Improvement of energy efficiency in the steel industry by utilization of low temperature waste heat

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Short Description (maximum 2500 characters)

At present the Austrian steel industry is consuming about 24 GWh oil, 13, 800 GWh gas und 3,700 GWh electricity. Steel industry could increase their energy efficiency further by the identification of the waste heat flows, characterisation according to load, temperature and time of availability and consequently developing concepts for utilization of the waste heat flow in the main processes or to generate electricity, with the goal to reduce the primary energy demand.
In the steel industry waste heat is a result during the production process. The billets produced in strand casting are heated and processed in rotary hearth furnaces or walking-beam furnaces. Other furnace types which are used in the production process to prepare the desired product properties are patenting furnaces, curing ovens, drying furnaces as well as annealing furnaces. In spite of using regenerative or recuperative preheating of the combustion air, these furnaces dispose of the exhaust gases at around 300° C. At the end of the production process the products are cooled to ambient air temperature by air (cooling beds) or by water (quench cooling).
For the identification of heat sinks and the integration of the recovered energy in the company's specific energy supply unit it is essential to know the processes in detail. The utilization of waste heat from furnace exhaust can be realized on the one hand with application of ORC plants (Organic Rankine Cycles) to generate electric power and on the other hand by the usage of waste heat boilers for heat extraction. Another heat source is the cooling water. If it is possible to separate the warmer flows e.g. for steam generation, for hot water generation or to bring them to a useful level, e. g. with an absorption heat pump, this energy can be used in other processes in the mill.
In the last year studies by the authors have shown that the steel companies can produce about 5 % of their electricity demand out of waste heat und that they can reduce the primary energy demand about 10 % by using waste heat. Using the waste heat flow contains a big potential for the future.

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