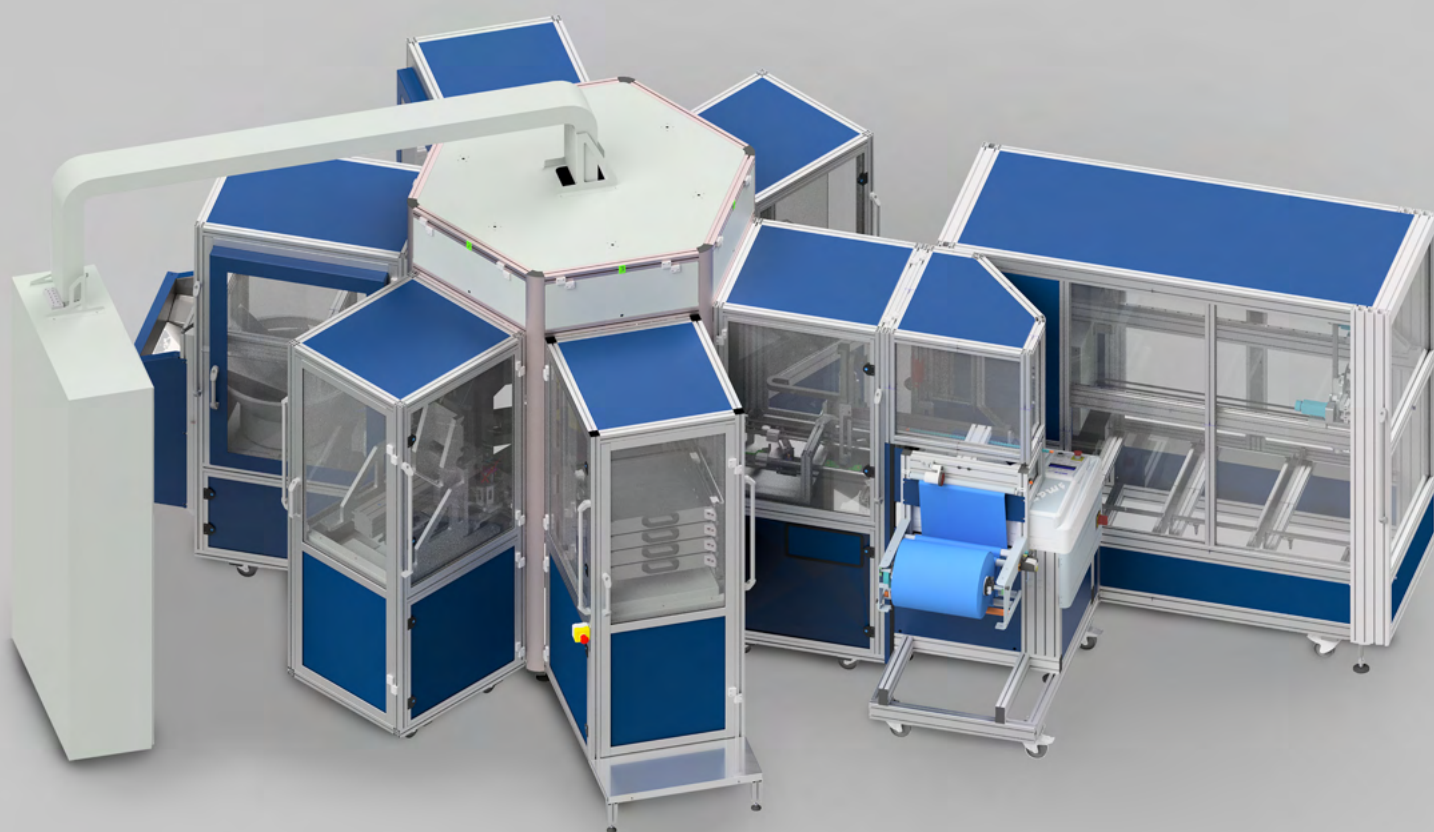
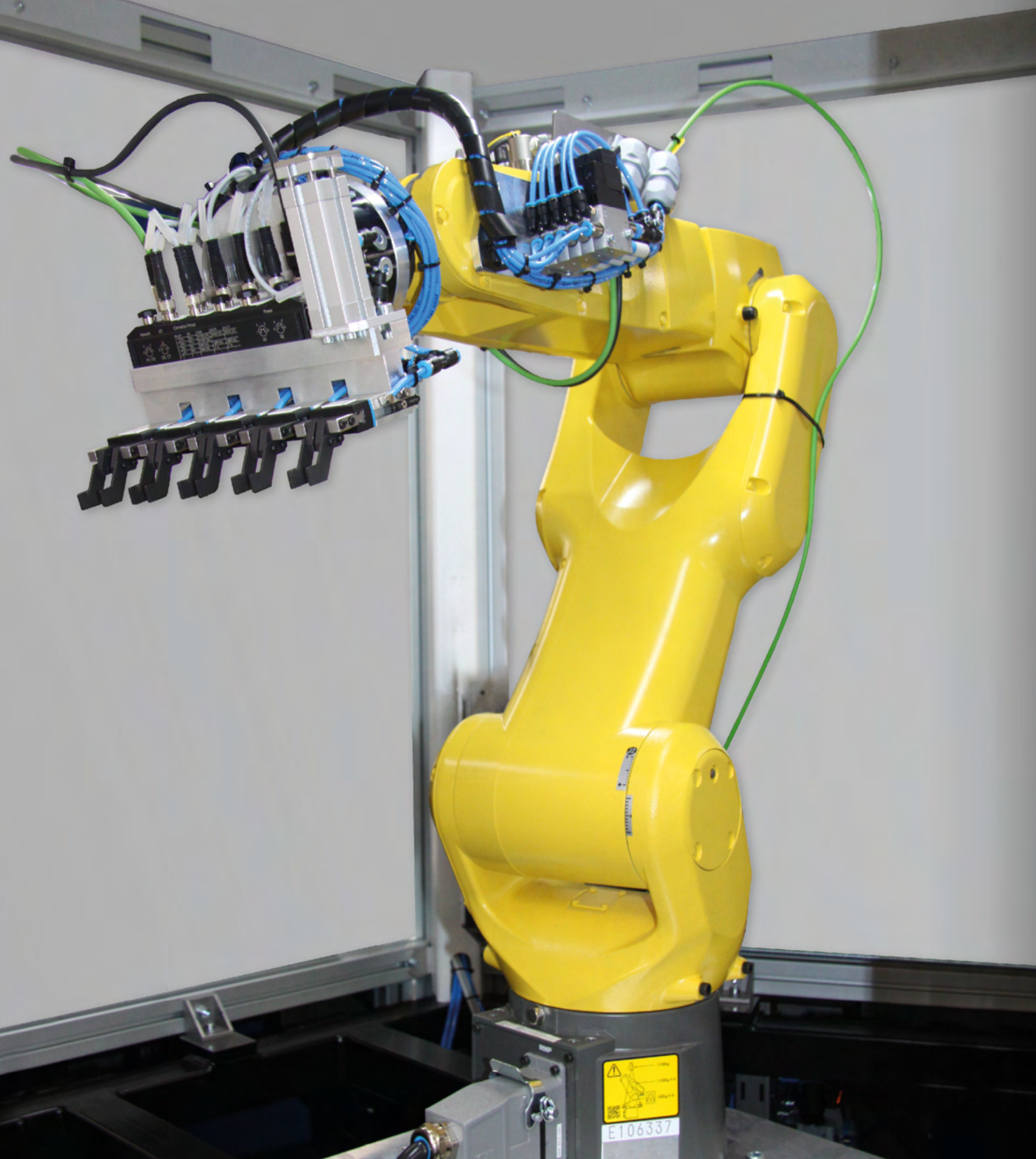




