Optimal strategy and arrangements for waste heat recovery from hot-rolled aluminium coils

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Master project in collaboration with Novelis company (internship possibility)

Objectives

- To conceive and design the best configuration(s) for recovering waste heat from hot-rolled aluminium coils, considering the heat transfer phenomena (residence time, interfaces, temperature profiles) and the constraints in the process schedule.
- To propose the most suitable alternatives for profiting from the waste heat recovered at higher temperatures, which could be used by Novelis and a future district heating systems in Sierre city (VS).

Profile

- Interest in heat transfer theory, energy conversion systems and energy integration method.
- Knowledge on heat transfer in high temperature energy systems (furnaces and waste heat recovery) and fluid mechanics.
- Some knowledge on R, Python and Lua is desirable. Experience with Ansys software is also recommendable.

Project plan

The study includes:

1. Identification of the process constraints and operative conditions (cycle times, temperature profiles, energy consumption) and waste heat available from the coil cooling process.

2. Proposition of a resourceful waste heat recovery system operating on air or moist air-based forced convection.
3. Heat transfer modeling and simulation using Ansys software and validation using existing experimental data.
4. Interaction with Novelis for the proposition of a simplified predictive strategy to correlate the heat transfer coefficient and other relevant parameters to the operating conditions of the coil cooling system.
5. Estimation of the techno-economic and environmental impact of the proposed system.
6. Identification of opportunities for additional waste heat valorization for combined heat and power production.

Observation

The project is related to the Net Zero Lab in collaboration with Novelis Sierre and HES-SO Valais and funded by the Swiss Federal Office of Energy.

Sources

See more at: https://www.novelis.com/net-zero-lab-valais/

Supervisors

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