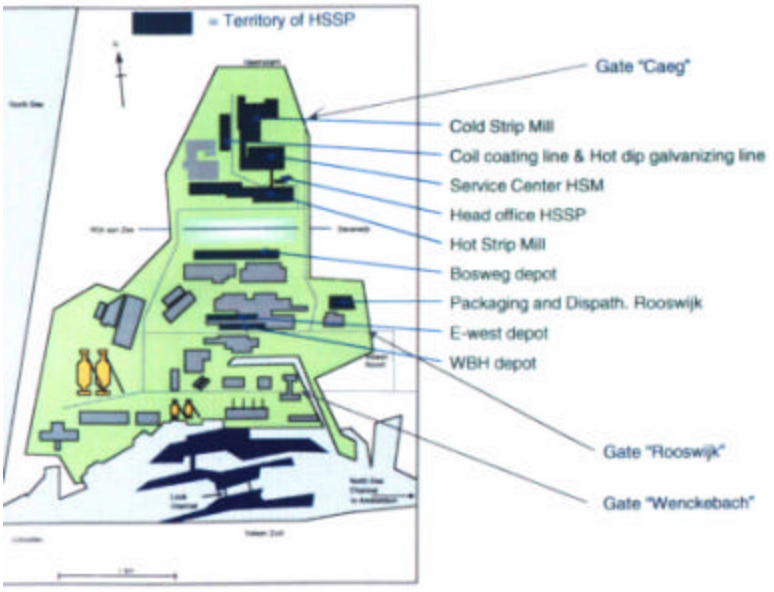
Report on the Prevention and Removal of scale using "**Scale***watcher*®"

The company

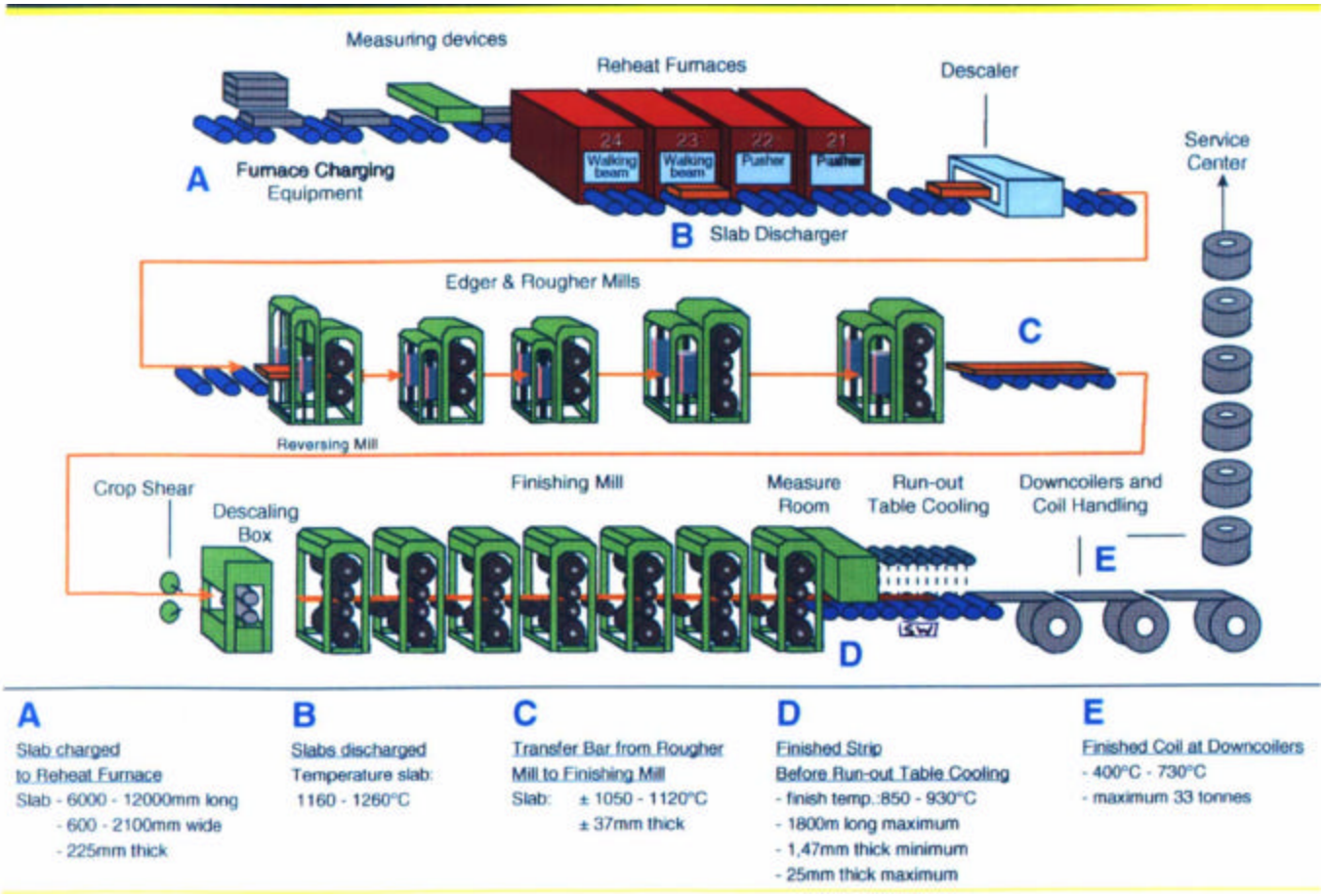
Hoogovens in The Netherlands is on of the big players in the global steel market. Tough competition requires a sharp eye on productivity and costs as well. **Scale***watcher*™ systems help to keep productivity up and costs down. A good example is the hot mill IJmuiden, where **Scale***watcher*™ systems significantly reduce maintenance expenses.