Universal robotic cell HXG

Developed and patented by ACAM Solution

One robot. Infinity of possibilities.



About HXG technology

We live in a time of economic prosperity, low unemployment and significant technological progress, which is by many labelled as the fourth industrial revolution. This period could be described in one word - dynamic. The dynamism brings manufacturing companies uncertainty of their production prospects, the necessity of frequent technological process innovation, new technologies and production processes and increasing requirements for production quality. Combined with the shortage of workforce, these effects led developers of ACAM Solution to create an universal robotic cell HXG which, as a result of its variable concept, enables manufacturing companies to respond quickly to aforementioned matters and make a profit from the benefits of flexible automation.

The concept of the universal robotic cell HXG consists of dividing the production process into partial operations in modules that are equipped with the required technologies (measuring, pressing, soldering, assembly, gluing, marking, drilling, packaging, etc.) to carry out the resulting process.

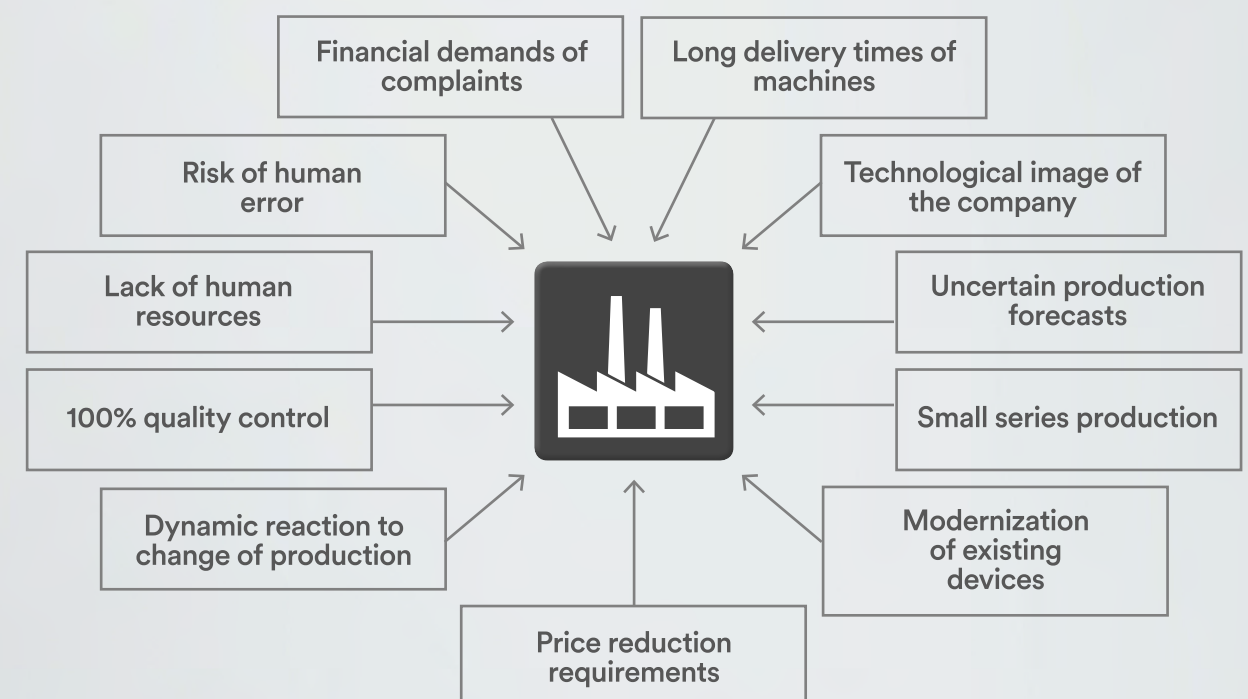
The core of the robotic cell is made up of a six-axis industrial robot or roundtable located in the centre of a patented hexagonal supporting structure fitted with quick-release mechanisms, an energy and communication channels for repeatable module connection.

