**Design measures keep robots under control**

**Safely using cobots in production**

**There is no avoiding automation – and cobots play a key role in this. Yet many SMEs shy away from the new technology because they feel overwhelmed by the complex safety aspects that are part and parcel of using collaborative robots. However, it doesn’t need to be this way – because flexible constructions offer a way to integrate cobots into existing production operations easily and, above all, safely.**

When it comes to automation, everyone is talking about cobots right now. According to statistics from the International Federation of Robotics (IFR), 55,000 cobots were sold worldwide last year, which represents growth of some 31 percent. Cobots now make up 10 percent of global robot sales. What’s more, they also show where robotics is headed. Some cobots already come equipped with all future technologies, including artificial intelligence (AI), thus simplifying the implementation process. They provide proof that it is in fact possible to strike the right balance between high technology and simple operation, so that even an employee with no specialist knowledge can benefit from AI – in other words, artificial intelligence without the headache. Hannes Fröhlich, Robotics Product Manager at item Industrietechnik GmbH in Solingen, Germany, also believes that cobots offer the ideal introduction to automation. “Manufacturers are putting a lot of focus on plug-and-play and easy handling. Users don’t need to be robotics experts to get to grips with the technology,” he says. What’s more, cobots can be used flexibly at different points in the production line. “If, for example, bigger production quantities are called for, users can bring in one or more cobots instead of extending the assembly line by adding another station complete with an industrial robot,” Fröhlich explains.

**120 sample solutions as a source of inspiration**

However intelligent they may be, cobots cannot simply be put down at the production line and set straight to work – they also need customised peripherals. Most importantly of all, it is vital that all safety requirements are met. item recognised this need many years ago and expanded its Building Kit System to accommodate cobots. The Building Kit System comprises around 4500 components. The aluminium profiles can be screwed together using flexible fastening techniques to create customised designs. item currently showcases 120 sample solutions on its website, and more are being added all the time. These solutions show potential customers the many things that can be created using the Building Kit System. There are 19 suggestions in the robotics category alone. These include, for example, mobile island units with a central cable duct for use with cobots, compact robot columns with a levelling base plate and partially enclosed cabins for using cobots. The solutions serve as a source of inspiration, and most of them can also be ordered directly. Thanks to the user-friendly item Engineeringtool, many sample solutions can be reconfigured and customised to suit specific production requirements.

**Safe cable management for every solution**

Safety is the number one priority for all solutions created using the Building Kit System. What’s more, this starts with each individual component. Preload on the flanks of the profiles ensures both stability and a strong hold, even under high loads, which are particularly common in robotics applications. The mobile constructions are fitted with swivel or jacking castors, so it is easy to move them from one place to the next as required. Since no strenuous effort is needed to move them, this also gives employers peace of mind as far as occupational safety regulations are concerned. Safe cable management is another key focus at item. “The majority of our solutions are designed in such a way that cables can always be routed optimally,” says Fröhlich. The profiles feature an intelligent cable management solution that also protects the cables. The cable conduit is accessible from the outside, so the cable routing can be changed or adapted at any time. Developers at item have been careful to ensure that all cables can be routed from the supply section to the cobot without getting kinked or trapped. The cables pass through dense brush strips to prevent dust and dirt from getting in. Mounting plates are used to fix the cobot onto the construction. Users can choose between mounting plates for different models from various manufacturers. “Here, too, we support the plug-and-play principle,” Fröhlich emphasises. “Users don’t need to set about milling a mounting plate and tapping threaded holes into it – they simply include this in their order,” he continues. What’s more, there are also universal mounting plates with exclusive patterns of holes for customised machining.

**Maximum load testing to ensure stability**

A construction with a cobot stands and falls – quite literally – by its stability. Besides the footprint and centre of mass of the complete solution, the robot’s weight, load-carrying capacity, speed and reach all play a key role when it comes to stability. item has devoted a great deal of attention to this complex issue. On the website, there is a PDF guide for calculations that customers can download to check their systems against the relevant figures. “Customers don’t need to have a degree in mechanical engineering to perform the calculations – they just need to understand the basics of conventional mechanics,” Fröhlich emphasises. “Moreover, if the customer goes down the route of a sample solution, they also have the option of getting us to perform this check for them,” he adds. When it comes to stability, item errs on the side of caution and always considers the worst-case scenario. This extreme scenario involves the robot operating at maximum speed and maximum load-carrying capacity with an outstretched arm when an employee presses the emergency stop button at the critical moment. If the design passes this test by withstanding the resultant forces, there will be no issue during use in an industrial setting, even when the strongest forces are at play.

