

Success Story

Cobot Work-Cell for Group Nivelles

Conceptual Study for a Flexible Robotic Sanding Operation



Cobot Work-Cell

Company description

Group Nivelles is a family business founded in 1994 in Sint-Truiden. It is a manufacturer and distributor of three brands, namely Assenti for bathroom furniture, I-Drain which is one of the leading brands in the flow technology area for shower and washbasin drainage system, and Dsignstone which includes washbasins, wall panels and shower trays in Premium Solid Surface. Group Nivelles distributes its products to more than 30 countries with the employs of about 45 people.

Motivation and challenges

The current sanding process of the solid surface products at Group Nivelles is manual. Even though there is a central vacuum system for the sanding station, due to the existence of the residual sanding particles at the environment, the operators needs to wear masks. Basically, this process is not ergonomic, additionally, it is tedious and labor-intensive due to the repetitive tasks that operators need to perform. Therefore, the Group Nivelles considered automating this process to not only reduce the risk for the operators and improve their working conditions but also reducing the manual labor in the sanding station to increase the overall production efficiency while being able to handle a large variance of the product.



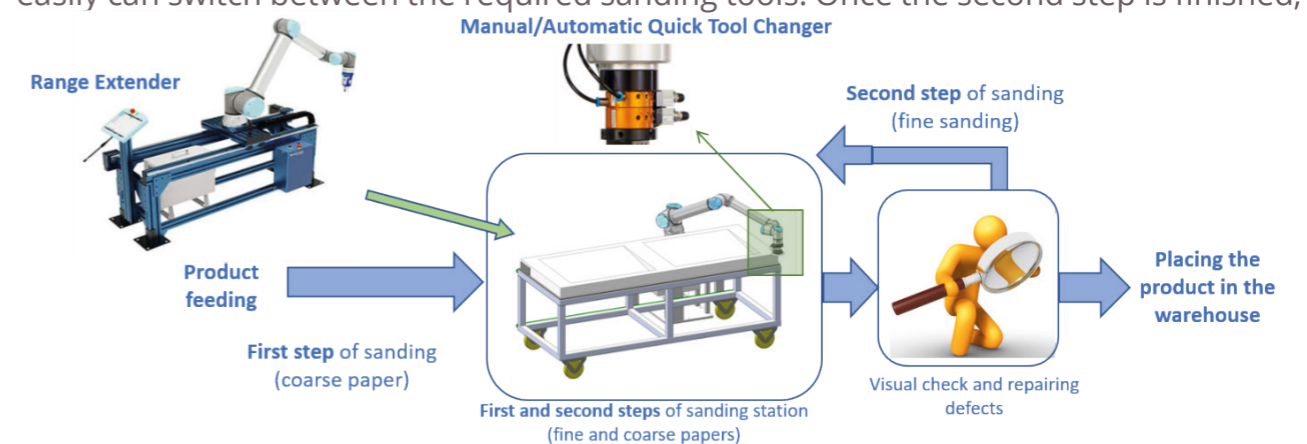
Technical solution

Group Nivelles considered a semi-automated system in 2019 as a solution. They performed some feasibility studies on a such a system with Sirris. The feasibility studies were done on a cobot (UR10e) and with robotic surface finishing kits. It was shown that the cobot could be used for this purpose. Even though, the initial performed tests were promising, Group Nivelles observed some limitations:

- The proposed solution could not reach the entire surface of the products without moving and manipulating the product itself.
- It did not offer automatic tool changing to facilitate and accelerate the very frequent product changeovers or shifting between two sanding steps (coarse and fine).

The concerns of Group Nivelles were explored within the Cotemaco framework by proposing a workcell to tackle the mentioned limitations and assessing the work-cell cost.

Based on the project requirements, the UR10e series mounted on a range extender combined with the force controlled sanding module of robotiq sanding and finishing kits were selected for the two steps of sanding (coarse and fine). The process starts with obtaining the products from the warehouse and placed in the cart by the operator. A single robot (UR) mounted on the range extender will extend the robot reachability to the entire surface of the product (7th axis range extender). The robot is responsible for both coarse and fine sanding operations. Once the first step is performed (coarse sanding), it needs to be inspected by an operator to identify any defects in the product. The robot is also equipped with an automatic quick tool changer to facilitate changing of the sanding kits. For the second step (fine sanding), the robot will change the sanding kit using the provided quick tool changer. During each step of sanding (first and second), the process usually involves two steps of surface finishing and sanding with different sanding tool shapes and grits. With the automatic tool-changer the robot easily can switch between the required sanding tools. Once the second step is finished,



the operator needs to inspect the surface and eventually returns the product to the warehouse.

Interview

How could COTEMACO support you?