The modules are equipped with their own controls enabling automatic operation with the HXG cell or stand-alone operation in a manual mode. Simply stated, the HXG is a construction set which you are able to teach your processes using mass-produced modules or custom modules developed by us to meet your needs.

A successive transition between subprocesses consists in disconnecting unnecessary modules of the existing process and plug n play connecting other modules to the HXG core in a defined order according to the new production process. This reconfiguration takes only several minutes and can be performed repeatedly even by regular operators.



Motivation



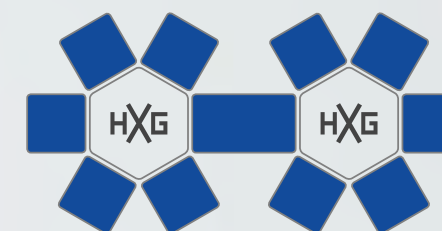
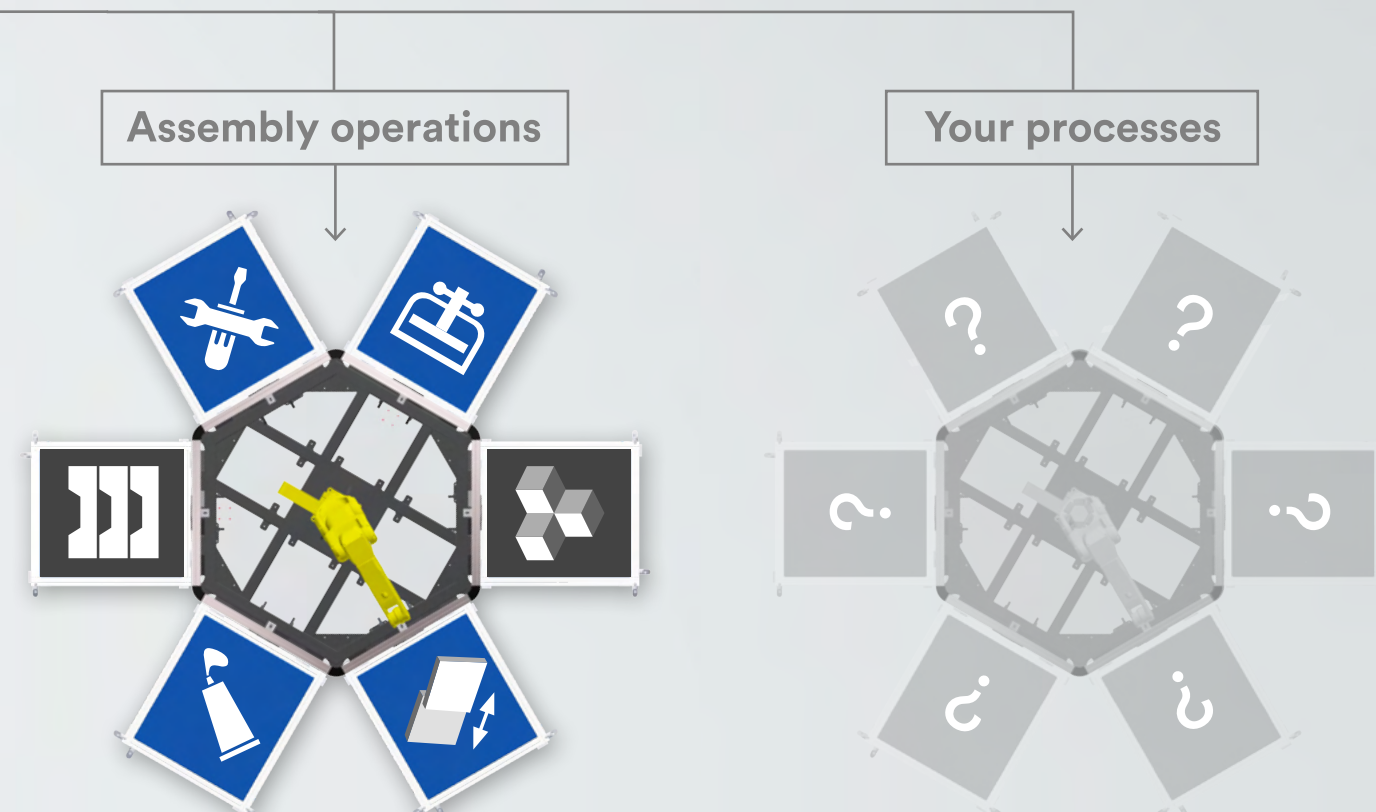
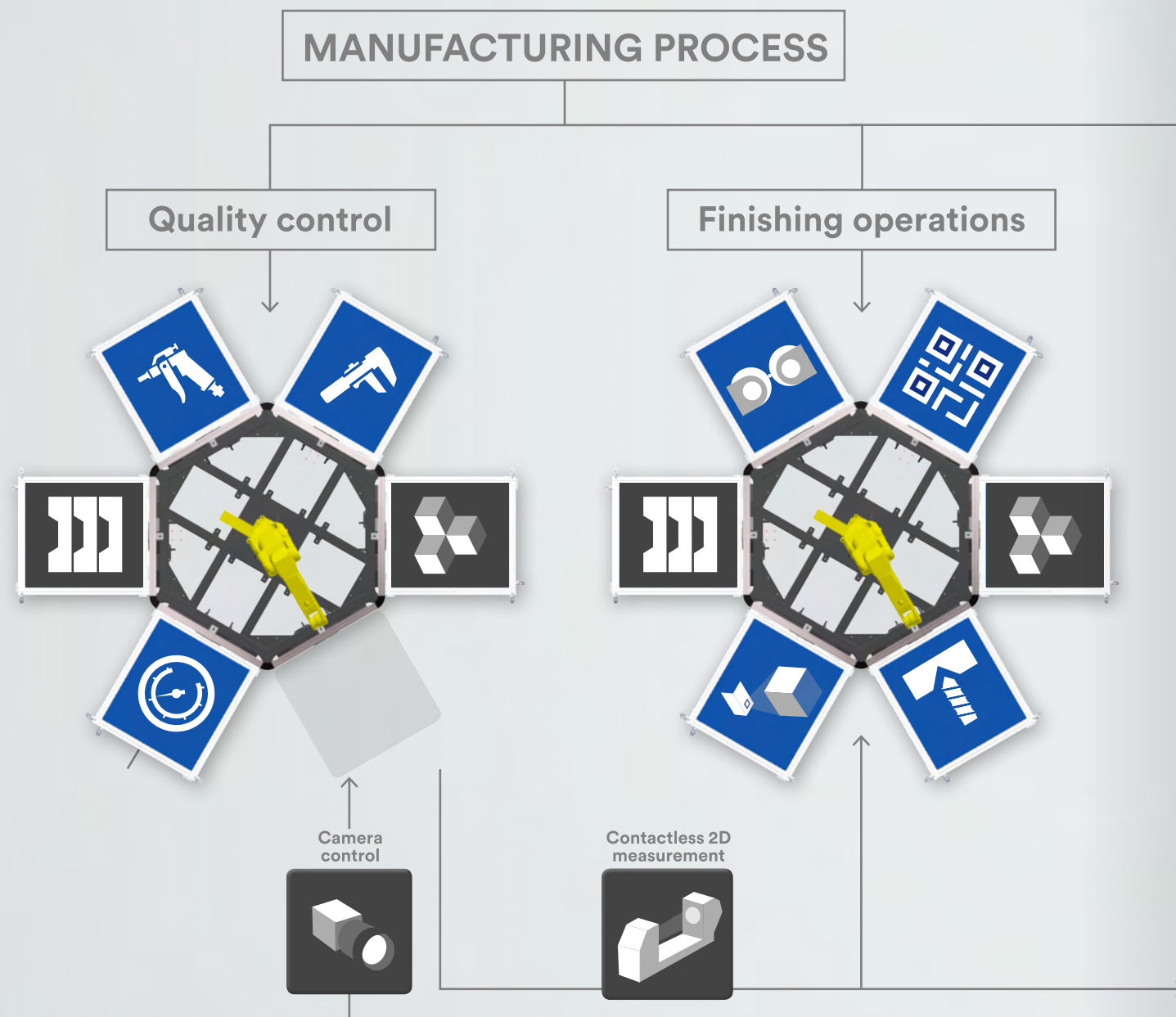


Process configuration

Imagine a device that is a quality control line and in a few minutes it can become a finishing operation line, an assembly machine, a packaging line or a combination of these processes using only the right composition of the modules. That device is HXG. Variability of HXG ensures that your investment will not only be usable for a single process or product as usual for single-purpose machines, but also makes

possible a quick expansion of the next process step or an adjustment to a different product shape. Such alterations are in single-purpose machines very complicated, costly and time-consuming and often do not work reliably. As for HXG, suffice it to add a module containing a technology of a new operation that you need to add to the production process or a module of operation directly designed

to production of a new product. Choosing HXG gives you the certitude of its permanent use. If the manufacturing process requires more than 6 steps, it is possible to interconnect several HXG cores into a production line which can be repeatedly divide into separate HXG cores at any time. Modules that are not currently used in any robotic cell can be used in manual operation.



