

Ranheim Paper & Board

Master thesis suggestions spring 2026 – improving
process operation and safety

Each master will have co-supervisor (cybernetics
engineer) from Randheim.

1: Developing a Modern HMI for Control Systems in Paper Mills

A well-designed HMI is critical for safe and efficient process operation, yet many industrial control systems still rely on outdated visualizations and practices.

This project will explore modern HMI design concepts, such as high-performance graphics, minimalistic color schemes, and KPI-driven dashboards. The goal is to create an interface that improves operator situational awareness, reduces cognitive load, and enhances alarm management.

The study will involve analyzing existing HMI structures, identifying weaknesses, and implementing a prototype layout. A key aspect will be testing usability and effectiveness in real or simulated conditions, evaluating how changes impact process monitoring and control.

The outcome could be to roll out a new HMI standard based on valuable and relevant insights, and best practices for industrial HMI development.



1: Developing a Modern HMI for Control Systems in Paper Mills

Preliminary suggested aspects to cover (possible to change):

- Investigate best practices for Human-Machine Interface (HMI) design, emphasizing abnormal situation awareness, effective KPI tracking, and operator usability.
- Evaluate how color schemes, layout structures, and alarm prioritization influence operator decision-making and process stability.
- Develop a prototype HMI layout incorporating modern design principles and test it in a simulated or real production environment.
- Analyze potential improvements in operator response times, process control efficiency, and overall plant performance.

Recommended background knowledge: Process control, process technical safety, industrial IT

2: Developing and roll-out of lock-out tag-out principles for enhancing process safety

Lock-out Tag-out (LOTO) is a crucial safety procedure for preventing hazardous energy releases during maintenance and servicing of industrial equipment.

This thesis will focus on developing and implementing LOTO principles for a paper machine and its associated systems at Ranheim P&B. The study will involve mapping current procedures, identify potential risks, and design an improved LOTO framework tailored to the mill's operations.

The work will include collaboration with maintenance and operations personnel to ensure practical implementation and adherence to best practices.

The final goal is to create a structured LOTO process that enhances process safety and minimizes the risk of unintended start-ups and energy releases. Additionally, the project will consider training needs and user-friendliness to ensure effective adoption.



2: Developing and roll-out of lock-out tag-out principles for enhancing process safety

Preliminary suggested aspects to cover (possible to change):

- Go through earlier work (project assignment).
- Assess current LOTO practices and identify gaps or improvement areas.
- Site visits to other plants may be possible.
- Develop a structured LOTO procedure based on industry best practices and mill-specific needs.
- Pilot the new procedure on a paper machine (or parts of) and evaluate its function and effectiveness.
- Develop training material and conduct awareness sessions for operators and maintenance staff.
- If time allows it: Investigate how digitalization of LOTO procedures and requirements therein can be implemented for instance in control system.

Recommended background knowledge: process technology and safety, risk management, mechanical or chemical process engineering principles, change management.