The process

Hoogovensstaal in IJmuiden covers the whole hot mill processing range. Blooms of 6000 – 12000 mm/236" – 472" length, 600 x 2100 mm/23.6 x 82.6" width and 225 mm/8.9 " thickness are processed to various steel products (photo 5). Processing steps are heating to 1160 – 1260 °C/2145 – 2325 °F and preconditioning followed by the rolling to sheets with a thickness of 37 mm/1.5" maximum. In the following rolling strip, the steel is processed to a thickness between 1.47 mm/0.06" and 250 mm/9.8" at a temperature of 850 – 930 °C/1587 – 1732 °F. The final step at 400 – 730 °C/778 –1372 °F leads to coils with a weight up to 33 tons.

Temperature control is crucial in all processing steps, ensuring the correct material parameters. A decisive point is the running out table, where the steel is cooled down with water. This line consists of a circuit of upper and bottom trays, in total 98 trays of 2,5 m/98" length with holes of 10 mm/0.4" diameter. Spray nozzles sprinkle the needed cooling water.



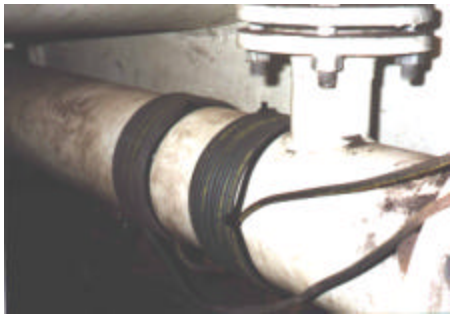
The problem

High temperatures and large cooling water quantities led to a massive scale build up in all water related parts of the running out table. The total contents of the water circuit amounts to 2500 m^3/h or (9259 GPM) with a make up of 550 m^3/h (2037 GPM) and storage of 1600 m^3 (5925 GPM). Two air-cooled cooling towers direct the water to the cooling trays via a natural, 17 m/52 ' high fall.

