

Doubled Production on Limited Floor Space

A year ago, German audio equipment leader beyerdynamic aimed to increase factory floor productivity by 50% on a 4-year plan. This had to be done in the same production space, without compromising the brand's highest quality standards.

A Vision System That Solves Every Manufacturer's Problem

Collaborative robots rapidly became the number one option for beyerdynamic's Production Manager Peter Härtel: "With the objective of establishing a really stable, high-quality process, automating some of our processes was the best way to increase production with the available space and staff. In the conceptual phase, we came across Universal Robots. They're easy to use and available at a great price. The software is integrated in the robot so programming is easy for us."

One of the processes presenting a high automation potential was a glue spraying application. "The speakers used in the headphones need to be refined acoustically by applying a medium", explains Manufacturing Engineer Jörg Lang. "Up until now, this application was done manually by our employees. The medium is spread onto the speaker, directly onto the membrane with a brush. This process is naturally not safe or stable. There are fluctuations and robots could solve those issues. We divided the robot tasks in two categories: handling and spraying."

"The camera solves the problem every manufacturer in the world has, which is picking up parts that are not in the same position."

Those tasks required specific end effectors for the robots. The handling process needed a gripper to pick the loudspeaker right after it had been precisely welded by a specialized worker. Then the speaker needed to be placed on a fixture in the spraying area. "We studied the market looking for possibilities and we found the Robotiq 2-Finger Gripper and Wrist Camera, both Plug + Play components which were very suitable for our purposes," Peter Härtel says.

"The Robotiq gripper is really easy to use," Jörg Lang states, "it comes fully integrated with the software and the programming environment. I do not have to come up with coordinates in my head, I can work directly with an item and in the worst case scenario, I can guide the robot manually and take it where I need it to be. This way, we are able to teach our application in a really short time."

“The camera is also well integrated,” Lang adds. “It solves the problem every manufacturer in the world has, which is picking up parts that are not in the same position. In our case, the workers place the welded loudspeakers on the green surface representing the camera’s field of vision. We only have to teach the form of the speaker and the camera recognizes it, the gripper picks it and it is ready to have the medium applied.”

Major Productivity and Quality Improvements

As soon as the gripper put the loudspeaker on the fixture, the medium spraying process begins with a second Universal Robot UR5 model equipped with a spraying end effector. It sprays the medium evenly on the speaker before moving on to the second fixture to perform the same task on a second loudspeaker that was placed by the gripping robot in the meantime.

The gripping robot is also programmed to put the sprayed loudspeaker in a tray, which can receive twenty loudspeakers before being changed for an empty one by the gripping robot. Getting all of these system to work together made up for a complete robot cell that delivers massive value. Integrating those systems went pretty well, thanks to Universal Robots URCap software and Robotiq Plug + Play components.

Beyerdynamic’s first 2 robots arrived in the factory in the fall of 2016. They were programmed and ready for testing in December. The complete handling and spraying application, which involved two robots with different end effectors to communicate with each other, were quite a challenge to coordinate in the beginning. “It was hard to find the right precision when spraying the medium with robots and other technologies involved all working together. It was a very good learning curve and we improved our cycle time a lot,” explains Jörg Lang.

“With the three coworkers who already worked at this station we have achieved a 50% increase in volume with a simultaneous increase in quality.”

Focusing on the output delivery time was key in the success of this automation project. “We started production in July 2017 and the production rate of this process has increased by 50%, which will have major impact on the business,” Peter Härtel recalls. “The other major gain is on quality standards. We have the medium applied equally on each speaker, which improves our own quality index by 50% as well. This is only the beginning of our optimization goals,” Härtel adds.

New Team Members

Getting the team behind robots is never easy, but Beyerdynamic’s CEO Wolfgang Luckardt knew that communication was key to have everyone on board from scratch: “Since we wanted to allay any fears our employees might have had, we put the emphasis on cooperation from the very beginning. We asked if any of the employees were willing to be involved in the pilot project, and have thus been able to establish an excellent cooperation between man and machine.”

Gülhan Boz was willing to give this robot project a try. She is one of the precision welders who hand the speaker to Jonathan and Fritzchen, her two new robot colleagues. “We get along with the robot pretty well. We used to apply the medium ourselves, but produced less than the robots do. We have been taught how to do everything. When we arrive at work, we turn Jonathan and Fritzchen on. If there is an issue, we are able to repair them ourselves and power them back up again. They are really quite easy to handle. And it really works.”

Maximization of human potential is on the right track at Beyerdynamic. “We can focus on tasks where the human work value is high,” Jörg Lang explains. “By leaving this gluing process to the robots, we are all able to do a lot more everyday with our people.”

There is still a lot to do. The factory’s optimization is a never ending process. For Beyerdynamic, this means adding new robots, training the team to program them for screwdriving and the final assembly steps. The big picture is a global increase of productivity and quality index higher than ever before.

And it’s already underway.

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About Robotiq

Robotiq’s Lean Robotics methodology and products enable manufacturers to deploy productive robot cells across their factory. They leverage the Lean Robotics methodology in order to get to the production phase faster and increase robot productivity. Production engineers standardize their processes using Robotiq’s Plug + Play components for their ease of programming, built-in integration, and versatility. They rely on Insights and Skills to accelerate robot projects and optimize robot performance once in production.

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