Reconfiguration

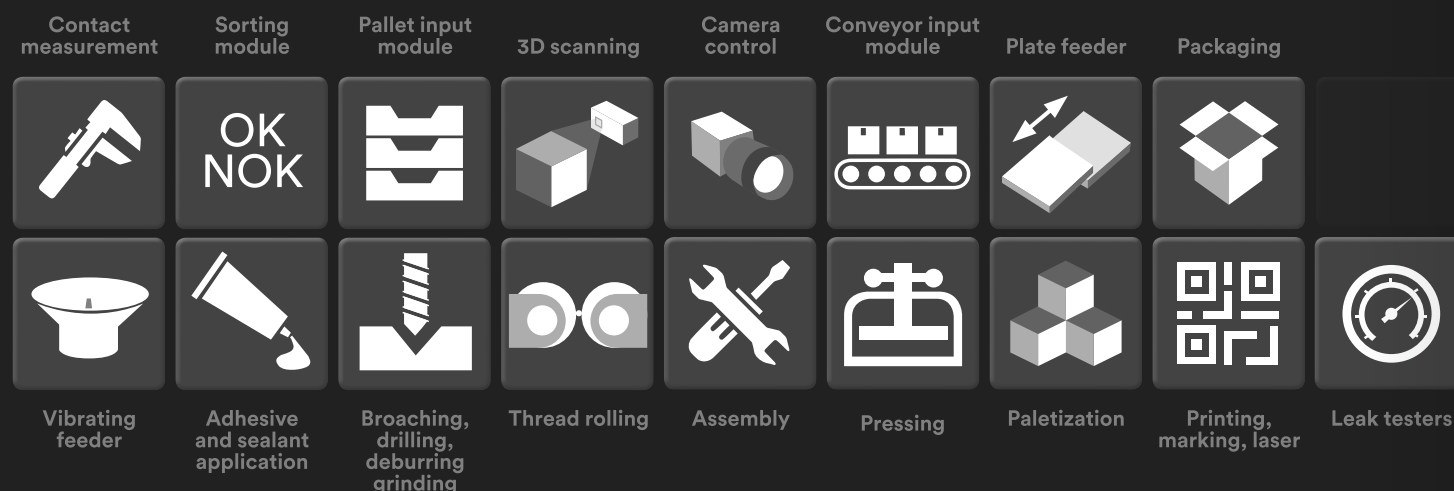
Stack of modules

There is a limited number of repeatedly performed operations that form the production processes in industrial production. ACAM Solution developers have integrated these operations into plug n play modules linkable to the core of the universal HXG robotic cell.

Each module contains its own control cabinet which, when connected to the power connector, allows the module to be used in a manual mode. Thus, even modules that are not

currently used in auto mode of robotic cell can increase return on investment in a manual mode.

The modules are divided into input, output, measuring, inspection, marking, welding, finishing processes, adhesive and sealant applications, cleaning, palletizing, packaging and many more. If your process requires an operation our mass-produced modules do not offer, we are able to develop a fitting module for your specific operation.



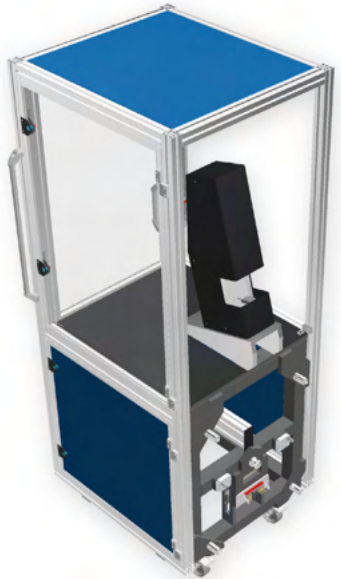
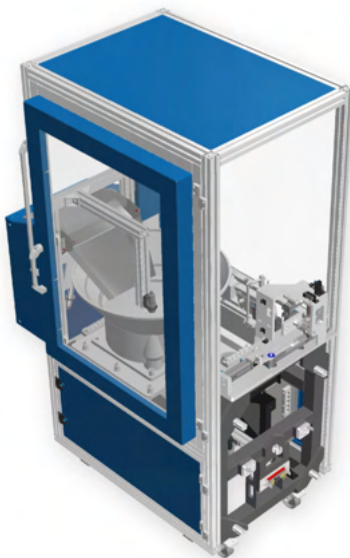
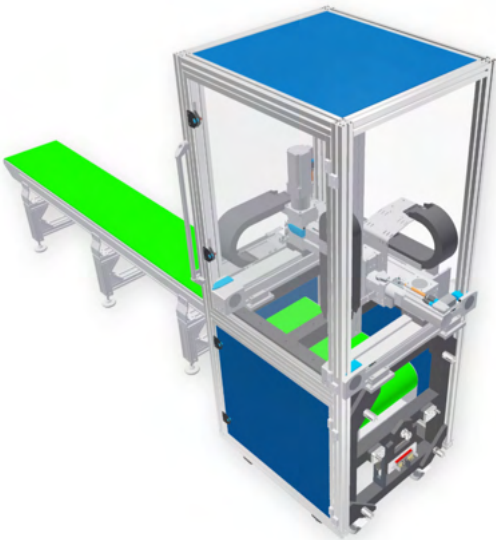


Core

External **1** or internal **2** control instead of sixth module, round table **3** or combination round table and robot **4**



