Go greener with robots

For ABB, the most immediate, practical and cost-effective solution to address the increasing energy and environmental challenges are the opportunities for energy savings that come from using energy more efficiently with available and proven technology.

Green thinking is smart thinking. At least that’s what governments, businesses and consumers all seem to agree on. Concern for the environment is no longer a fringe issue that interests a small segment of the population, and industries – including plastics – have taken heed. Not least because lessening the impact on the environment often also means saving costs, in particular when it comes to saving energy, a key element in the environmental improvement equation. The fact is, energy efficiency is one of the biggest trends in the business at the moment.

But where do robots fit in regarding the issue? “By studying every step in which plastics are produced, we have been able to make our robots and the processes in which they work more precise and more...”
One important trend within the plastics industry is the progressive shift from hydraulic powered injection moulding machines to electric ones.

According to a study performed by Materialdepå, a Swedish supplier of plastics material and equipment, which compared 160-metric-ton hydraulic and electric powered injection moulding machines running at the same hourly rate per year. Savings of almost SEK 45,670 (USD 7,069) in running costs were achieved with an electricity-powered machine. With the same total hours of operation, the hydraulic machine used 16 kWh of electricity compared to only 7 kWh for the electric one.

Related to this finding is an increased awareness of the role electric motors play in industry. As an example, Cantex Inc. is a leading producer of PVC (polyvinyl chloride) pipes in the U.S. Cantex has upgraded three of its 18 extrusion lines at the plant with ABB industrial drives. Earlier, the extrusion lines were driven by non-ABB DC drives. “This plant operates seven days a week, 12 hours a day. ABB’s system is the difference between noon and midnight,” says Cantex plant manager Ron Berry.

The company increased production by 30 percent by retrofitting 75 kW, 90 kW and 110 kW ABB drives, respectively, for the motors powering the mixing screws of three extrusions.

Looking at production processes themselves, one of the biggest trends is eliminating waste in general, which is also one of the main benefits of working with robot cells to begin with.

Take the case of t:ac, International Auto Components, a Tier 1 supplier to the automotive industry. Before installing the latest automated cell in its Skara factory in Sweden, it had a defective parts rate shipped to customers of 150 parts per million. After installing robots, this number fell to 50 parts per million, a distinct advantage in the highly competitive auto industry. An improvement in quality means less scrap – and less waste of material.

“To compete on the world market from a high-cost country like Sweden, we have to be as efficient as possible. And these robots give us efficiency, quality and confidence in our products. Robots are a must have in our industry,” says Steve Hammond, the t:ac Factory Manager in Skara, Sweden.

There are other ways of conserving energy during the production process, of course. For example, ABB’s Machine Sync is an energy- and time-saving system which reduces the robot’s cycle time by moving the robotic arm just in time to extract the plastic product from the mould. Instead of having it wait for the mould to open, the robotic arm is there when it does thereby saving cycle time and yielding more parts from the machine’s running time.

Another major trend affecting the plastics industry is the automotive industry’s push to produce lighter vehicles, which in turn consume less energy.

This, says Liberg, poses great challenges for the automotive industry as well as its sub-suppliers to move from today’s primarily steel and aluminum-based materials to lighter magnesium and plastic composite materials.

“Everyone is exploring new techniques to combine composite materials with glass fiber, fabrics and metals to achieve properties similar to metal concerning stiffness, impact strength and ageing. And to produce such parts requires a different way of working with metal and textile inserts as well as in a controlled way move plastics parts between stamp presses and moulding machines and secondary moulding. This can only be done with 6-axis robots, since it requires high accuracy in the positioning of the part,” says Liberg.

For cleaning, de-burring, drilling of moulded, thermo formed or foamed parts, laser, water-jet or mechanical cutting is used.

These cutting techniques are often used in trimming automobile interiors and exterior parts, for example in the process of air bag scoring and carpets, as well as white goods and large parts like chairs bins, etc.

Getting it right still requires a lot of trial and error, wasted energy and especially a lot of scrapped plastic.
parts that could be avoided through a simulation program. One example of “lean manufacturing” is to simulate the actions of the robot before trying it out live.

The ABB Robot Studio software tool allows the application engineer to program the robot’s motion first in a virtual 3D world on the computer, tweak all the steps, and then transfer the information directly to the robot. The benefit: no trial and error waste, which translates into materials savings, and therefore energy savings.

The paint shop, last but not least, is where plastics of all shapes and sizes are given their final finish, and certainly a place for energy savings and reducing waste.

“Paint application is a difficult industrial process but it is an area that ABB has much experience in,” says Hubert Labourdette, head of ABB’s Global Lead Center for Paint Process Automation.

“With a robot, you can optimize the whole painting process and minimize the use of paint. ABB has developed an air recirculation system combined with a state-of-the-art energy saving process in the paint booth. This solution combines air recirculation, solvent disposal and energy saving and is fully compliant with environmental regulations,” says Labourdette.

“Compared to traditional schemes, this new process reduces the quantity of fresh air used – and hence the energy consumed – by a factor of 10.”

Reports Product Finishing Magazine: “There is an estimated 30 percent paint savings for automated systems when compared to human operators.”

From almost any aspect of the production process, whether it’s injection moulding, extraction or downstream applications such as cutting and painting, robots have a roll to play in improving energy efficiency and reducing waste.

“Energy can be saved in every step of the process of producing a plastic product...”

Anna Liberg

The energy at the heart of ABB

“The need for energy efficiency is huge and immediate, and ABB is dedicated to doing its part. Through almost all its products and services in the automation and power areas, ABB contributes to the more efficient management of energy,” writes Peter Terwiesch, Chief Technology Officer at ABB, in the ABB Review 2/2007.

“Using less energy for the same tasks has the same overall effect on the global energy balance as the introduction of other alternative energies.”