**Enclosures allow for greater operational speed**

For safety reasons, a freestanding cobot that is not being used with any other protective measures, such as safety sensors, is only permitted to operate at what is known as “collaborative speed”, specifically 0.25 m/s. However, this is merely a guide value. Further safety measures also need to be taken, depending on the working height and the workpiece suspended from the gripper. To ensure the process can still be efficient, an area sensor can also be added to the solution. This sensor is installed low down on the construction, close to the floor. If a worker approaches the cobot, the sensor transmits a signal to the control system at the opportune moment and the cobot switches to collaborative mode. If speed must not be compromised, the cobot can be housed in a partial or complete enclosure. This option has been implemented on some of the sample solutions, but can also be installed retrospectively on request. This solution means cobots can be operated at a consistently high speed behind the large, impact-proof panes of the enclosure. Employees are therefore afforded excellent protection from the robot, but can also easily see the process. Additional operating elements are simply clipped into the integrated cable conduit. If necessary, all cables can also be routed safely and securely inside the profile frame. Special fastening sets serve as cable feed-throughs between vertical and horizontal profiles and ensure cables can pass through without any kinks. It is the process that determines whether or not it makes sense to use an enclosure. “If the cobot will always be operating in collaborative mode, then you don’t necessarily need an enclosure,” says Fröhlich. “This also applies if an employee is working in tandem with the machine and reloading it with material on a regular basis, for example, which would mean constantly having to open and close the door,” he continues.

**Giving the customer peace of mind**

When planning a solution, there are many aspects to consider, and this is why item has a guide available on its website to help customers. Customers can use this guide to identify possible hazards in advance and put suitable safety measures in place. “Our aim is for our customers to get a safe solution that suits their needs, but that’s not all – we also want them to be confident they are on the right track when it comes to pressing ahead with automation in their company,” says the product manager.

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**Caption 1:** Safety is the number one priority for all solutions created using the item Building Kit System. For example, this includes safe cable management with a cable conduit that is accessible from the outside.

**Caption 2:** Mounting plates are used to fix the cobot onto the construction. All cables can be routed from the supply section to the cobot without getting kinked or trapped.

**Caption 3:** Besides the footprint and centre of mass of the complete solution, the robot’s weight, load-carrying capacity, speed and reach all play a key role when it comes to stability. item considers the worst-case scenario when testing stability and checks whether the construction can withstand the forces that occur.

**Captions 4 and 5:** One efficient safety measure is an area sensor that is installed low down on the construction, close to the floor. If a worker approaches the cobot, the sensor transmits a signal to the control system at the opportune moment and the cobot switches to collaborative mode.

**Caption 6:** Cobots can be operated at a consistently high speed behind the large, impact-proof panes of the partial enclosure. Employees are therefore afforded excellent protection from the robot, but can also easily see the process.

**Caption 7:** It is the process that determines whether or not it makes sense to use an enclosure. “If the cobot will always be operating in collaborative mode, then you don’t necessarily need an enclosure,” says Hannes Fröhlich, Robotics Product Manager at item.

**About item**

item Industrietechnik GmbH is the pioneer in building kit systems for industrial applications and a partner of the manufacturing industry across the entire globe. Today, the item product portfolio comprises more than 4500 high-quality components designed for use in machine bases, work benches, automation solutions and lean production applications. The company has received a string of awards for products with ground-breaking industrial design and end-to-end ergonomics.

item is spearheading digital engineering by driving forward the digitalisation of processes with software tools developed in-house. The item Academy offers training at various levels, with on-demand training and online courses available in multiple languages.

Headquartered in Solingen, Germany, item has subsidiaries in various countries. Some 900 employees worldwide harness their know-how and passion to develop innovative solutions and services. Eleven sites make sure the company is always close to customers in Germany, with a global logistics chain ensuring swift delivery times for all components.

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