SUMMARY

The main aim of this thesis was to design the virtual model of an existing robotised bending cell, in order to being able to use it as a simulation tool for the integration of a new product in the production process. This tool allows the company (Inission Tallinn OÜ) to test the integration of a new product without the need of stopping the production, saving money, time and resources.

Indeed, simulation plays a key role in the engineering world in the development, designing and optimisation of systems and processes. The main advantages of simulation are: cost reduction, optimisation, risk reduction, development time reduction, performance improvement, adaptability and flexibility.

Before starting with the realisation of this project it was important to have a good understanding of the sheet metal bending methods. Metal bending dates back to the ancient civilisations time and throughout the history the various processes have been refined up to the point of having numerical control machines in the middle of the 20th century and fully automated processes in the current century.

The first step for the realisation of the virtual model was to have an overview of the existing bending cell in the company. The cell includes a Yaskawa robot MH50 II and its tools, a press brake machine Amada HFE M2 1003, 2 pallets and a zero table. For all these components/machineries it was necessary to have a 3D model for the simulation and if for some of them the model was either included in the simulation software (like the robot) or available for download online (like the press brake machine), other parts such as the customised one had to be redesigned on SolidWorks.

It was then necessary to analyse the product that had to be integrated into the bending cell, focusing especially on the bends sequence and the positioning of the product on the pallet.

Once the work in the company was completed it was time to choose the correct software to execute this work. As concerns the simulation software the choice fell on MotoSim EG-VRC given the better compatibility with the Yaskawa robot, while for the 3D modelling the choice was SolidWorks.

To create the simulation, it was first of all necessary to import the controller data from the real robot (for a better accuracy) and then the 3D models of all the components.

After adapting the robot program to the product that needs to be integrated, it was the time to write the model script in order to make changes to the part under work into the simulation.

At this point the simulation was ready.

The biggest challenge throughout the realisation of this project was the understanding and the writing of the model scripts in MotoSim EG-VRC, since they were the actual thing that could show how the product would change throughout the process.

This work has the potential for further development, for example adding the possibility to integrate different products without the need of manually changing the robot program and the model script.