STUDY ABOUT VIRTUAL AND ACTUAL MANUFACTURING PROCESS WITH KUKA ROBOT HELP

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Abstract: *In this paper the authors aim to identify the possibility of broadening the use of industrial robots for the processing of wood. In the robotics laboratory has attempted a stand where the robot will be able to process the wood pieces with tool attached to the robot. We try to point out the steps for application development; our target was cutting process of wooden objects. Industrial applications could be very many and diverse. The robot programming was developed for working on multiple facets of a piece type cube it used the robot simulation processing. To realize a comparative study of robot manufacturing with three axes CNC machines was used NX cam software which allowed us to simulate the same processing.*

Keywords: *robot, milling, processing, manufacturing, simulation,*

INTRODUCTION

In this paper the authors aim to identify the possibility of broadening the use of industrial robots for the processing of wood. The wood industry can be divided into four main areas: the furniture industry, the construction-related sector, the wooden materials industry, and other sectors. The jobs that robots are called on to perform in the wood industry include painting, handling, grading, and repairing of wooden parts and products. In the last years, the flat-pack furniture and construction materials industries are entering a new era of robotized, flexible manufacturing. The manufacture wood technology with flexible technology that can quickly and accurately adapt to varying surfaces and consistency of materials.

The requirements on personnel and machines are just as great in high-precision machining applications in the manufacture of large work pieces. Now we can see how an industrial robot in wood industry offers increased productivity at a lower cost.

We can offer an example polishing and buffing of wood products is an interesting application and many robots are integrated for wood products. In figure 1 we can see how a major guitar manufacturer had integrated a work cell with robot to polish and buff guitar bodies. In that application, the robot picks up the guitar body and presents it to sanding and buffing wheels [10].

Material handling of wood products is another important job that robotics accomplish for end-users. In many workshops where working with wood, in the secondary operations of wood product processing for cabinets, windows and doors manufacturing, robotics are taking pre-cut parts and assembling them or presenting them to joining machines.

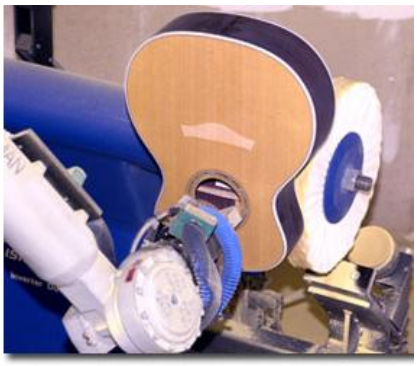

Figure 1. *Details of robotics guitar buffing* [10].

End-users ask why they should invest in robotics to help manufacture wood products when people have been performing these tasks. Most times the answer could be: tedium suffered by those in the woodworking industry is one reason that robots are used but is not only that. The robots can increase productivity, quality and efficiency of wood processing objects.

In the robotics laboratory has attempted a stand where the robot will be able to process the wood pieces with tool attached to the robot. We try to point out the steps for application development. Our target was cutting process of wooden objects. Industrial applications could be very many and diverse.

EXPERIMENTAL

The choice of the parts to be processing is very important because choosing a piece with a quite complex geometry can lead to the demonstration of all robot´s real skills. For the basic study and the work one can choose first a relatively simple part, in our case a cube, on whose sides various processing can be done. This part allows us to demonstrate the fact that the robot is not limited by its freedom degrees, but by the clamping device. This means that if we could clamp the cube on one sole corner then we could make processing on all the cube´s sides without any other movement of the device.

Next step consists of the study of the positioning and clamping device of the part. This device has to fulfill the following conditions: to be robust in order to prevent vibrations; to be universal in order to allow the clamping of a wide variety of parts; to be positioned in an optimum position (height, distance) from the robot to allow easy processing on all surfaces; to allow a simple positioning, a good screw on with a reduced number of operations; to ensure the elimination of the waste resulted in the processing operation.

The choice of the milling device, its modification and clamping to the robot form the next stage of the study within the modeling and simulation of processing with the help of the robot. The mill must be mounted on the robot so to prevent any interference or collision with the robot´s parts or with the part´s clamping device in the moment of processing and also must be rigidly clamped to ensure a quality manufacturing.

After the study of all these problems, we can start the actual simulation of the robot processing and we can make its program.

For the stand, parts as well as the splinting device the software CAD/CAM NX was used, software which offers a wide range of programs in one integrated solution, to allow the user to use the lasted technologies in terms of used tools and processing processes. NX CAM supports the latest generation of multiple function tools, including milling, drilling and turning on a 5 axis machine. NX allows a wide range of flexible processing on 5 axis machines and with tool control on various axes.

NX CAM is completely related to the other NX solutions so that the NC programmers cannot directly access technical design drawings, assemblies and tools in a processing environment. Through modeling by manufacturing´s associatively, the changes of the model are automatically conveyed into processing operations. Programmers and mechanical engineers can work with modeling parts, can create and mount devices, can develop paths and can even mould whole machines through a 3D simulation of the processing in this work environment.

For the part to be processed we will start from the simple cube type part on whose sides various types of transformations can be done. As it can be seen in figure 2, on each side of the cube the different forms from figure 2 can be milled, some simpler, some more complex. For the tridimensional parts the 3D, NX CAM software was used.

After a favorable result, more complex shapes can be tried, with complex material removal, like conic wholes, uneven surfaces, with variable radius. It is to be mentioned that now days there are specialized software which convert the course of the tool necessary for the surface processing from the design software into the robot´s specific language.

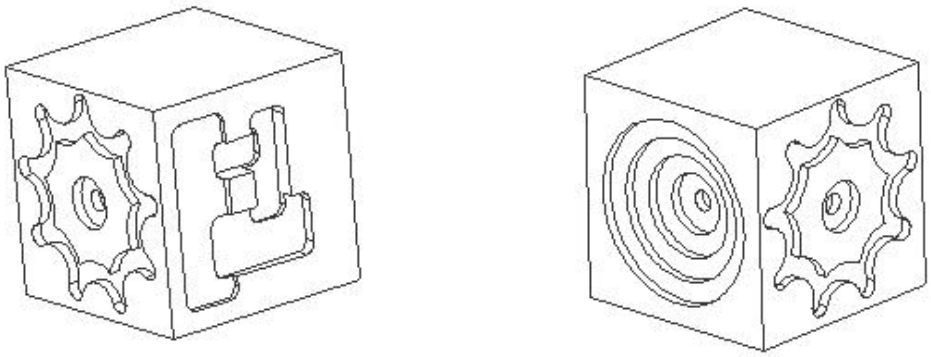

Figure2. *Cube type part with various manufacturing*