

## Title (en)

Multivariable flatness control system

## Title (de)

Mehrgrößen-Planheitsregelungssystem

## Title (fr)

Système de contrôle de la planéité à variables multiples

## Publication

**EP 1181992 A2 20020227 (DE)**

## Application

**EP 01119908 A 20010817**

## Priority

DE 10041181 A 20000818

## Abstract (en)

The system detects band flatness with a measurement system and separates the planarity error into orthogonal components. A real-time model takes all rolling process parameters into account. Another model computes planarity regulation demand values. A multi-parameter regulator regulates band planarity. Control parameters for inclusion in dynamic optimization are predicted from the dead time. Noise parameter mixing is performed. The system detects the flatness of a band with a measurement system and separates the planarity error into orthogonal components. A real-time capability model takes all parameters involved in the rolling process into account and another model computes demand values for planarity regulation. A multi-parameter regulator regulates band planarity. Control parameters for inclusion in dynamic optimization are predicted from the dead time. Noise parameter mixing takes into account the characteristics of the incoming band, the variation of the roller force and thermal crowning. Independent claims are also included for the following: a method of measuring and/or regulating flatness in when rolling material, and a device for measuring and/or regulating the flatness of a band.

## Abstract (de)

Verfahren zum Messen und/oder Regeln der Planheit beim Walzen, bei dem die Planheitsfehler in unabhängige Komponenten zerlegt werden.

&lt;IMAGE&gt;

## IPC 1-7

**B21B 37/28**

## IPC 8 full level

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## CPC (source: EP US)

**B21B 37/28** (2013.01 - EP US); **B65H 2557/2644** (2013.01 - EP US)

## Citation (applicant)

- W.H. PRESS ET AL., NUMERICAL RECIPES IN C
- A. RALSTON; P. RABINOWITZ: "International series in pure applied mathematics", 1978, MCGRAW-HILL, article "A first course in numerical analysis"
- PU, H. ET AL.: "The Hardware-in-Loop simulations and on-line tests of an integrated thickness and flatness control system for the 20 rolls sendzimir cold rolling mill", PROC. INTERN. CONF. ON MODELLING OF METAL ROLLING PROCESSES, 13 December 1999 (1999-12-13), pages 208 - 16
- SODA, K. ET AL.: "Improvement in Flatness Control Response for Tandem Cold Strip Mill", PROC. INTERN. CONF. ON STEEL ROLLING (STEEL ROLLING '98), 9 November 1998 (1998-11-09), pages 760 - 765
- W.H. PRESS ET AL.: "Numerical Recipes", 1992, C, CAMBRIDGE UNIVERSITY PRESS
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## Cited by

CN1311922C; DE102004005011A1; DE102004005011B4; EP1488863A3; CN103406364A; CN107138540A; DE102014007381A1; US7031797B2; WO03078086A1

## Designated contracting state (EPC)

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## DOCDB simple family (application)

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