

7 STEPS GUIDE:

HOW TO BOOST YOUR SMES PRODUCTIVITY WITH COBOTS

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CONTENT

Introduction 03

Statistics 04

1. Assess current business and barriers to development 05

2. Address automation starting from your most valuable resource: employees 06

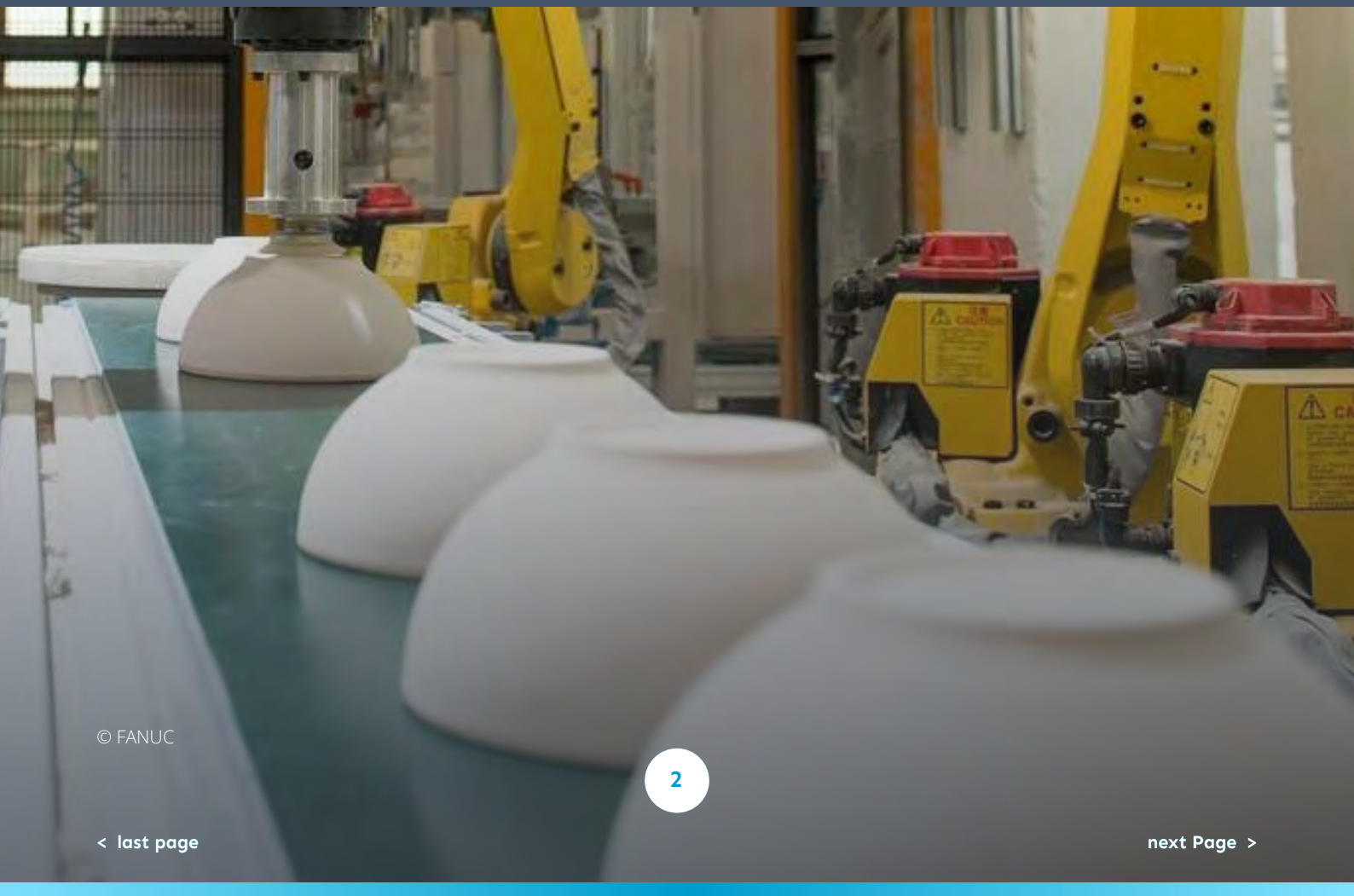
3. Evaluate potential applications and choose the most valuable one 07

4. Eliminate safety concerns 08

5. Define Return on Investment (ROI) timeframe 09

6. Choose your cobot 10

7. Look beyond your first cobot 11



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Introduction

Cobots are boosting small and medium-sized enterprises' (SMEs) automation: can you take the risk of being left behind?

