Turning Roll Systems
Axial drift of heavy rotationally symmetrical components on Turning Roll Systems

Turning Roll Systems (Fig. 1) are used to turn resting, rotationally symmetrical workpieces while or between welding or mechanical manufacturing processes. Each Turning Roll System consists of at least two rotatably mounted rollers on which the workpiece rests. Usually, at least one roller of at least one Turning Roll System is driven by a motor, by which the workpiece can be rotated. During the rotation of the rotationally symmetrical workpiece on the Turning Roll System an axial force is produced, which either moves the workpiece in the axial direction or/and acts as an external load on the roller blocks (Fig 2). These loads can be so high that the roller blocks are moved or torn from the rails and are pushed over. This axial movement is referred to as „drift".

The drift occurs in both cylindrical and conical workpieces and can neither be predicted precisely in direction, nor in dimension. The causes of this undesirable process are probably different surface textures, a deviation from the ideal axial orientation, shape inaccuracies of the workpieces or the deflection because of its own weight.

The results of the offset between the weld and the position of the welding head or the actual and desired position of the tool during machining, are defective production results. At best, these can be corrected through rework, which is time-consuming and costly. Serious production errors can also lead to unusable products, which decrease the profitability of the company. In the worst case there is an industrial accident, caused by a falling down or falling over workpiece because of the drift, the caused forces or during the attempt to stop the drift.

In this project, a theoretical description of the mechanical system and an analysis using the FEM is performed first. After that, experimental studies on a model test rig (to be developed) are planned. Special attention is paid to the measurement and control of technical equipment. The task is to find out how the axial drift occurs and which forces act while the workpiece is moving. This information will be used to develop a system that is holding the workpiece in its position without causing internal forces.

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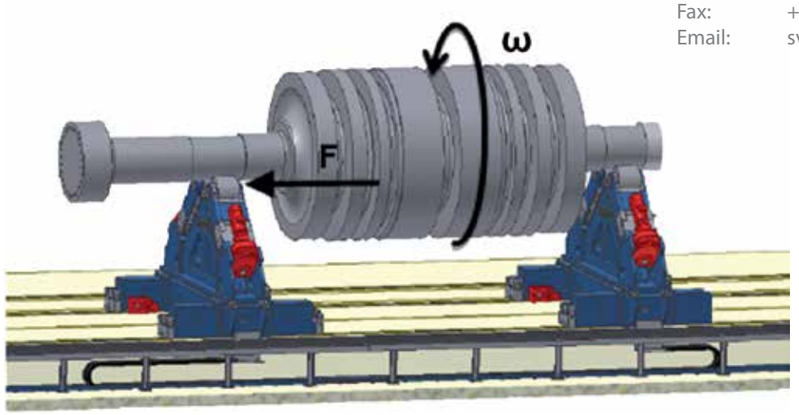
Fig. 1: Turning Roll System with workpiece (tube) [Source: DEUMA]

Fig. 2: Representation of a Turning Roll System with rotor and visualization of the resulting axial force F upon rotation of the workpiece [Source: DEUMA]



I Project Management and Execution

Management:
Univ.-Prof. Dr.-Ing. Claus-Peter Fritzen

Contact:
Univ.-Prof. Dr.-Ing. Claus-Peter Fritzen
M. Sc. Sven Vitt

Universität Siegen
Dept. Mechanical Engineering
Institute of Mechanics and Control Engineering – Mechatronics
Paul-Bonatz-Straße 9-11
D-57076 Siegen

Univ.-Prof. Dr.-Ing Claus-Peter Fritzen
Phone: +49 (0) 271 / 740-4621
Fax: +49 (0) 271 / 740-2769
Email: fritzen@imr.mb.uni-siegen.de

M. Sc. Sven Vitt
Phone: +49 (0) 271 / 740-2132
Fax: +49 (0) 271 / 740-2769
Email: sven.vitt@uni-siegen.de