Groups of modules

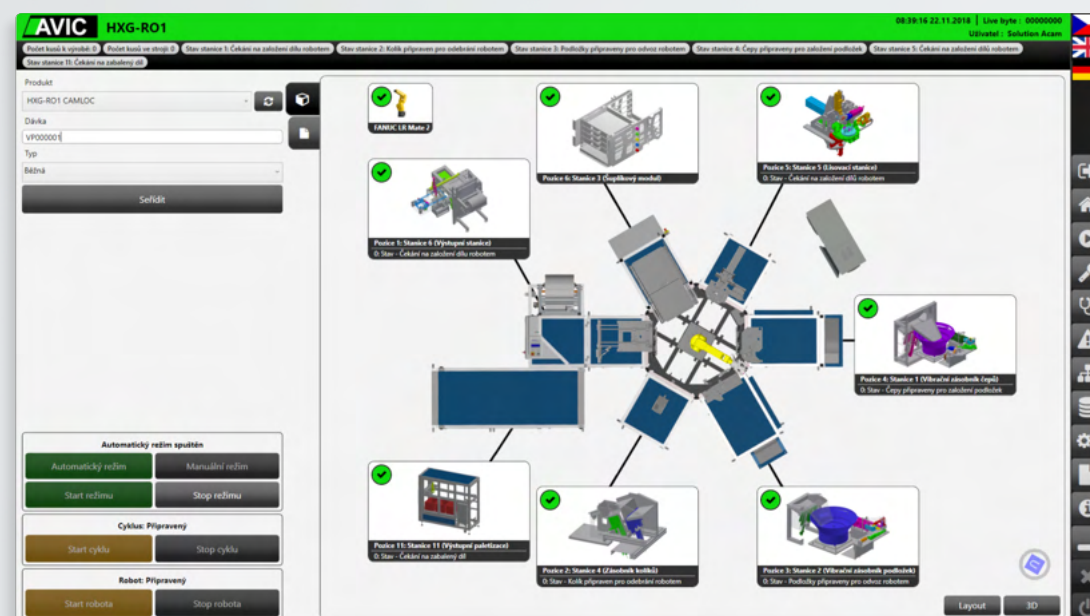
Input / output modules	Measurement / control modules
Pallet module	Camera module
	
Input: vibratory, plate, conveyor, pallet feeders, bin picking, visualine tracking, Output: KLT trays, packaging, marking, conveyor	Camera control, 2D/3D line scanning, inner diameter air pressure measurement, confocal, pressure, torque and force measurement, leak testers
Assembly modules	Production modules
Valve assembly module	Machining module
	
Separation, orientation, completion, pressing, bonding, glueing, sealing, screwing, soldering, welding, printing, marking, packaging	Machining, drilling, deburring, grinding, broaching, bending, laser cutting, engraving



AVIC user interface

Industry 4.0 concept sets the trend to which the comfortable AVIC user interface developed for HXG responds. Using its own SQL database, AVIC has been programmed with advanced features and intuitive control of HXG for an operator without any special qualification.

In the HXG, the AVIC system has the functions of a control panel, a new process configurator (for standalone and group deployment of HXG), a learned process database, a user database with work permissions structure, production process status records, production and operation statistics, service and setup modes.



Case study



Investor characteristics

An investor runs a business in the production of rotary machined parts and assemblies in medium and large series, mainly for the automotive sector.

measuring of internal diameters and compressed air cleaning.

HXG implementation

In terms of covering the forecast for the numbers of manufactured parts, the need for 3 pieces of HXG cores with a decentralized switchboard was calculated. Supplied modules of 2D micrometric measurement of diameters and lengths during rotation, camera detection of chip presence, contact length measurement, depth gauge, broaching module, X and Y axis compensated drilling spindle module, grinding module, compressed air cleaning module, metal residue extraction module, input pallet module, output sorting module, laser marking module and assembly module. The modules were assembled into 4 processes for: 100% final inspection, finishing operations (stretching, deburring, drilling, grinding) and assembly.

Motivation of automation

The investor has been struggling for a long time with repeated customers complaints. Defects are mainly caused by accidental failure of the human factor combined with insufficient human resources capacities in relation to the investor's requirements for increasing number of pieces produced. To increase production stability, the customer (investor) has made investments in single-purpose automated finishing and final inspection machines for component groups most represented in the production. Due to the development of the automotive industry, there have been changes in the production process and shape variedness, which has led to the need for new production devices. Following the expected further changes in the production program, the customer expressed the demand for the universal solution.