99% of European businesses are SMEs. They employ two out of every three people and produce 57% of European added value*. Thus, they have surely widely contributed to (and benefited from) the European Union's economic growth over the past seven years.

But, as the European Commission has reported, economic growth is expected to slow down in the coming years, while labour costs have been growing more quickly since 2016 than ever before*. Continuing to increase productivity is thus the key to remaining competitive, and enhancing automation is surely one of the solutions that will help achieve this goal.

No surprise then that robot installation forecasts continue to peak, with around 90,000 additional robots expected to be installed in Europe in the course of 2023 and around 90,000 in 2025.** Robots are indeed the ideal automation companion, as they can carry out all kinds of tasks and thus adapt to any production process. Any SME owner should evaluate the benefits of introducing them on its shop floor. Indeed many SMEs have already started to do this, seizing new automation opportunities offered by robots to secure their future by setting the path for the sustainable growth of their business. Collaborative robots in particular, so called cobots, are able to bring added value to SME businesses. Being designed to perform tasks in collaboration with workers, collaborative robots open up new opportunities for SME owners to increase production.

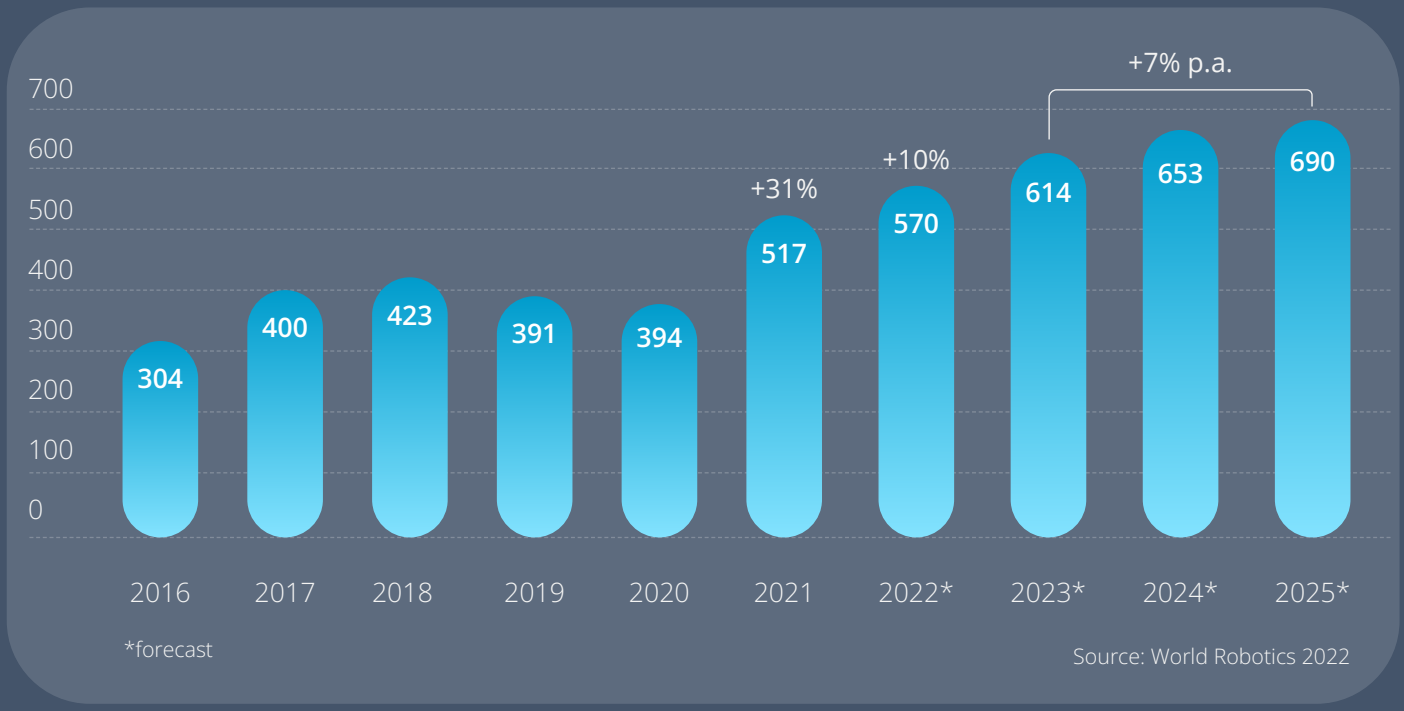
This E-book is thus intended for all SME owners who still wonder if and/or how they can draw benefits from robotisation and in particular from collaborative robots. We do hope that this 7 step guide will provide you insights into how to successfully introduce cobots to your company.



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Statistics

Annual installations of industrial robots 2016-2021 and 2022*-2025*



*forecast

Source: World Robotics 2022

Collaborative and Traditional Industrial Robots

'000 units



Source: World Robotics 2022

*revised

Step 1

Assess current business and barriers to development.

Automating for the sake of automation seldom leads to making the right decisions. Automation should be assessed according to its contribution to a company's sustainable growth. However, many SME owners do not integrate automation, in particular robotisation, into their business development strategy. They should. This could help them uncover growth opportunities and reengineer value creation.

Below are three ways to reassess current business and barriers to development, taking into account automation opportunities:

Which markets could you enter with better quality?

Every company is doing its best to deliver the level of quality expected by customers. However, production tools and processes do not all provide the same level of precision and repeatability and some markets are more demanding than others.

Robots can carry out high-precision tasks all day long without deviating or making mistakes. They can help you cross a critical threshold in rejection rate when manual processes become too complex. They can also offer you the opportunity to move your human resources from production to quality control and thus meet the quality requirements of new customers.

What would your production capacity be on a 24 hour/7 day basis?

Many SMEs are limited in growth, because they cannot take the risk of employing three shifts on a full-time basis, when business is not secure enough. This can curb prospecting activities, especially in entirely new markets.

Robots can work on their own or together with a machine tool, and without human supervision during nights and weekends. All they need for that is enough raw material and safety procedures to stop the job in case of a problem. The additional production capacity provided outside working hours can, for example, be used for time consuming machining or special orders, without increasing manpower costs.

Is customer value moving from product to services in your markets?

Servitisation is a key issue for many manufacturers' futures. Therefore, reengineering value creation by reducing production costs and devoting more resources to services is a must. Here again, robots can help. They will produce more, more quickly, while freeing your employees from undemanding tasks. You will get the resources to address new jobs in the field of services.



Step 2

Address automation starting from your most valuable resource: employees.

Once you have reviewed your business development options in light of the changes that robots could bring into your organisation, and in particular in light of the way you can better use human skills to create value, you can start looking at where using robots would make most sense. Focusing your analysis on your employees' difficulties and expectations will help you secure robot acceptance and draw maximum benefits from automation.

This means:

List all « zero value » operations.

Any job entails tasks where humans bring no value. In production, these are mainly moving products from one place to another or feeding machines. Besides impairing production costs, such tasks are not motivating for skilled workers who would happily get rid of them.

Track musculoskeletal disorder hazards.

Heavy loads, uncomfortable movements and non-ergonomic working positions inevitably generate tiredness and potentially create musculoskeletal disorders. Such hazards can have serious consequences for productivity and social costs, but above all, they can make a job totally unattractive. Here again, workers would happily be relieved by robots.

Pay attention to mental load.

All tasks that require high attention efforts and/or precision, need to be carried out quickly, when workers are responsible for the quality of this, it creates a psychological stress called "mental load".

Such tasks could be considered difficult to automate since they call for typical human skills. But using robots in a collaborative way allows you to reduce the stress level of your employees by putting a reliable partner at their side to bring comfort at work.

Identify critical skills.

Skill management is crucial to any transformation and should be led considering core knowhows, as well as new needs. Careful assessment of existing skills and professional development expectations amongst employees will help define a human centred target organisation and reveal voids created by human skills reallocation, where robots will naturally find their place.



Step 3

Evaluate potential applications and choose the most valuable one.

It is now time to list all potential robot applications and prioritise them according to the benefits your company can get. Entering this stage, robots can still be of any type, and they are many (articulated, cartesian, scara...). But since collaborative robots are the main subject of this guide, let's now focus on them.

A good way to select your first cobot application is to:

Cross analyse results from step 1 and 2.

Within the list of all dangerous and tedious tasks where humans bring no value, you will have to define those where cobots will have the biggest impact on production costs and capacity, as well as on quality. But you will also have to identify where and how cobots can save enough of your employees' time to enable them take charge of new, value-added tasks.

