HALTER
CNC AUTOMATION

CUSTOMISED OR GENERIC?

CNC AUTOMATION: THE PROS AND CONS OF COBOTS, ROBOTS AND PLUG-AND-PLAY SOLUTIONS.

FLEXIBLE AUTOMATION IS A NECESSITY

It is clear that automation offers the solution to the challenges facing the manufacturing industry. Smaller series, pressure on delivery times and prices, and a growing shortage of professionals make the flexible automation of CNC machines a necessity. But how do you automate? Is a cobot really the cheapest option? Or should you develop your own solution with a stand-alone robotic arm, tailored to your current production? Or do you opt for a flexible plug-and-play system?

Each solution has its advantages and disadvantages. What is just as important is the choice of supplier, because the right supplier will have extensive knowledge of automation and the CNC industry and will quickly be able to determine what the most suitable solution is. And as an automation partner, the supplier can also contribute to the development of its customers.

THREE FLAVOURS: PLUSES AND MINUSES

The customised solution

When purchasing automation, you can opt for a generic solution or customisation. Generic solutions are often plug&play systems that can be installed almost immediately for a wide range of workpieces. In case of a customised solution a lot of time has to be put into the design and programming of the automation. For the robotic arms of the leading suppliers such as Kuka, ABB and Fanuc, it takes in-depth knowledge of robotics to properly program the robot for the parts that you will be machining. This can be a good solution for large, very long-running series, for example a few months or longer. The investment in the preparation and optimization of the program pays for itself over the long life of the product because the automation has been optimized for this workpiece down to the smallest details. The downside of a dedicated solution is that it is not possible to quickly switch to another workpiece. The robot first has to be reprogrammed and there is a good chance that the hardware will also have to be adjusted. Changeover takes a lot of time and requires the commitment of a robot specialist. The downside of a dedicated automation concept for longer-running series is its lack of flexibility.

The cobot

Suppliers have to be more responsive. Customers are placing smaller orders and want to get products delivered faster at prices that are often lower than what was previously paid for a large series. The cobot (an abbreviation for collaborative robot) can be a solution to these challenges. Compared to a 6-axis industrial robot, the compact robot is cheap. You can easily pick up the cobot and place it on another CNC machine. And the cobot is easy to operate with teach-in programming, even without any knowledge of robotics. Despite these advantages, there is an important limitation, namely the lifting weight of the cobot is limited. This makes sense because this allows the system to operate safely close to a person. For the production of heavier workpieces – from about 10 kilos – the cobot is less suitable or even not usable at all.

Cobot suppliers such as Universal Robots only supply the cobot itself and leave the design of the hardware to the robot integrators or end users. However, the cobot is only one part of the solution that is required to enable unmanned production with a CNC machine. The cobot must be attached to a construction. This partly determines the cobot's ultimate accuracy, which is always lower than that of an industrial robot. In addition, there must be a positioning plate or some other solution for the raw material. In addition, a construction is needed on which the processed products can safely be placed. All this still has to be designed and produced before the cobot can be used. These are additional investments, on top of the purchase price of the cobot. The user can design and make this himself or outsource it to a robot integrator, but the final costs are always considerably higher than the initial investment in the cobot. Moreover, the total costs are often difficult to estimate in advance and it can make the turnaround time for the implementation much longer than expected.

In practice, the flexibility of the cobot is often disappointing. Several items, such as the table and a reference plate for positioning the starting material and the workpieces, must be regularly adapted to the new workpiece. This again costs time and money, not only to develop it the first time, but often also for repeat assignments the setup has to be determined again. Although programming a teach-in cobot does not require specific knowledge of robotics, it is time-consuming to do this precisely, including programming the gripper. This means that converting to another workpiece takes extra time, something that manufacturing companies don't always have. In addition, although the cobot is in itself safe for working with humans, the downside of this is that it is very sensitive and will quickly enter a safety mode. This means that the cobot can have unwanted downtime during unmanned production.