Analysis of production processes

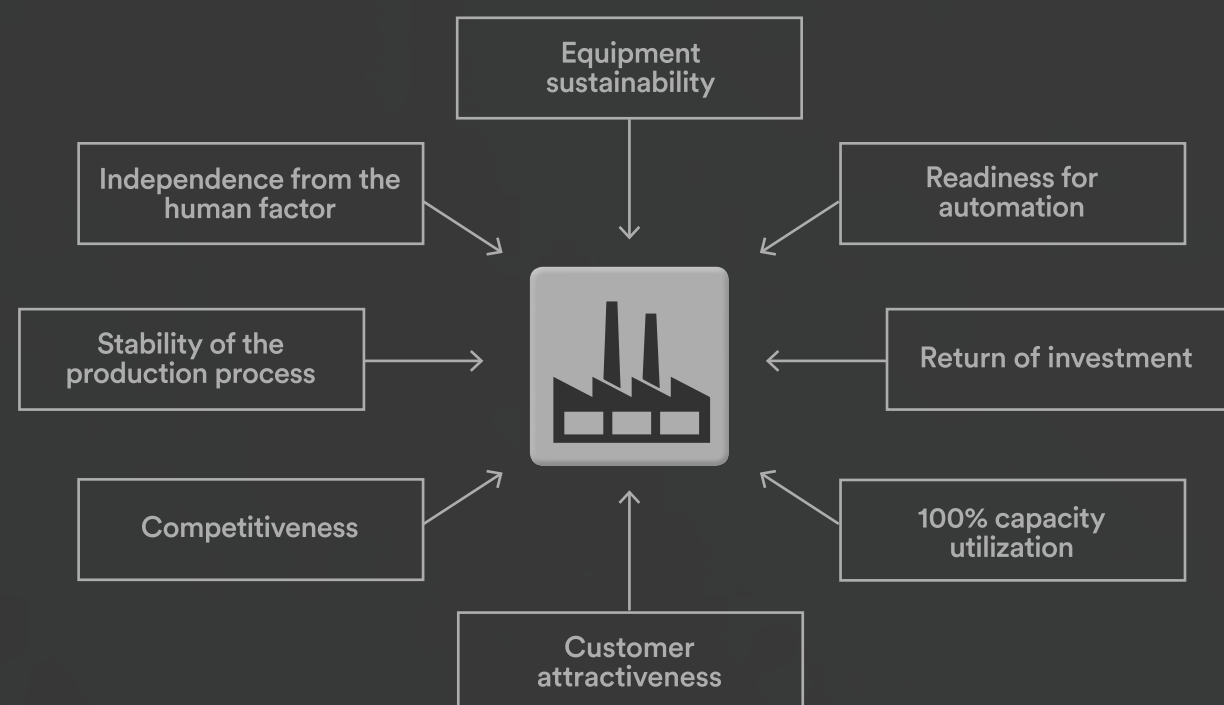
The investor used the services of an analyst who defined the intersection of operations through existing and expected future processes. As repeated operations were chosen: diameter and length measurement, examination of shapes and surface defects on sealing surfaces, broaching, deburring,

Conclusion

By implementing HXG, the investor strengthened his production capacity, acquired equipment modifiable for