Screen applications according to cobot possibilities.

If you want to start automating your production process using collaborative robots, you have to make sure that the application you choose is within the scope of what they can do.

The main constraint you have to keep in mind is energy. As soon as collaborative robots share space with human beings, their kinetic energy must be kept under potential injury level. Which means (amongst other things) that speed and transported mass are limited. Typically, collaborative applications imply speed under 250 mm/s. This value can be used to estimate whether cobot cycle time will enable productivity gains or not.

Find the ideal scoring application.

The application to start with will ideally be the one that can handle several important issues.

For example:

- precision task with uncomfortable movement
- high rejection rate
- long manual cycle time

or

- no human added value
- heavy loads
- constant human presence necessary

Typical applications to start with cobot automation are:

- dispensing, finishing, assembly and more generally, all operations that require ultimate consistency and where human productivity decreases over time,
- machine tending, packaging, palletising and more generally all low speed pick and place

Step 4

Eliminate safety concerns.

Collaborative robots benefit from the highest safety standards, so that they can be safely operated amongst humans without barriers. However, the cobot is only one part of the robotic application. Risk also comes from the effector (tool placed at the end of cobot's arm) and from the product handled or processed by the cobot. Therefore, it is necessary to conduct a risk assessment for the collaborative application as a whole. A step that also helps to get the best from collaborative robots.

A good way to select your first cobot application is to:

Identify the kind of collaboration needed.

Cobots can be used in different ways.

They can:

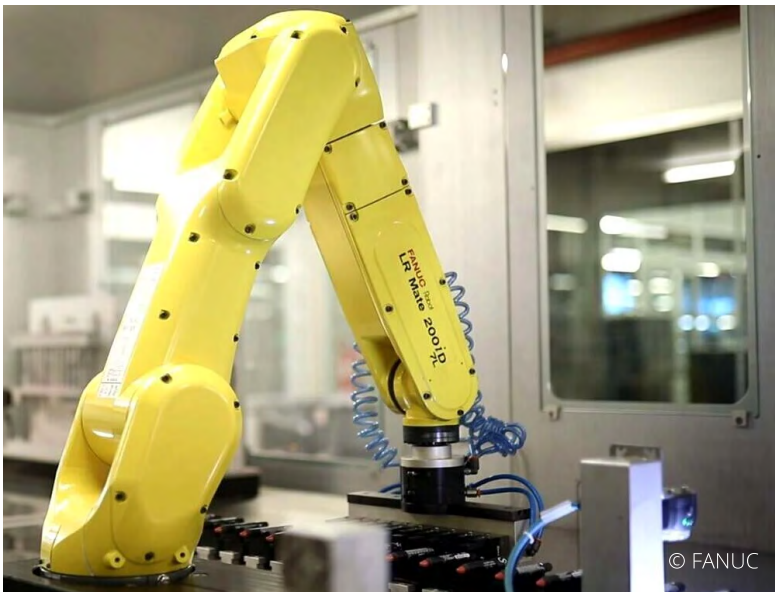
- work on their own but share space with humans carrying out other tasks;
- collaborate indirectly with humans in a production process (A cobot executes the first step and a human executes the second step);
- assist humans in a particular task (for example lifting a heavy item and holding it until a task is completed);
- collaborate directly with humans in a production process (both work on a piece simultaneously).

Risk level is not the same from one case to another. Identifying the right kind of collaboration can avoid unnecessary work in risk assessment and authorise higher working speed in some cases.

Make sure you will be able to use your cobots wherever you planned to.

As soon as you move your cobot into a new part of the shop floor, use a new gripper, pick a new object or create a new path, you might generate new risks that haven't been assessed before and you must then conduct a new analysis.

To avoid repeated, deep risk analyses and to benefit from maximum flexibility while ensuring employees' safety, it is recommended that you plan to use the cobot for similar applications.



Step 5

Define Return on Investment (ROI) timeframe.

Let's look at the financial part of the decision-making process. Although all previous steps already set you on the path towards a fruitful investment, it is now time to maximise benefits over time. Prepare yourself for some surprises. First, the payback period of a cobot can be very short. Why?

Because cobots will trigger a positive chain reaction throughout the company and unlock benefits right away by:

- saving energy costs
- making production faster
- reducing errors and thus saving valuable resources
- keeping high quality standards
- decreasing after-sales costs
- avoiding accidents and injuries amongst employees

Second, ROI analysis could reveal that you can go further than you first thought and lead you to set more ambitious targets for your first automation project. To put it simply, the cobot can open the door for global automation.