The plug-and-play solution

The plug-and-play robot loading systems are more generic and standard for direct use on a wide range of workpieces, without the need to develop additional software or hardware. Moreover, the price is fixed, and it is clear in advance how much the automation will cost. Plug-and-play robot loading systems from Cellro, Robo2Go and Halter, among others, capitalise on the flexibility that manufacturing companies are looking for today. The developers of these systems put a lot of robotics knowledge into their software. As a result, specific knowledge of robotics is no longer required to set up such a system. The control is so intelligent that entering just a few parameters, which are very familiar to every CNC operator, is enough to set up the cell for another workpiece. The hardware – for example, the grid in which the workpieces are placed – is also pre-programmed in the robot controller. In combination with universally adjustable grippers, such a plug-and-play robot loading system can be converted to another workpiece within minutes.

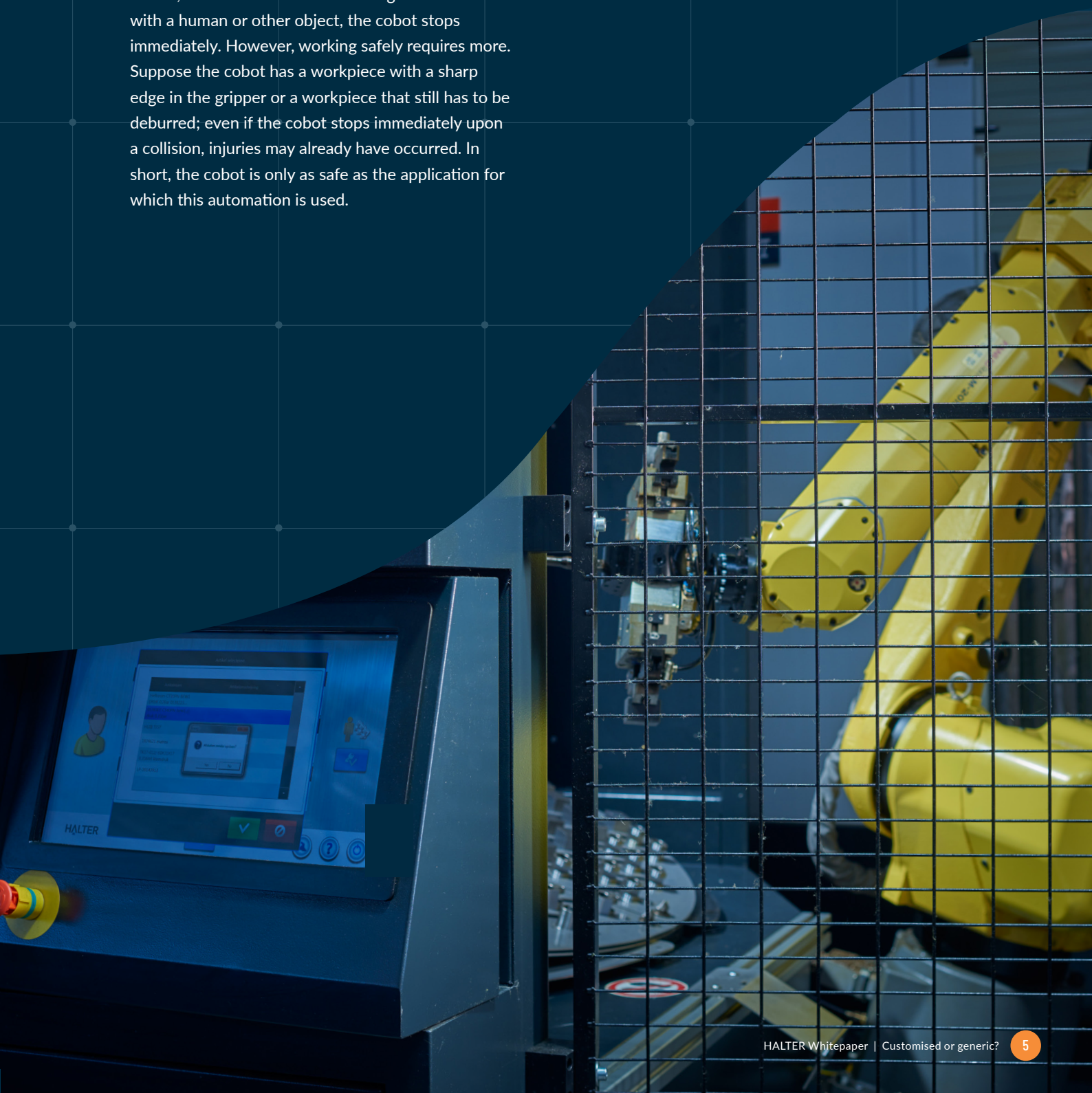
The interface between the robot cell and the CNC machine is such that older machines can also be automated very easily. In practice, coupling a CNC machine with a modern control system often requires hardly any extra time. Moreover, with the plug-and-play robot loading cell the system is up and running in a very short time because the hardware, software and robot are optimally coordinated. The investment therefore starts to pay off from the first day after installation.

