

## **Master Thesis – supervisor evaluation**

**Name of the student: Arun Natarajan**

**Topic: Control and visualization of the special drive application**

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According to the master thesis guidelines the tasks were:

1. Study materials to TP 220 set - pneumatic drives
2. Design control by PLC for semirotary drive application
3. Design visualization of the application in the SCADA system
4. Compare tacts time for variant types of the loads

Student has started to work upon the topic given immediately after the official task definition to understand new topic of special drives technology in the typical manipulation tasks from industry. He has fulfilled upon the first point of the guidelines – to study materials to the TP 220 set – pneumatic drives. He has build all the tasks given with the real components of this set both for the linear drive and for the semirotary drive with rotary table and for all variants of loads defined. He has mastered step by step all the problems that have occurred – e.g. proper tubing, proper placing of the senzors for the measurement at both drives, proper setting and usage of the function generator module for the measurement, etc.

All tasks have been also prepared and simulated in the simulation software FluidSIM<sup>®</sup> 5 for better understanding and as a preparation of the control system algorithm writing for the PLC.

Student then has prepared the control application for both tasks – semirotary and linear drive - with the PLC SIMATIC S7-200. For the first attempt, there have been some mistakes in the application programm written related to starting of the interval for masurement of movement time period for the first quater of the turn for semirotary drive. 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 programm 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 consultaions with teachers in the laboratory and his colleague. Also the problem of the possibility to control the task both from the local operator panel at the simulated machine with the semirotary drive and from the SCADA system has been solved with the help of the supervisor.

The problem with the measurement of the time period for partial movements of the semirotary drive has been solved with the help of the supervisor by changing the programming system environment from IEC 61131 to Simatic, where suitable funcion modules are at disposal directly.

Automated measurements for all cases related to the point 4 has not been fulfilled, these measurements have been done only in the manual mode with electropneumatic equipment, but not in the automated mode and with the help of the SCADA system, perhaps for not having enough time to complete it all in the time frame given.

In the third point - visualization and evaluation of the measurement data the implementation could be better and deeper e.g. by usage some summary calculations for evaluation of more measurements attempts. Also some scripts could be written for better graphical display of the semirotary drive movements including the variant types of loads.

For some steps student needed help of the supervisor or colleague. Sometimes during the problem solution student spent so much time related to the problem given and time spent here then lacked for the next steps.

There are some inaccuracies in the text and unfortunately also some mistakes, e.g. in the Table 12 for comparison of the measured values from the manual mode with the help of the classical electropneumatic and with the help of the PLC control application and SCADA system. This needs to be explained.

But our student proved his knowledge and the ability of the knowledge application - with some help of the supervisor - upon three layers of the automation control system. Upon the first layer – instrumentation in the field – at the laboratory at the new area of special drives technology for manipulation tasks, upon the second layer – where application for semirotary drive control has been created and debugged. And also upon the third layer of SCADA systems, where the project have been prepared to visualize the running technological proces, to supervise it and to gather and display data from the measurements.

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 and with good results.

To conclude: all four points from the description of the tasks given have been fulfilled at good level.

With the respect of the facts given my evaluation is „C“ - good

In Prague, 21.6.2017

Ing. Marie Martinásková, Ph.D.