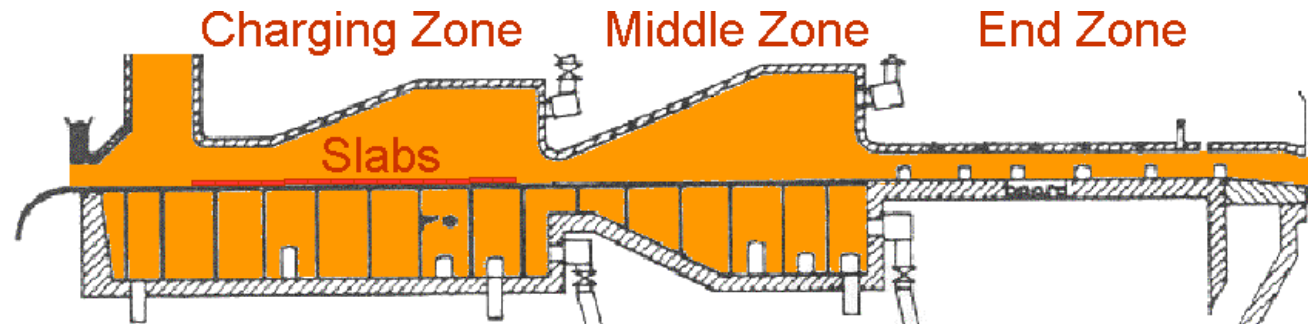


Temperature Control in Slab Reheating Furnace



A reheating furnace of a hot strip mill heats steel slabs up to 1200-1280°C. The existing temperature control followed optimal heating curves. These curves were defined off-line and balance between energy savings and required final temperature distribution inside the strip.

Due to a change in customer requirements, the slabs had different temperature requirements and the optimal curves could not be followed.



Target

It was decided to improve the temperature performance by improved control philosophy. Heating too high costs energy but is sometimes accepted as too cold slabs cause costly rejects.

- When one or more slabs are expected to come out too cold (outside limit), the (expected) coldest slab will overrule the abovementioned average and be used for control

Project plan

- Build a complete dynamic model of the reheat furnace, including control systems and validate it.
- Determine a new control method and show performance improvement with simulations.

Finally it is shown that more slabs are heated within tolerance and much less slabs are rejected due to too low temperature.

Results

A complete dynamic simulation model was built and validated, based upon physical slab heat-up and an ARX model for the furnace response.

A new controller was designed based upon the following:

- For each slab the expected end temperature is calculated with a dynamic slab model and compared with its individual set point. The average difference is used for zone temperature control.

