



## ***EFFICIENCY IMPROVEMENT – BOF STEELMAKING***

**Customer:** EVRAZ NTMK, Nizhny Tagil, Russian Federation

**Plant data:** NTMK is an Integrated Steel Works producing approx. 4.2 mtpa liquid steel in 4x160 t converter after they reduced their production by 2.0 mtpa from OH-operation. The steel is produced from Vanadium rich hot metal in 2 steps by the DUPLEX process. Step 1 is the De-V process in the converter and step 2 is the conventional BOF De-C process. The liquid steel is cast into blooms for further processing into long products (trails, medium / heavy sections, railway wheels) and into commercial slabs. The sale of V-slag from De-V is adding further value to the commercial result of the company.

**Objective / Challenge:** EVRAZ had the intention to evaluate their current steelmaking operations in order to develop specific measures for improving mainly the following aspects:

- BOF Productivity Enhancement by improving plant logistics
- Improvement of refractory lifetime and bottom stirring
- Reduction of specific consumptions

Once the measures are defined, HWC shall lead the technical team of NTMK to implement the improvements in the daily production.

**Project** Evaluation and measure development:

**Duration** December 2018 to June 2019

Implementation program of specific measures (HWC lead):

July 2019 to now

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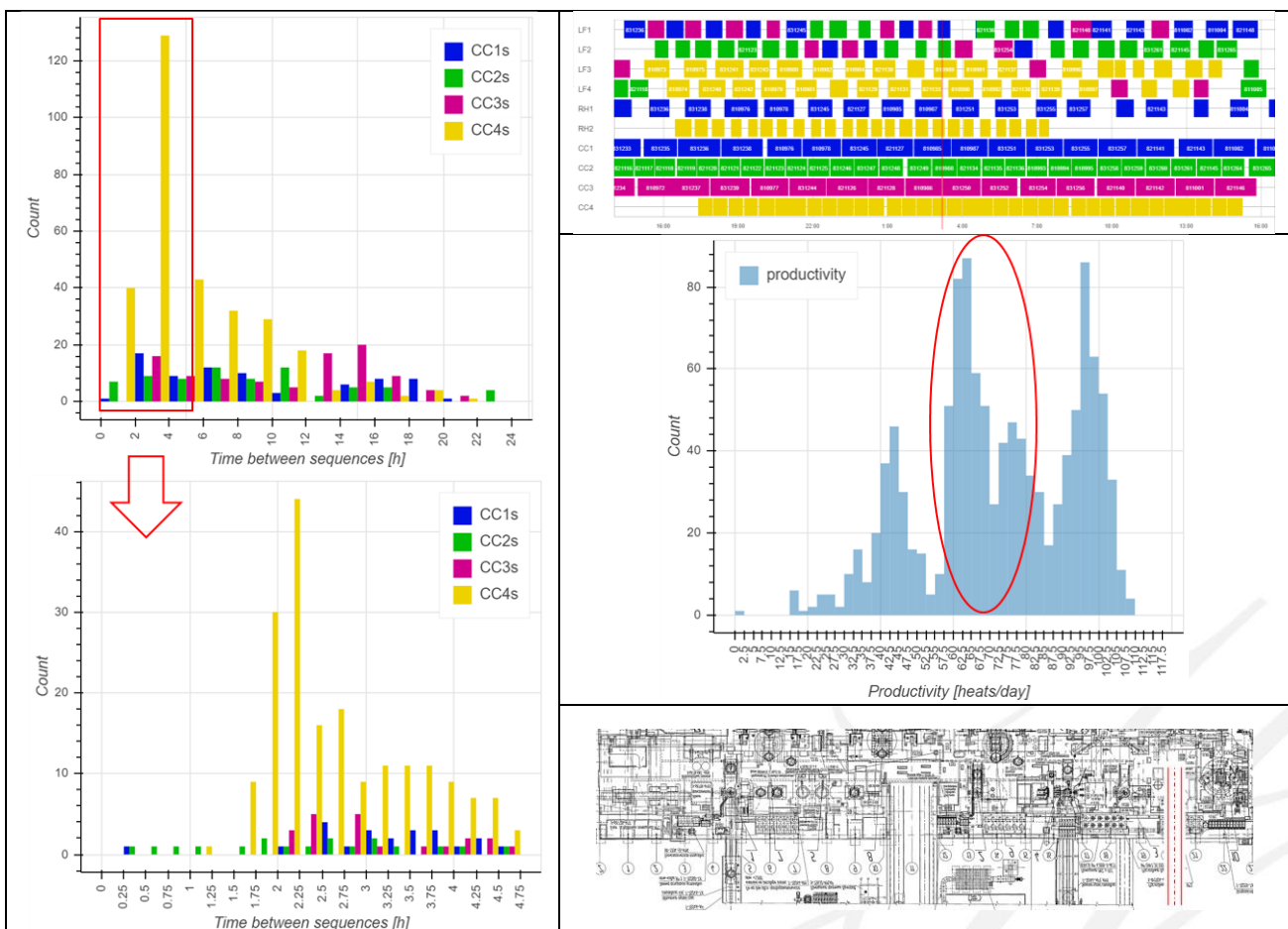
## Project description:

### EVALUATION PROGRAM

- **BOF Productivity Enhancement by improving plant logistics**

HWC has performed a detail process time analysis of significant production units. Additionally, crane movement analysis and ladle transportations have been under investigation as well as the integrated plant production. Clear bottlenecks and consequently certain improvement areas had been identified.

