Small production runs, high stakes

One of today’s main challenges in the plastics industry is managing the increasing demand for smaller volumes of many more products. From phones to running shoes, the availability of customised and unique models is growing. This requires a higher number of mould changes, therefore reducing machine downtime is essential. A clear example can be seen within the automotive sector, the trend started with Mini and followed when Fiat launched their Fiat 500 in 2007. Fiat offered 500,000 different combination options for the vehicle; the original selection included 14 body colour hues and 20 wing mirror covers. This has now grown to over one million variations to choose from. To remain competitive, production lines have to be able to turn out a large range of individual products. All technological (products and processes) and non-technological (organisation and design) factors are redefined to ensure this is possible. Each sector has to apply “Just-In-Time” or Lean Manufacturing principles whilst also focusing on cost, lead time and quality without losing sight of operator safety.

Within this demanding production environment, the plastics industry plays an important role: its parts provide the finishing touches which complete the products of many sectors.

The plastics industry is particularly affected by new production requirements to satisfy customer needs. Engaged in a large-scale analysis of its processes, this sector is redirecting investments and renewing equipment to take up the challenge posed by smaller production runs.
Identify and eliminate

To maintain high performance levels, each production unit has to analyse its workplace framework. When a company looks to cut stock, downtime and unnecessary or hazardous processes etc., all areas of production must be analysed. SMED and Lean processes identify and eliminate any activity that is reducing the fluidity of the overall process.

Productivity analysts look into the performance of resources and the efficiency of the organisation/facility. Their findings reveal new action “triggers” which aim to improve production strategies. The specific recommendations generated by these findings can be implemented at a pace defined by the customer.

Did you know?

The SMED method (Single-Minute Exchange of Die) was developed in 1970 by Shigeo Shingō for Toyota. His goal: to change a mould in less than ten minutes, by keeping unproductive time, between the last and the next mould on the production run, to a minimum. The theoretical optimisation brought about by this process translates into a changeover time that is equal to zero, thanks to the transformation of unproductive time into productive time. In an ideal scenario, single piece production is not therefore more expensive than series production.

“ The most important time during a production run is the time when we are not making anything.”

Brian C.
Automotive Sector | Production Manager
Production changeover: a key moment in the plastics industry

Production sites within the plastics industry often handle hundreds, sometimes even thousands of different moulds. Productivity levels not only rely on the performance of the machine, but the management of machine downtime. Injection mould changeovers often accumulate the largest amount of downtime.

The actual length of time required to carry out a mould changeover often proves to be far longer than anticipated. Observing the process gives organisations the opportunity to detect where improvements can be made. During this observation they can also identify manoeuvres which are dangerous for the operators handling the equipment.

As a result, analysing the whole production line becomes vital to improving productivity. Recommendations can be made to save time, boost flexibility, optimise the reliability of the process and guarantee the quality of the parts produced.

Did you know?

OEE: an essential factor for competitiveness

Overall Equipment Effectiveness (OEE) identifies the percentage of manufacturing time which is truly productive. An “ideal” OEE score of 100% would be reached by producing only good parts (100% quality), as quickly as possible (100% performance), without any downtime (100% availability). Measuring OEE makes it possible to identify losses, monitor progress and improve productivity by not only modifying tools but also company processes. Searching for optimal OEE is a hunt for downtime in all stages of production. Within the plastics market, mould changes are the key consideration. If tool changeover duration was zero, unitary manufacturing and mass production would incur the same overall costs.

Observe and measure: the real test

Using Stäubli quick-release couplings has saved us close to 40% on our processes during production line changeovers.

Denis P. Methods Engineering Technician

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Every market sector can improve its productivity. Following a full analysis of the production line, results support optimisation and process changes in all industrial facilities. Making these changes and converting to automated production can be implemented in various different stages, dependent on investment plans. A strategy can be defined based on an estimated ROI.

Improving production and processes at your own pace

By starting with simple solutions to improve the efficiency of existing equipment, it is possible to achieve a rapid and positive impact on productivity while keeping costs down. For example, standardising the back plate of presses using a hydraulic clamping system enables moulds to be utilised on all machines. Standardising the position of the couplings on the moulds reduces amount of steps for the operator, which saves time and lowers costs.

If a company decides to upgrade its overall production equipment, the expected productivity gains are even greater.

