Advanced Technology Solutions_KUKA flexFELLOW
In order for companies to remain competitive in the future, they have to face up to new challenges. As a result, there is a need for flexible and versatile solutions in industrial assembly operations. KUKA Systems has developed a solution for this.

The basic module in this concept is the KUKA flexFELLOW. This mobile robot unit can be quickly moved into place and operated where it is needed. KUKA flexFELLOW allows completely new flexibility for planning systems as well as continuous variation in terms of the degree of automation.

The option of human-robot collaboration (HRC) dispenses with the need for safety fencing and the space requirements for automation are significantly reduced. The mobile robot unit allows a combination of manual and automatic tasks. Production can thus be optimally adapted to meet any capacity requirements.

The advantages of the robot can thus be combined with the particular expertise of the human operator. Complex, additional sensors are rendered unnecessary by using the safe, integrated joint torque sensors of the KUKA LBR iiwa. In this way, KUKA Systems is demonstrating that the KUKA flexFELLOW can also optimally support production during workload peaks and resource bottlenecks – so-called “spontaneous” automation.
For its stator manufacturing operation in Bad Neustadt (Germany), Siemens was on the lookout for a flexible solution to automate the simple activity of passing on and positioning workpieces which had previously been done by hand. The requirements specified high quality and continuous, barrier-free access to the working area for people.

Siemens is using the KUKA flexFELLOW as a mobile loading unit. The task of the KUKA flexFELLOW is to remove the part to be processed, the stator, from a shelf on a workpiece carrier to feed a lathe for machining. This cuts the stator automatically. Additionally, the KUKA flexFELLOW is used for quality inspections.

Thanks to networked technology, precise measurement and identification of each component makes it possible to calculate immediately whether a correction is required, and this can be implemented in the system. Parts that have to be adjusted in the machine are placed into a buffer – the so-called HRC zone. This is defined for human-robot collaboration, as the operator can work here together with the mobile robot unit and unload and modify parts if required.

Thanks to HRC, safety fencing can be dispensed with and the space requirements for automation significantly reduced. After the successful use during the test phase, the application was multiplied several times.
KUKA flexFELLOW takes over the fitting of pump pots in the dishwasher production line. Since the KUKA flexFELLOW is equipped with the sensitive LBR iiwa lightweight robot, the operator can walk right up to the robot during operation to observe and monitor the process. No safety fences are required.

Using its responsive capabilities, the KUKA flexFELLOW can then calibrate itself independently at its workstation, use a search run mode to find the screw positions, re-apply pressure to the component if it is not correctly positioned and finally tighten the four screws. This is exactly the right solution for Bosch Siemens Hausgeräte GmbH.

It is important to the household appliance manufacturer that the manual workstation remains unchanged and that the automation solution, KUKA flexFELLOW, can be integrated into the existing assembly line. In this way, the mobile robot unit can easily find its way to its workstation and is perfectly able to handle bulky and imprecisely positioned components.
KUKA flexFELLOW

Innovations
- Pneumatic unit with high-quality pull-out guide section for improved accessibility
- Infinitely adjustable handle
- All service and operator interfaces in one place
- Additional mounting plate on the inside
- Improved accessibility for servicing and maintenance
- Scratch-resistant function plate of brushed stainless steel
- Transition-free cover for corner-side drilling function plate
- Socket with RCCB
- Internal profile grid system for individual installation of additional and standard control cabinet components
- Optional installation of multiple small robots

Options
- Pneumatic unit
- Application package pneumatic components
- Lowering device for stability
- Height-adjustable handle for ergonomic pushing
- Safety-oriented polling of the lower handle position
- Additional Emergency Stop on function plate
- Disconnectable smartPAD
- Interface for locking of additional carriage and peripherals

Overview of the advantages
- "Spontaneous automation" in 10 minutes (change from manual to automated)
- Change from automated to manual in 1 – 2 minutes – thereby increasing availability
- Increase in productivity of 30 %
- Payback of investment costs within 2 years
- Space requirement of less than 1 m²
- One system for different tasks – tool change in approx. 1 minute
- Very high energy efficiency – average power consumption approx. 500 watts

