

MAKING CARDBOARD PALLETS BY USING INDUSTRIAL ROBOTS

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Abstract: *This paper is the result of a study conducted in the faculty's robotics laboratory. The study had two objectives: first, the presentation of cardboard pallets as a replacement for wood, plastic or steel pallets; the second, the development of cardboard pallet assembly technology using industrial robots. Pallets are an internationally approved packaging that ensures easier handling of the goods. This project was recommended by one of the leading manufacturers of corrugated paper and cardboard packaging in Romania and the leading independent corrugated cardboard manufacturer in Europe and Africa.*

The managers of that company were and are still interested in developing new paper and cardboard products, among which cardboard pallets in particular are of interest. At one of the meetings that took place at the headquarters of the enterprise, the engineers expressed their desire to develop a technological process for pallets that would be as mechanized as possible, maybe even completely automated. Our proposal was to apply the industrial robot technology, given the lack of workforce and the benefit of an increased productivity levels. At the same time, the pallets quality should be considered carefully.

We visited the chains of production in the company and saw the technological process specific to the paper and cardboard industry. The suggested theme seemed interesting to us and with immediate application. Cardboard pallets are still little known on the market, and the process of robotic assembly was a challenge for us.

Cardboard pallets have emerged in recent years as a replica of wood, steel or plastic pallets. The worldwide offer of cardboard pallets is already quite varied, with pallet manufacturers in many countries, demonstrating the growing confidence of carriers and warehouse owners in this type of pallet.

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Prof. Romeo Ionescu has been teaching courses in the field of industrial engineering, mechatronics and management. His research field is in manufacturing, robotics and design experiments.

He has had several trainings in France and Belgium. He is the author of scientific papers, books, patents, courses, monographs and education materials published in Romania, but also in other countries (SUA, Belgium, France, Bulgaria, Ukraine....). He has participated in several national and international research and educational projects, grants and in national and international conferences and events.

Prof. Ionescu has been invited to several universities in Europe, USA and Africa.

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Generally, wood pallets manufacturing is done using technology that involves a lot of manual work. Some companies have mechanized some assembly operations, others have advanced to the partial robotic assembly of wood or steel pallets.

Because of growing orders for palets, we assumed from the beginning that the carton industry would have to robotize as many operations as possible from the pallet assembly process, reducing manufacturing costs and increasing productivity.

We had to answer the question whether cardboard pallets are a viable alternative to pallets of other materials, especially wooden pallets. As a result of the documentation we have found that there is a growing use of cardboard pallets worldwide. Regarding the quality parameters, the manufacturers of these pallets suggest that cardboard pallets are equal or even superior to wooden pallets.

The next step was to put into practice the technology for making cardboard pallets. We have designed and made the assembly technology using a Kuka industrial robot, aiming at the correct completion of the assembly in the best possible time. We wanted to demonstrate that the use of robots is possible in the cardboard industry with favorable consequences on the quality and productivity of the manufacturing process.

Key words: *cardboard, pallet, robot*