HWC was targeting to specify potential logistic improvement measures which are enhancing the overall crude steel production (BOF productivity) in the steelplant.



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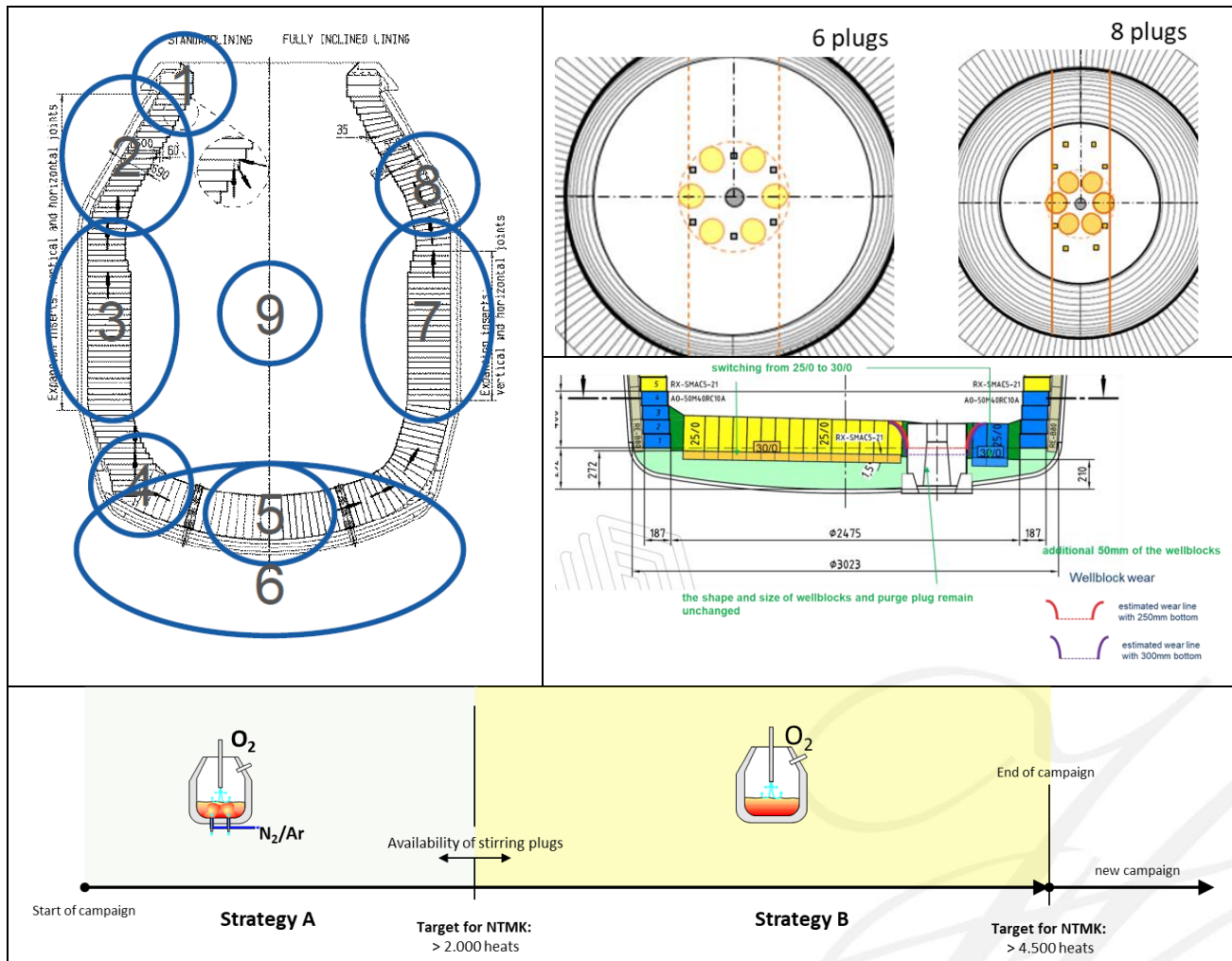
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- **Improvement of refractory lifetime**

HWC has performed a detail assessment of the current refractory maintenance strategy and evaluated the refractory lifetime of converter and teeming ladles in order to identify potential improvement measures. Main target was to verify if the current strategy for refractory lifetime is proportional to the respective operational costs.

Suitable benchmark figures facilitated this verification and showed certain improvement potentials. In order to obtain the optimal proceedings, HWC involved dedicated expertise of RHI-Magnesita AG into this project.



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- **Reduction of specific consumptions**

HWC has performed a detail assessment on the specific consumptions and related specific costs of the converter steelmaking units in order to identify potential improvement measures.

General focus was on following cost objects:

- Charging Materials
- Refractories
- Energy Utilization

## IMPLEMENTATION PROGRAM

After evaluation and developing improvement measures, a certain implementation program is carried out.

HWC is supporting NTMK in the following aspects, with the main target to improve operation procedures and operating costs:

- Bottom Stirring Efficiency
- BOF refractory strategy
- BOF DeC Process Philosophy
  - Oxygen Lance Pattern, Nozzle Design
  - Converter Slag Condition Optimization
  - Flux Additions

HWC actions are aiming to improve the main key performance indicators (e.g. CxO product, Yield, consumption figures, etc.) in the relevant production areas.

HWC is advising with its full available knowledge and international network in order to guide NTMK in their actions to improve the efficiency of the plant. HWC is supporting in any activities, such as:

- Trial Test Definition
- Data Analysis and Interpretation of Results and Heat Reports
- Process Calculations
- Presentation of Results

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