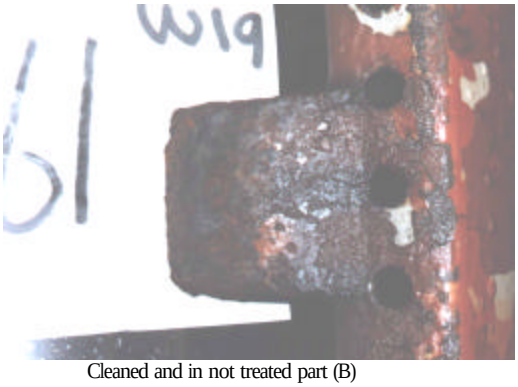
In this line the upper trays did not suffer from scaling, while the bottom trays experienced calcium carbonate hard scale precipitation caused by instant water heating during the spraying. Every two weeks the process had to be shut down for maintenance. To prevent the spray nozzles from blocking, two employees had to drill the nozzles mechanically open. Hoogovensstaal regarded this situation as unsatisfactory and Mr. A. Koorn contacted **Scale*watcher***™ to find a solution.

Test Installation

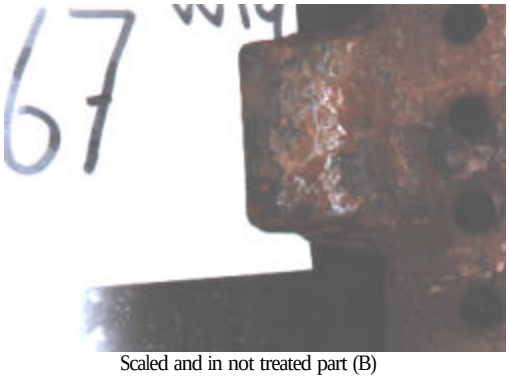
For testing, only two out of 98 pipes at the running out table were chosen. Two **Scale*watcher***™ Industrial 3 Systems were chosen and installed on May 30th 1996.



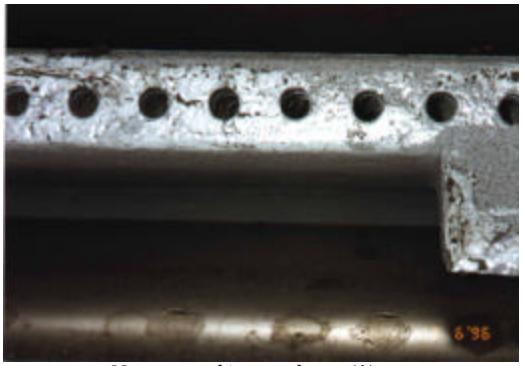
The remaining sections (B) were not treated to get comparable results on the **Scale*watcher***™ effect.

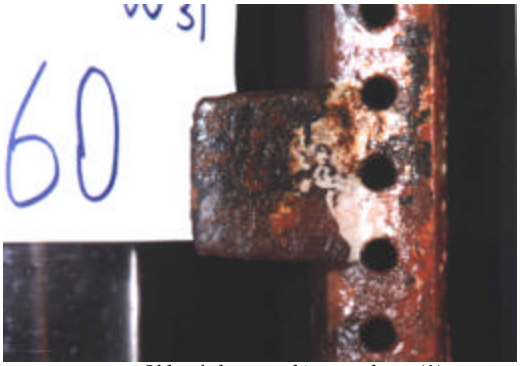


Cleaned and in not treated part (B)



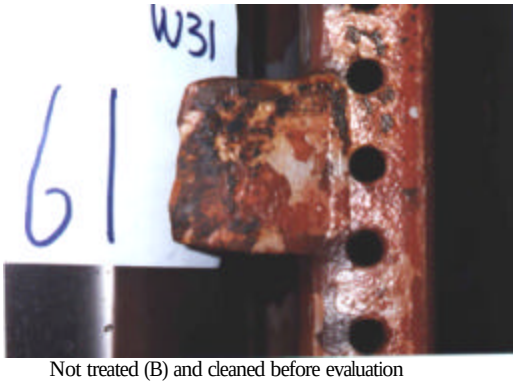
Scaled and in not treated part (B)