other processes and components, minimized the human factor impact on the production, ensured stability and flexibility of production through quick HXG reconfiguration, covered both current and possible future processes and products by portfolio of modules, approached new customers by presentation of fully automated production and increased competitiveness against enterprises with manual production.

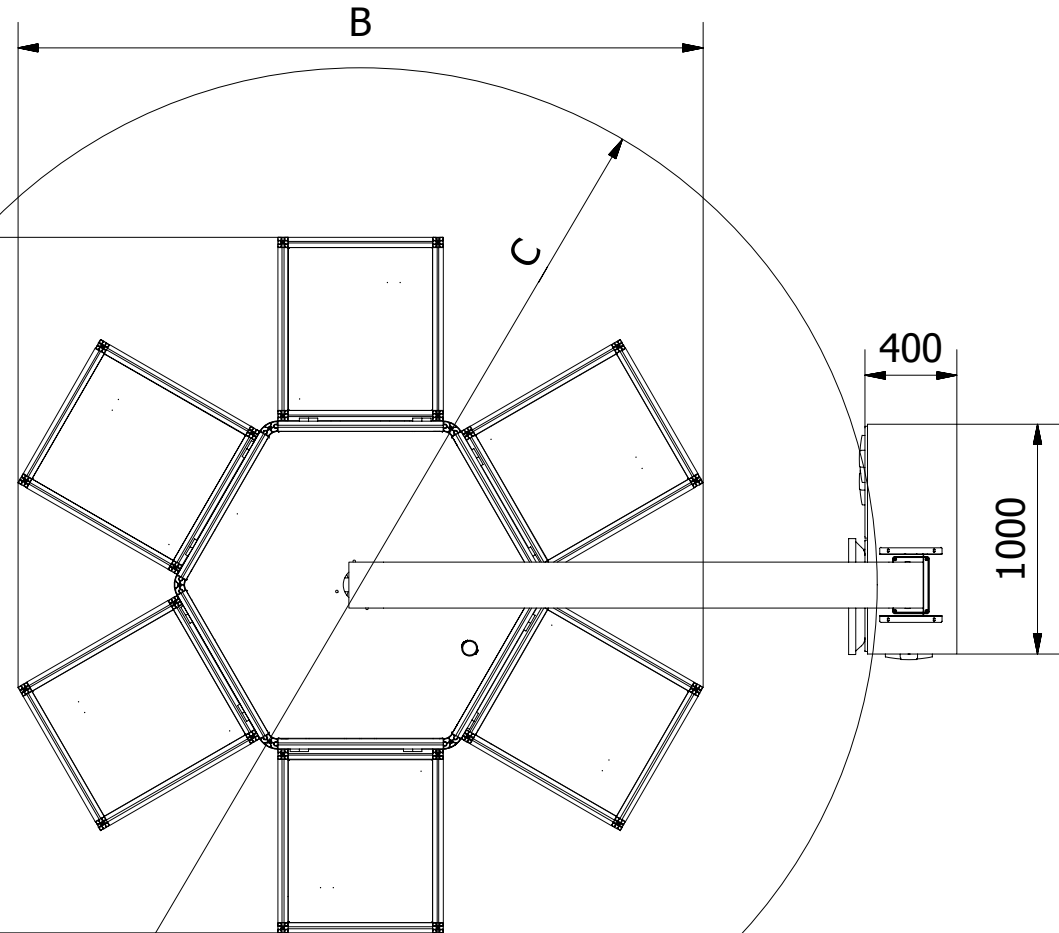
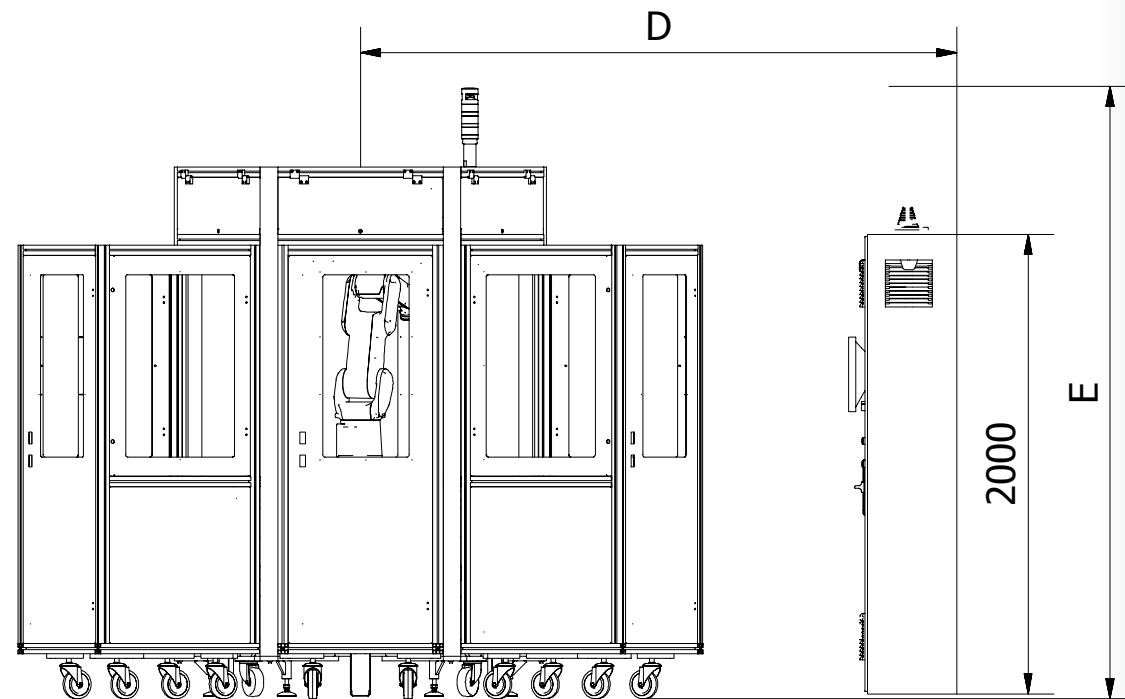