The ROI topic should be approached in the following way:

Value all expected benefits.

It is important to list and value all the benefits you expect from your cobot, from cost reductions (rejection rate, temporary staff, musculoskeletal disorder costs...) to additional incomes (additional margin and sales). It is also important to define how benefits will evolve over time and to split them year by year (see third point below).

Set your investment cost targets.

Once your benefits are precisely valued, you will be able to calculate when your investment will start to be profitable, depending on its global cost. You will thus fix your final cost target and maybe realise you can afford some integration costs that will boost your profitability.

Compare ROI for long-lasting and short-lasting equipment.

Considering the market price of collaborative robots, investment cost can be paid back within a few months. But that is just the time when ROI starts to become interesting. Compare how much your company will earn using the same cobot for five, ten or fifteen years (of course without having to engage high maintenance and repair costs), and see how much money you will be able to further invest in automation by opting for long-lasting equipment versus short lasting equipment.

Step 6

Choose your cobot.

The cobot offer is increasingly wide, making it difficult to choose the one that really fits your needs. Focus is often on programming ease, be it through the HMI or hand guidance.

However, attention should also be paid to three other particular points that are important for the success of the application:

Combination of payload and reach requirements.

Should you decide to install a cobot to relieve your employees from heavy loads, you will need a cobot with a high payload. And if you want to move these loads, for example from the end of the line to the palletising area, you will need the robot arm to have quite a long reach. But having a heavy load picked at the end of a long arm is highly demanding for mechanical components, therefore you need to pay particular attention to a cobot's robustness.

Repeatability.

Cobots significantly improve your production process when they take charge of the same task, over and over again, all day long. But to make sure they can do it properly, their movement must be highly repetitive. Otherwise you might have to frequently stop your cobot. Some cobots show a repeatability of ± 0.01 mm, whereas others are only at ± 0.1 mm: ten times less. It does not seem much, but this can really have consequences after hundreds of cycles, especially if your pieces are small, which means it is even more important on small payload cobots.

Additional sensors.

The most profitable tasks to automate, like dispensing, finishing, assembly or bin picking, generally require particular force sensors and/or vision features. Make sure then that the cobot you choose offers such options and that you will be able to integrate them easily.



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Step 7

Look beyond your first cobot.

Remember that if you have opted for a first cobot implementation, it's because you believe robotization is becoming a necessity to secure the future of your business. Success should pave the way for more cobots in your company. It is thus a good idea to look beyond the application itself and use it as an incentive to develop an automation culture within your team.

Use your first cobot to reveal passion for robotics.

Most people only need a hint of confidence to reveal hidden vocations. Cobots, which can be easily programmed with hand guidance or step-by-step instructions, are far less inspiring for people who have never worked with robots. Getting used to working with them, your employees will realise how fun and rewarding robot programmation is. You can be confident that at least one member of your team will become highly motivated to get robotic skills and help you build in-house expertise.

Nurture curiosity about robotics and the automation world.

The automation world is full of opportunities and provides numerous solutions to any industrial issue. Once vocations have been revealed, automation experts should be encouraged to look beyond cobots and get an overall view of new technological developments that could be useful for the company.

Get ready for new applications.

Experience proves that as soon as a company starts getting in-house expertise, or at least an appeal, for robotics, new application ideas arise easily. Experiencing all the benefits of robotisation, your team will probably want to go a step further with more complex, but also more profitable, applications.

Welcome to the virtuous loop of automation!



Checklist: Recap

- [ ] Assess current business and barriers to development
- [ ] Address automation starting from your most valuable resource: employees
- [ ] Evaluate potential applications and choose the most valuable one
- [ ] Eliminate safety concerns
- [ ] Define Return on Investment (ROI) timeframe
- [ ] Choose your cobot
- [ ] Look beyond your first cobot

About IFR / Go4Robotics

As a non-profit organization IFR's mission is to promote the use of robotics to address societal challenges and improve the quality of life for all. Our vision is that robotics will revolutionize various industries and create a better future for all. With almost 100 institutional members from more than 20 countries representing over 3000 robotics organizations worldwide, we offer the all-round view of the world of robotics across industries and countries. With our Go4Robotics campaign, we want to provide beginners with easily accessible and understandable information and experts with deeper insights into trends and innovations in the robotics industry.