

Bachelor's Thesis, Term Project

Conceptional Design of On-line Electro-Hydraulic Test Rig for pumps as an application for the Industry 4.0 - Electrical part (Sponsored by Ezz Steel)

(Industrial Project, With Collaboration with Ezz Steel)

Main Advisor(s): (Assoc. Prof. Dr. Eng. Amir Roushdy and Dr. Eng. Taher Salah eldeen)

Co-Advisor(s): (Eng. Malek Mahmoud)

The sudden trips of the Main Control Center (MCC) units controlling (driving) the main industrial hydraulic pumps (DR pressure controlled) of Rolling Mill Stands of a Flat steel plant (FSD) are related to improper setting of these pumps. The need to develop an online portable test rig is very essential for direct setting and adjustment of hydraulic pumps pressure control valve as well as for judgement of pumps conditions needed to overhauled (repaired) to save time and effort and take the right decision. **There is a Master's student from Mechatronics Engineering Department, Senior Researchers from ARATRONICS also available to help and advice and The Lab Engineer from ARATRONICS, guiding and directing the student with Assoc. Prof. Dr. Eng. Amir Roushdy.**

Online Pump Test Rig

Electrical System (EHRS – Electronics Scope)



Fig.: electric System (EHRS-Electronics Scope)

For more details please contact:

Assoc. Prof. Dr. Eng. Amir Roushdy, Room: C7.108, E-mail: amir.ali@guc.edu.eg, Web site: www.aratronics.com



Project outlines and chapters:

1. Overview and Principles of Hydraulic Pump Control Principles.
2. Overview of hydraulic essential measurements in basic hydraulic system.
3. Conceptual design of the control system of power unit including the followings consideration: -
 - o The Hydraulic Pump power unit.
 - o Control Philosophy defined by hydraulic team
 - o Displays / Gauges to observe the critical measurements during the test
 - o Use Proper Control System (Arduino / PLC)
 - o Use a Proper HMI / LCD for user interface
4. Hydraulic Power unit safety precautions.
5. Design of control system.
6. Define the needed sensors related to power unit control philosophy
7. Define the needed data to be displayed and logged through the HMI.

Research focus of this project:

- Literature review on the project should be studied properly.
- Not only, creating a software control system for the project but also the hardware.
- Experiments using the gadget and control system should be built properly.
- The outcomes must be documented.

Requirements:

- Passionate to learn more about, Soft Robotics, 3D Printing design, Robotics and control.
- Prior mechatronic design expertise is desired like "SolidWork and Arduino".
- Enthusiasm for completing actual practical work with 3D printing staff (design fabrication and construction).
- A method of working that is both structured and self-contained.

General tasks of the project:

- The complete methodology is already available in the ARATRONICS Lab, so we will discuss it from the first day to start the automation process for it
- Fabricate the machine/system using 3D printer/CNC machine (small parts).
- Assembly all parts of the Robot.
- Changing the working variables and see the effect on the locomotion of the robot.

Other notes:

- A weekly meeting with the advisors will be required for this project, as well as weekly progress updates (*The meeting could be more than once during the week based on your progress and based on your achievements*).
- You should to be in the Lab two days per week (*It could be more than two days based on your progress and based on your achievements*).

For more details please contact:

Assoc. Prof. Dr. Eng. Amir Roushdy, Room: C7.108, E-mail: amir.ali@guc.edu.eg, Web site: www.aratronics.com

- All reports must be prepared in the style of a research paper.
- The outcome of this research will be published in one of the coming international Conferences and , or Journal

For more details please contact:

Assoc. Prof. Dr. Eng. Amir Roushdy, Room: C7.108, E-mail: amir.ali@guc.edu.eg, Web site: www.aratronics.com