineering tool inside of APROL provides a consistent platform for optimum efficiency in the coordination of machines and their infrastructure.

Process control systems serve as a source of historical data, current trends and discrete events. In APROL, process data acquisition is included as a standard feature.
Factory automation

openSAFETY

openSAFETY, the only fieldbus-independent safety protocol – is the first choice when it comes to plastics processing machines. With extremely short response times it guarantees minimum stopping distances, even for very fast movements. openSAFETY also allows drives to perform intelligent, safe reactions that provide controlled emergency operation and rapid restarts while ensuring the complete safety of plant employees.

Integrated safety technology

Like other sectors of machine manufacturing, the plastics industry is being shaped by a trend towards modularization. Bus-based safety technology is an important topic when it comes to modular machines. It facilitates the development of optional machine components and makes it possible to exchange machine modules during operation. The result is a considerable boost in efficiency compared to a hard-wired safety solution.

B&R uses the fieldbus-independent openSAFETY protocol for the communication of secure signals. Using the “black channel” principle, openSAFETY can tunnel through the transport layer of any Ethernet system. Even machine components equipped with different control systems and different fieldbus systems can be easily integrated.

openSAFETY – First choice for plastics processing machines

There are other reasons why openSAFETY is first choice for plastics processing machines, however. With extremely short response times it guarantees minimum stopping distances, even for very fast movements.

openSAFETY also allows drives to perform intelligent reactions, preventing damage in the event of an abrupt stop and providing controlled emergency operation and rapid restarts – all while ensuring complete safety for plant employees. An array of safe reactions, such as safely limited speed, can be implemented not only for individual axes, but also for the tool center point of complex kinematic chains.

Safe communication throughout the plant

Integrated safety technology has firmly established itself as a solution for individual machines – particularly for machines with handling units and optional components. Recently, however, plastics manufacturers have also been using it to provide safe communication throughout an entire series of cascaded production machines.

With openSAFETY, the machines can be grouped in a safety network regardless of what fieldbus technology they use internally. This enables them to coordinate their reactions to safety-related events. It also eliminates the risks involved in having different machines along the same production line each respond differently. Having the entire line share a single safety perimeter shrinks its footprint and saves the cost of peripheral safety equipment.

Complete system – Complete consistency

Numerous users are already using B&R’s APROL process control system to unite their plant systems centrally into a hierarchical complete system. With a broad spectrum of functions – including integrated system simulation using MATLAB/Simulink – APROL is able to combine every level of automation into a homogeneous complete system.

Direct integration of external systems and signal sources allows for an all-encompassing approach that ensures reliable and efficient operation of the system over its entire service life.