A challenge - Application of innovative automation to revamp an old tandem cold rolling mill into a sophisticated and productive plant

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ABSTRACT

It is a challenge to modernize a fifty year old tandem mill retaining the major components. SMS group did just than when they modernized Severstal’s fifty year-old four-stand batch tandem mill “1700” (TCM) in Cherepovets. The target of this revamp was to increase production, expand product mix to include automotive grades and also improve quality, as it is a must for automotive grades. The productivity was also to be enhanced by reducing the off-gauge length, increase availability and reduction of gap time between two coils.

Additionally, the stands were to be made stronger so that the mill can later be converted into a PLTCM. To achieve this, new actuators were implemented in the mill stands (hydraulic adjustment systems, work roll bending, CVC® plus shifting). The drive systems became a “mixed solution” due to budget constrain - new and modern AC drive of mill stand #1 and existing DC drives (Ward Leonard drive trains) for stands #2 - #4 with a new field excitation control.

Automation system was completely new SMS X-Pact® Automation including Level 2 Automation and SMS X-Shape® flatness measurement. One of SMS’s special and patented threading functions -TRC® was used to reduce the off-gauge length per coil. TRC® used special functionalities within the model-based Level 2 system as well as Level 1 system.

The state-of-art Automation system could handle the different dynamics between stand 1 and the rest of the stand and produce high quality products. The entire system passed through the SMS “Plug and Work” test and this allowed the mill to be restarted within 3 months. Especially the phase between the first mechanical movement after erection and the first rolled coil was shortened to a record time of only 10 days.

Keywords: TCM Modernization, Upgrade of Ward Leonard drives, X-Shape, X-Pact®, Yield Improvement with TRC®