Height-adjustable handle
Lowerable transport unit
Accommodation of all electrical components (including Sunrise Cabinet)
Standardized user interfaces are accessible from one side

Modular structure

Function plate with signal lamp and handle
- Robot mount, signal lamp and height-adjustable handle
- Pre-integrated hole patterns at corners for connection of peripheral equipment

Pneumatic unit (optional)
- Carriage height with pneumatic unit: 900 mm (without pneumatic unit: 750 mm)
- Can be used to accommodate applicationspecific hardware

Basic unit
- Protection classification IP54
- Mounting plate, controller on the back, battery compartment
- Service strip (socket, network, USB)

Transport unit with fork slots
- Standard: Rollers with locking brake
- Optional: Hydraulic lowering (manual)
KUKA flexFELLOW – A strong family

The product family
The KUKA flexFELLOW family has grown and now includes, as well as the mobile robot unit, the KUKA flexFELLOW platform, the additional location-flexible carts to provide and store material, as well as to the KUKA flexFELLOW equitable provision of units and shelves.

All trolleys have:
• Mating parts for the electromagnets, Locking with KUKA flexFELLOW at corners
• Corner-side hole patterns for simple mounting of add-on parts on function plate
• Fork slots for safe transportation over longer distances
• Grounding of additional trolleys via innovative connector system

Carriage
The different carriages offer space for accommodation of additional devices or equipment:
• 2 carriage heights (600 and 800 mm)
• KUKA flexFELLOW compliant provision of devices, equipment or racks
• Stowage space accessible from two sides
• Wheels with locking brake
• Optional: height-adjustable handle

Material rack trolley
The two different material rack trolleys help you to process bulk material. The operator can load the trolley with single parts while the sensitive robot is removing the bulk material or the other way around:
• Material rack trolleys for offloading and provision of workpieces
• Variable arrangement of up to five inserts
• Horizontal or inclined installation of the inserts
• Adjustment of inclination by means of profile grid system
• Optional installation of sliding surfaces and roller system or gravity feed of material
• Unloading from short and long sides
• Optional inspection window on trolley with unloading from short side

Drawer trolley
The drawer trolley helps to sort components in blister or small carriers that can then be simply removed by the robot:
• Drawer trolley for HRC-compliant material supply
  – Human unloads from one side
  – Robot unloads from other side
• Only one drawer can be opened on each side at any one time
• Drawers locked for transportation
• Unlocking of drawers with a height of 100, 150 and 300 mm by pushbutton
• Optional integration of small load carriers (600 mm x 400 mm)
**Industrie 4.0**

Prepared for transformation of the worlds of production

Smart Production, Internet of Things or Industrie 4.0. Even if the names and terms used vary from one country to another, they all share the same goal: the creation of elementary competitive advantages – at both company level and in global competition.

Work on the factory of the future is thus in full swing worldwide. This involves intelligent, networked industrial production and logistics processes on the basis of cyber-physical production systems (CPPS). Or, to put it simply: factories that, by means of advanced networking, respond intelligently to changing tasks and continuously reconfigure themselves. The factory of tomorrow should be able to organize and continuously optimize its production processes, thereby counteracting the consequences of another development: demographic change. New solutions are called for because of falling birth rates and increasingly aged populations in modern industrial societies. Without the “smart factory”, it will be simply impossible to achieve a productivity increase on this scale at the same time as effectively husbanding our existing natural resources.

In order to make new working environments both highly productive and ergonomically beneficial for the labor force, KUKA is developing central key technologies: collaborative robots, mobile assistance systems, autonomously controlled vehicles and intelligently networked automation solutions that support humans in the work setting, easing the workload in a variety of ways.

In collaboration with experts from diverse sectors, KUKA is now already implementing highly flexible, digitized manufacturing processes that will open up new opportunities in a competitive environment and lasting change the way we work and produce.