

## **Master Thesis – supervisor evaluation**

**Name of the student: Surya Rengarajan**

**Topic: Control and visualization of the experiments in the vacuum technology**

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According to the master thesis guidelines the tasks were:

1. Study materials to TP 230 set – Vacuum technology
2. Design control by PLC for the particular experiments
3. Design visualization of the particular experiments in the SCADA system
4. Evaluate data from the measurements

Student has started to work upon the topic given immediately after the official task definition with great enthusiasm to understand new topic of vacuum technology in the typical manipulation tasks from industry. He has quickly fulfilled upon the first point of the guidelines – to study materials to the TP 230 set – vacuum technology. He has build all the six tasks given with the real components of this set and master all the problems that have occurred (creating his own working place related to the pressure air distribution, replacing some valves and tubings necessary, proper vacuum switch setting etc.) He has tested all designed tasks succesfully. He has also measured the efficiency of two types of vacuum ejectors and has gained some experiences with various types of suction cups and various types of surfaces and shapes of the objects - workpieces.

All tasks have been also prepared and simulated in the simulation software FluidSIM<sup>®</sup> 5 for better understanding and for preparation of the control system algorithm writing. From this part of work the possibility to automate the Task 5 – Energy saving circuit and Task 6 – Manipulation with rejection of the workpiece has been derived.

Student has then prepared applications for these two chosen tasks with the PLC SIMATIC S7-200. For the first attempt, there have been some mistakes in the application related to the false internal loop in the program causing too high frequency duty the generation of the vacuum ON/OFF switching. After deeper analysis of the solution and comparing the results with the measurements on the classical electropneumatic circuit the mistake has been discovered with the help of the supervisor and the program has been corrected.

Greatest problems that have occurred for setting the proper communication parameters between OPC server PC Access and SCADA system Reliance has student also solved after consultations with teachers in the laboratory. Also problem of the possibility to control the task both from the local operator panel at the simulated machine and from the SCADA system has been solved with the help of the supervisor.

The student proved his knowledge and the ability of the knowledge application upon three layers of the automation control system. Upon the first layer – instrumentation in the field – at the laboratory new area of vacuum technology for manipulation tasks, upon the second layer – where application for control of two tasks by PLC – here tasks for energy saving circuit and classical task of the manipulation with energy saving circuit and the controlled rejection of the workpiece have been created. And also upon the third layer of SCADA systems, where the project have been prepared to visualize the technological proces, to supervise it and to gather data for evaluation of the pressure air cost savings due to the usage of the saving circuit.

In the fourth point evaluation of the measument the implementation could be better, e.g. by usage some filters in the reports or even some scripts that will evaluate measured data automatically.

So all four points from the description of the tasks given have been fulfilled.

Our student proved during working upon this master thesis that he is able to fulfill upon the simple but very complex tasks overgiven in the short time frame given with enthusiasm and very good results.

With the respect of the facts given my evaluation is „B“ – very good.

In Prague, 21.6.2017

Ing. Marie Martinásková, Ph.D.