Benefits





Dimensions



TECHNICAL PARAMETERS		
Mark	Description	Dimension [mm]
A	Ground plan 1	3029
B	Ground plan 2	2983
C	Optimal handling space	4500
D	Maximum distance of the control panel	2600
E	Built-in height	2665



ACAM Solution s.r.o.

We are a leading Czech supplier of integration and development of technological units, equipment and software in the field of industrial automation with many years of tradition. We have our own team of developers, designers, programmers, analysts, salesmen, installers and service technicians.

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Analysis

- Automation
- Robotization
- Digitalization

Software development and delivery

- PLC
- PC
- Database
- Evaluation

Project

- Production optimization
- Process automation
- Big data analysis

Maintenance and service

- Device
- Monitoring
- Service support

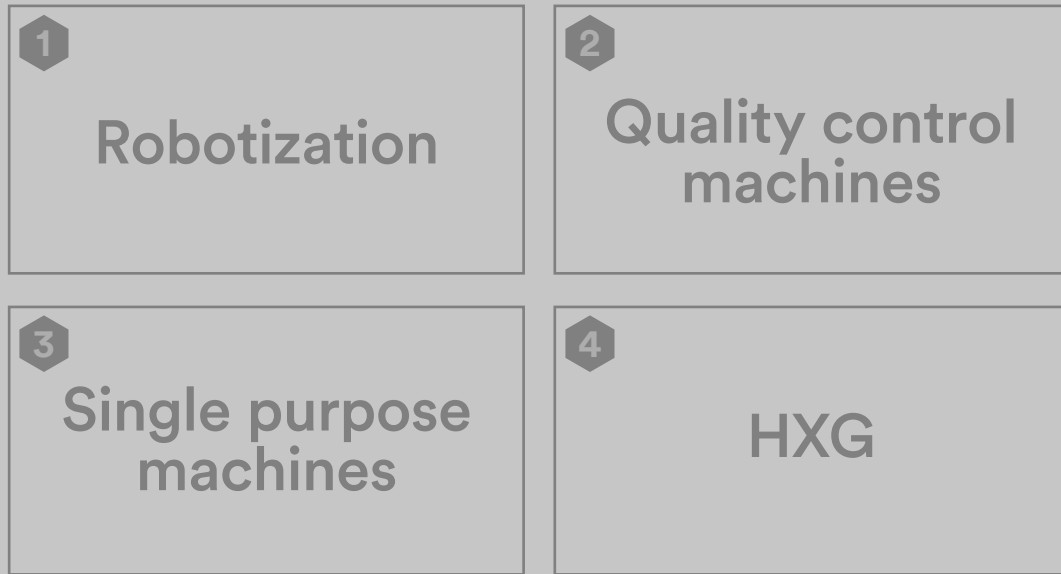
Development and supply of devices

- Single purpose machines
- Robotic cells
- Measurement and machine vision
- HXG

Education

- Automation
- Service
- Programming

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