ROI: an interesting case study

<table>
<thead>
<tr>
<th></th>
<th>Actual</th>
<th>QMC optimised</th>
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<tbody>
<tr>
<td><strong>Average Values</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mould changes / shift</td>
<td>2 changes / shift</td>
<td>2 changes / shift</td>
</tr>
<tr>
<td>Total mould change time</td>
<td>60 min / change</td>
<td>20 min / change</td>
</tr>
<tr>
<td>Requirement of personnel</td>
<td>2 person set-up</td>
<td>1 person set-up</td>
</tr>
<tr>
<td><strong>Calculated Total Values</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mould change time</td>
<td>1,500 hours / year</td>
<td>500 hours / year</td>
</tr>
<tr>
<td>Production time (max. 6000h)</td>
<td>4,500 hours / year</td>
<td>5,500 hours / year</td>
</tr>
<tr>
<td>Mould changes</td>
<td>1,500 changes / year</td>
<td>1,500 changes / year</td>
</tr>
<tr>
<td>Set-up cost</td>
<td>75,000 € / year</td>
<td>25,000 € / year</td>
</tr>
<tr>
<td><strong>Calculated Potential</strong></td>
<td></td>
<td>1,000 hours / year + only one person set-up</td>
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</tbody>
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Process optimisation

Productivity increases even further with the use of automated systems which communicate with one another to optimise processes. The “smart factory” gathers and analyses data that initiates new profitability optimisation options. Smart manufacturing not only resolves traditional problems but combats potential new production difficulties.

Integrating Stäubli solutions with our existing equipment has allowed us to optimise the economic efficiency and flexibility of production on each press. We can now meet all our customers’ requirements without having to invest in a new press.

Helen K. Plastics Industry Project Manager

Progressive automation systems

By opting for a centralised temperature control solution, an operation which used to take 42 minutes can now be carried out within 1 minute. In the plastics industry the high level of performance and the reliability of solutions implemented, has had a significant impact on the productivity of injection presses.
6 ways to save time

1. Mould preheating
   Preheating stations enable the next mould to reach operational temperature while the current mould is still in use. This reduces downtime between mould changes to a minimum.

2. Connection of energy circuits
   Fluids for temperature control, hydraulic circuits for sequential injection, core pulls and electrical circuit connections all have to be manipulated during each mould changeover which can be complicated and time-consuming. Centralised connections, whether manual or automated, offers significant time savings for minimal investment whilst preventing connection errors.

3. Mould transfer and loading
   Any mould change involves managing tool transfer between storage and the production line. This stage of the process can benefit from significant time savings with fixed or mobile, manual or automated solutions.

4. Mould clamping
   A secure mould guarantees the safety of the operator and the equipment. Without compromising on safety, the key consideration must be the production profitability. Magnetic technology allows the secure clamping of a mould at the touch of a button. The choice between various clamping technologies can be made based on not only the equipment, but the objective regarding ROI and automation of the processes.

5. Predictive inspection and mould maintenance
   To assess the quality of the mould and ensure there are no issues during production, each mould can be inspected and tested remotely from the machine. With data collection during testing and production we are now able to perform predictive maintenance to eliminate potential future problems.

6. Robot tool changing
   With increasing demands for multiple mould changes, flexibility is essential for remaining competitive. For robotic industrial processes, modular solutions allow the robot to change tools in a fully automated and timely manner.
Each action counts: this principle drove the design of our Quick Mould Change solutions.

To optimise overall mould changeover time, customers can select and combine a range of different solutions.
Stäubli solutions for every stage of the process

Today, Stäubli is the only partner in the world capable of providing global solutions for quick mould change, from energy connection to full process automation and robotic products. Each of our technical innovations can be adapted to your specific project and industry requirements.

Our partnership

Stäubli experts can provide specific solutions following a customised SMED analysis. This approach transcends our role as a coupling system manufacturer and demonstrates our long-term commitment to our customers. By providing our customers with an overview of their processes, we can suggest personalised efficiency improvements. The quality of our relationship with every customer is key to resolving specific issues and improving productivity at each site.

Local services, on an international scale

Thanks to our international presence, our customers benefit from local contacts and a quality service, regardless of their production site locations. For Stäubli, the quality of a solution goes beyond technical specification, which is why we support you at every stage of your project. From the initial planning stage to system installation, operator training and after-sales service. Our dedicated teams deliver the same high standard of service to each of our customers, wherever they are.

Follow us

For more regarding our solutions, please visit our dedicated website: www.quick-mould-change.com