AN OVERVIEW OF ADVANTAGES AND DISADVANTAGES

	STAND-ALONE ROBOT	COBOT	PLUG AND PLAY SOLUTION
Initial investment	✓	✓	-
Investment in total system (including periphery)	-	-	✓
Ease of operation	-	✓	✓
Time for conversion to another workpiece	-	-	✓
Unmanned production	✓	-	✓
Installation time (until the system is running)	-	-	✓
Maximum workpiece weight	✓	-	-
Safety (part of the solution or arrange it yourself)	-	-	✓

SAFETY: NOT A GIVEN

Production automation is surrounded by regulations. This is sometimes overlooked when companies themselves get started with a robotic arm, especially with a cobot. The cobot is equipped with a force sensor, which ensures that at the slightest contact with a human or other object, the cobot stops immediately. However, working safely requires more. Suppose the cobot has a workpiece with a sharp edge in the gripper or a workpiece that still has to be deburred; even if the cobot stops immediately upon a collision, injuries may already have occurred. In short, the cobot is only as safe as the application for which this automation is used.



WHO MAKES A SOUND RISK ANALYSIS?

The European Machinery Directive is clear about who is responsible for making a sound risk analysis of the link with the CNC machine: it lies with the customer of the loading robot that is linked to the CNC machine. Moreover, for cobots or stand-alone robot systems, an extensive risk analysis and technical construction file must be recorded in order to obtain CE at all for the constructed automation system. The user must do this himself or he must hire an external party to do this. Plug-and-play robot loading systems are already provided with CE as standard and are equipped with standardized safety provisions, such as a fence, a light curtain or a scanner that detects if someone gets too close to the robot. At that moment, the robot stops before unsafe situations can arise. Working safely is in the DNA of the manufacturer of these automation solutions. Suppliers of leading brands know the safety standards and will therefore always be able to carry out and issue the legally required risk analysis immediately upon installation for the connection of the automation and the CNC machine.

> MORE AND MORE COMPANIES WANT CERTAINTY IN ADVANCE THAT AUTOMATION MEETS ALL LEGAL SAFETY STANDARDS.

THE ROLE OF THE SUPPLIER AS A SUCCESS FACTOR FOR AUTOMATION

In 2020, working with robots no longer requires specific knowledge of robotics. The operation can be so intuitive that after just one day of training a CNC machine operator is able to convert a robot loading system to another workpiece within minutes, after which production can continue without his direct input. However, this development does not mean that the integration of a robot into production has become child's play. For several reasons, the choice of supplier is an important condition for the successful integration of automation into production:

- A professional supplier controls the entire process, minimizing implementation time. The interface with the CNC machine in particular plays a crucial role in this. Suppliers who have already installed hundreds of systems have extensive experience with various CNC machines, which means that building the interface between robot and CNC machine takes little time. Therefore, the promised results in terms of efficiency improvement can be achieved immediately after installation.

- The right supplier has an extensive portfolio of different solutions, so that the system can be delivered that best suits the current and future production of a machining company.

- The right supplier offers solutions that grow with the customer. In other words, it has systems that can be expanded later, in terms of both software and hardware, for example if a customer wants to integrate a measuring cycle into the loading robot, or if a customer wants to deburr workpieces automatically.

- The best supplier starts the automation process from its consultancy role and first maps out the automation needs and does not take its own solution as a starting point. Such a supplier allows the customer to experience, on the basis of his own workpieces, how smoothly and quickly such a cell can be converted to another workpiece.

MORE RETURN FROM YOUR MACHINERY

Would you like free advice on how to improve the efficiency of your machinery with a user-friendly automation solution? Feel free to contact one of our experts. Together with you, they will look at the existing situation in your company and advise you on the right automation choice.
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