

## **SUMMARY**

This work defines the current concept of Industry 4.0. and current trends in organization of production, their need for this due to constantly developing technologies, requirements from state and environmental departments. High competition in the manufacturing organization was also in focus.

The author of this thesis has no intention to consider results as the fullest possible analysis done, as it is determined by the acquired knowledge and personal experience gained in the process of working in a real enterprise, closer in profile to an industrial enterprise for the production and processing of products.

A "smart manufacturing" concept was defined, a description of the simulation process was given in detail, an explanation of the need to use this technology was made. It has also been described what robot manufacturing cell represents, how to organize a manufacturing cell layout.

The concepts and definitions of 3D configuration and simulation of robot manufacturing cell were given. The advantages of using these techniques and software to develop the necessary solutions for the organization of the technological process in production were considered.

Justifications are given for the reasons to use modern techniques for organizing the production process these days compared to the approach that was used earlier when the development of IT technologies did not allow doing this in an optimal way. I was interested to compare the use of modern technology 3D, used in many areas of production with previously used only on the basis of 2D drawings.

One of the important points of using 3D configuration and simulation of robot manufacturing cell is the analysis of the necessary changes related to the modernization and reorganization of both production as a whole and its individual sections, the creation of additional lines of production processes, analysis of the efficiency of the existing process and the ability to propose a new solution by change.

The definition and explanation of what is Robot manufacturing cell was made. How its work is organized, what goals and objectives are solved using the manufacturing cell. In what types of production can a manufacturing cell can be used and the description of the elements that are included in the manufacturing cell was given.

The robot is described as the main element of a manufacturing cell. The scope is described, the types of tasks that can be solved with the use of a robot, the areas where the use of a robot and manufacturing cell is optimal and economically justified are listed.

In the practical part of thesis, it was necessary to modify the existing welding process for parts at Norcar company situated in Estonia. In particular, to offer an option of equipping the manufacturing cell with additional equipment so that the process is organized with minimal operator involvement and the process runs automatically.

In the process of work, it was proposed to install on the existing cell a storage for placing the frame parts that need to be processed, a loader for transporting parts from the storage to the conveyor line and vice versa, a conveyor line for delivering parts to the welding zone.

This process was developed using Virtual components software, performance analysis of the manufacturing process was provided, approximate calculations of costs and resources for additional equipment were made for the final decision on the need to make these changes.

For this work, I needed the knowledge that I acquired at the university in subjects that studied production processes, the use of necessary equipment, and working with software that can be used to design and analyze production processes. As a result of the work done, I gained skills in working with Visual components software, learned how to design a manufacturing cell according to the required technological process, analyze the data of the equipment that is included in the technological process.

As a continuation of this work in the future, I would consider the organization of the process as closer to real as possible. Namely, in the process, various parts of the body frame are welded. Since they have a different shape and design, this implies a different time for their welding. It would be interesting to get prepared and analyzed this project in order to provide more detailed cost estimation for it.

In general, I can say that the work on this task was interesting and I got initial practical engineering experience that I can apply in the future.