Global adaptive model for prediction, characterization and control of chatter in rolling mills

PROJECT DETAILS

Funding Programme:
Research Fund of Coal and Steel (RFCS)
Sub-Programme:
Steel Research
Funding Scheme:
Research Project
Project Reference:
00015;
CECA-08-RFSR-CT-2008-00015
Project Duration:
36 Months (from 2008-07-01 to 2011-06-30)
Total Project Value:
€ 1.879.635
EU Grant-Aid:
€ 1.127.781
Funding to UniOvi:
€ 313.880

Website:

PROJECT DESCRIPTION

The overall aim of this research project is to develop the technology for a global approach to the effective prediction, detection, characterization and damping of vibrations and spurious oscillations experienced by the hot strip mill machinery during rolling in order to minimize their adverse effects on the volume of production and on the strip quality. Investigations were centred on the hot strip mills of ThyssenKrupp Steel at Bochum and ArcelorMittal at Aviles. Mainly three types of new sensors — torque sensor, distance sensor and sound sensor — were developed and installed in the participating mills for chatter on-line monitoring. Elementary analysis of the data from these sensors empirically showed the dependence of chatter on the material type and dimensions, the speed, the rolling force, etc. The data were also used to develop and test three models. A software tool based on the SOM neural network model permits earlier identification of chatter cases. A physical roll gap model of the stand and an FE model were able to identify the natural frequencies of rolling stand oscillations. The FE model also visualized the effect of chatter on various components. It has been established that chatter is the resultant of both torsion and translational oscillations. A very effective mechanical chatter damping system was developed based on the stand model and tested on a test bench. Due to an ongoing modernization work at the Bochum hot strip mill the models could not be implemented on-line as scheduled. This also hampered the ultimate merging of all the models into a global model.

UNIOVI TEAM

Ignacio Álvarez García [1]
ialvarez@uniovi.es
Guillermo Ojea Merín [1]
gojea@uniovi.es
José María Enguita González [1]
jmenguita@uniovi.es
José Antonio Cancelas Caso [1]
cancelas@uniovi.es
José Carlos Rico Fernández [2]
jcarlosr@uniovi.es
Alberto B. Díez González [1]
abdiez@uniovi.es
José Ángel Sirgo Blanco [1]
sirgo@uniovi.es

[1] Department of Electrical, Electronic, Computers and Systems Engineering
[2] Department of Construction and Manufacturing Engineering

PROJECT PARTNERS

Project Coordinator
Cetto Maschinenbau GMBH & CO. KG, Germany

Germany
Thyessenkrupp Steel A.G.
Technische Universitaet Clausthal
Spain
Acelormittal España
Universidad de Oviedo
Italy
Scuola Superiore di Studi Universitari e di Perfezionamento Sant'Anna