New tray, and in treated part (A)

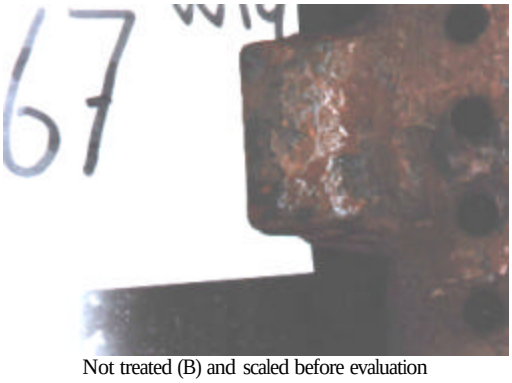


Old scaled tray and in treated part (A)

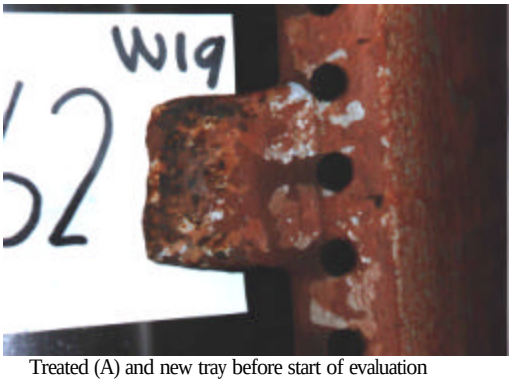
Amazing results with the Scale*watcher*™ after six months of evaluation.



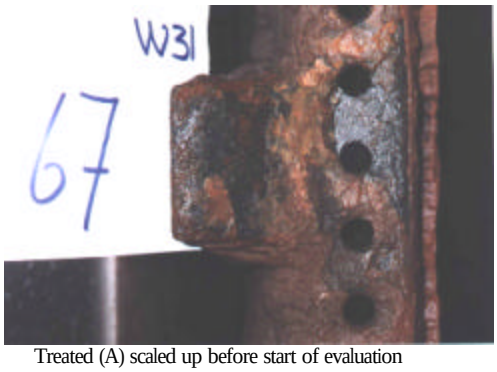
Not treated (B) and cleaned before evaluation



Not treated (B) and scaled before evaluation



Treated (A) and new tray before start of evaluation



Treated (A) scaled up before start of evaluation

The results in the treated sections were convincing: the spray nozzles in the **Scale***watcher*™ lines remained open and the trays showed nearly no further scaling at all. Old scale gradually disappeared within twelve months. This **Scale***watcher*™ effect is known from a lot of applications.
But there was an effect that was really amazing at first glance: even the neighboring sections showed much less scaling than before. What was the reason?

Studies of the water distribution scheme made it clear: Sections that were not directly treated with **Scale***watcher*™ systems took advantage of water circulation within the whole system. Though only two water lines out of 98 were directly treated, **Scale***watcher*™ effectively protected the whole system – directly and indirectly.
The documents clearly show the effects:

- Spray nozzles remain open, no deposits on the trays in the treated sections. (Part A)
- Minor deposits in the indirectly (not) treated sections (Part B)
- Old deposits are gradually disappearing.
- After six months, it became clear, that the scale build up in the whole system had decreased remarkably and that the spray nozzles could be cleaned much easier.
- After twelve months, the drilling team reported that there was no further drilling work on the spray nozzles of the complete running out table to be done.

Conclusion

The convincing results led Hoogovensstaal to keep both installed **Scale***watcher*™ systems. This was decided on June 1997. Due to less service shutdown time and no more manual scale cleaning, Mr. A. Koorn, project supervisor, calculated that the **Scale***watcher*™ investment was paid back within three months.

Source

Hoogovensstaal, Mr. Koorn