Via the SME support programme, COTEMACO engages with SMEs through field labs. These regional field labs in the Netherlands, the UK, Belgium and Germany are showcasing key production steps in order to tackle current low sectorial awareness and knowledge gaps. The field labs will exchange knowledge on different manufacturing tasks, such as handling and (un)loading.

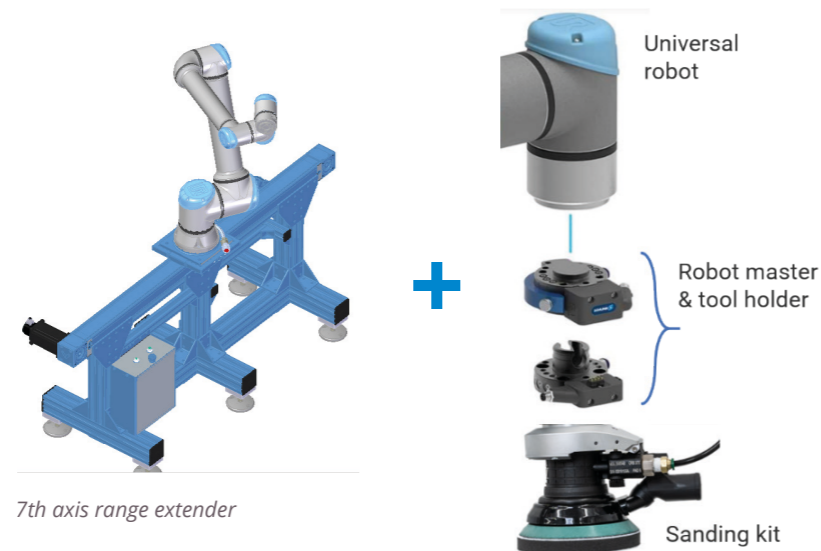
With the COTEMACO programme, manufacturing SMEs are guided through the process of adopting collaborative robotic and shop floor digitalization technologies, from the exploration of technological opportunities to the detailed definition of a business plan.

What are the benefits?

Within the COTAMACO program a potential technical solution for the Group Nivelles case was identified in order to semi-automate their current manual sanding operation. The identified solution was based on employing a 7th axis range extender to enhance the robot reachability, a quick automatic tool-changer to facilitate exchanging of sanding tools, and a forced controlled sanding module to sand and finish the product surfaces. The proposed solution is flexible enough to handle the variance of the products.

The safety features of the Cobot combined with the enclosed axis of the range extender provides a safe environment for the operator to work in the vicinity of the work-cell. The proposed automatic tool-changer facilitates the tool exchange without the operator intervention. The sanding and finishing kits provides an easy way to automate robot sanding operation with Universal Robot. The module combined with the Universal Robot force control capability, automatically adjust the desired force for sanding operation. The desired trajectory can be programmed using the robot hand guiding for flat as well as for complex and curved surfaces. The required sanding tools including both random orbital and orbital sanders with different sizes and foot shapes are supported by the proposed solution. Within the project, the conceptual design of the work-cell, plus an overview of the estimated work-cell costs was provided.

Group Nivelles, was perusing the fully automated system in parallel with Roboticom who is the provider of such a system. Due to currently obtained satisfactory results with a fully automated system, Flanders Make exploration on the semi-automated system will not be pressured further.



Were your expectations fulfilled – technical implementation and support through Cotemaco?

“The sanding process is an ergonomically very demanding process for the operator, so we were keen to automate this process. A cobot and a robot were considered. Tests with the cobot revealed some problems: limited range, manual tool changes, and programming dependent on the operator.

For this reason, we opted for a fully automated system with a robot and CAM software for programming. After successful testing with the supplier, Group Nivelles chose to install a robot with an automatic feed and discharge line.

The Cotemaco project was an interesting experience in which we gained a lot of clarity about our challenges in our automation needs.”

Dimitri Joris , Process and Project Engineer at Enginity, innovation partner for Group Nivelles



What is COTEMACO?

The project, which is an initiative of Interreg North-West Europe, aims to support around 60 SMEs in the automotive and food manufacturing industries with so-called „test environments“ and to encourage them to integrate collaborative robotic systems and digital technologies into their business. Accordingly, in addition to increasing production flexibility, the relocation of production abroad will be curbed and the number of jobs in manufacturing increased, which will generally lead to an improvement in the competitiveness of the companies involved.

In the project new technologies are implemented in application examples - the aim is to move from the prototype in the laboratory environment to the transfer to production, taking into account the legal situation and certifications.

You want to become part of COTEMACO too?

You are interested in further Best Practice implementations?

Then visit our website at:

www.robot-hub.org/cotemaco

Implementation partner:

