Health Check for Neural Networks

Technological service to improve forecast of rolling properties by a regular Health Check.

Steady growth in the variety of steel grades has created the need for self-learning statistical models – like neural networks – in order to achieve high setup accuracy and tight product tolerances, as well as to apply to new materials. The performance of neural networks depends in turn on the quality and quantity of training data available. Erroneous data lead to poor modeling behavior, weakening pre-calculation accuracy – and the performance of the mill declines. Improvements to the pre-calculations of thickness, width, strip temperature, profile, and flatness using neural networks results in higher quality and more exact strip dimensions.

Your challenge:
The rolling process occurs smoothly and at top speed, with minimal width overhead and the most accurate thickness and flatness results. To achieve this optimal performance, the pre-calculation of roll force, strip temperature, width, and flatness must be as accurate as possible. Scrap at the head and width of the strip should be minimized in order to increase profits. In addition, new material must be rolled using the best methods, without manual engagement. The overall result of enhanced thread-in accuracy will be smooth rolling and optimal performance.

Our solution:
To avoid any deterioration in ongoing quality, Siemens VAI provides a regularly scheduled check of the neural networks consisting of a detailed network analysis and the initiation of any necessary corrective maintenance activities. The data required for the analyses will be acquired via the existing common remote access (cRSP). After the checkup, the maintained and optimized “retrained” networks will be reinstalled either through remote access or during an on-site visit. With a regularly maintained neural network, all of your mill’s challenges are mastered – and your rolling process benefits to improve your rolling process.
Offshore remote data analysis with maintained and optimized neural networks

The comprehensive data check by Siemens VAI provides a detailed diagnosis of the actual condition and quality of your implemented neural networks. Different configurations will be compared in order to arrive at the perfect setting. Implausible data will be erased from the training data in order to retain only correct values, which are used by the self-learning mechanism of the neural networks.

After finishing the on-site analysis, a report is created providing detailed information on tasks performed and a comparison of the previous and the optimized neural network.

On-site activities / remote activities

Careful planning of the neural network installation lays the foundation for subsequent successful stages of the optimization. The newest version of Siemens’ neural network software will be installed to increase performance and protect the network from erroneous inputs. The resulting simplified operation and handling are more advantages for your mill.

With the installation of Siemens’ graphical tool NNDS (Neural Network Diagnostic System), customers have the option of running some of the diagnostics themselves – and your process automation personnel will be able to observe product quality firsthand.

Advantages of a neural network service

- **Improved quality** of rolling material
- **Reports** estimating the pre-calculation error
- **Newest software** benefiting from cumulative improvements
- **Optimized neural networks** from which faulty data is deleted so that the network cannot learn from erroneous data
- **Smaller differences** between strip head and body mean a reduction of the cut-off at the head
- **Smooth rolling** due to higher thread-in accuracy
- **Customer-specific configurations** adapt to your product portfolio
- **More precise width** means less waste
- **Flatness correction** makes flatness settings more accurate
- **ROI after 2-3 months** with an assumed 3,000,000 tons/year and 1% quality improvement

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