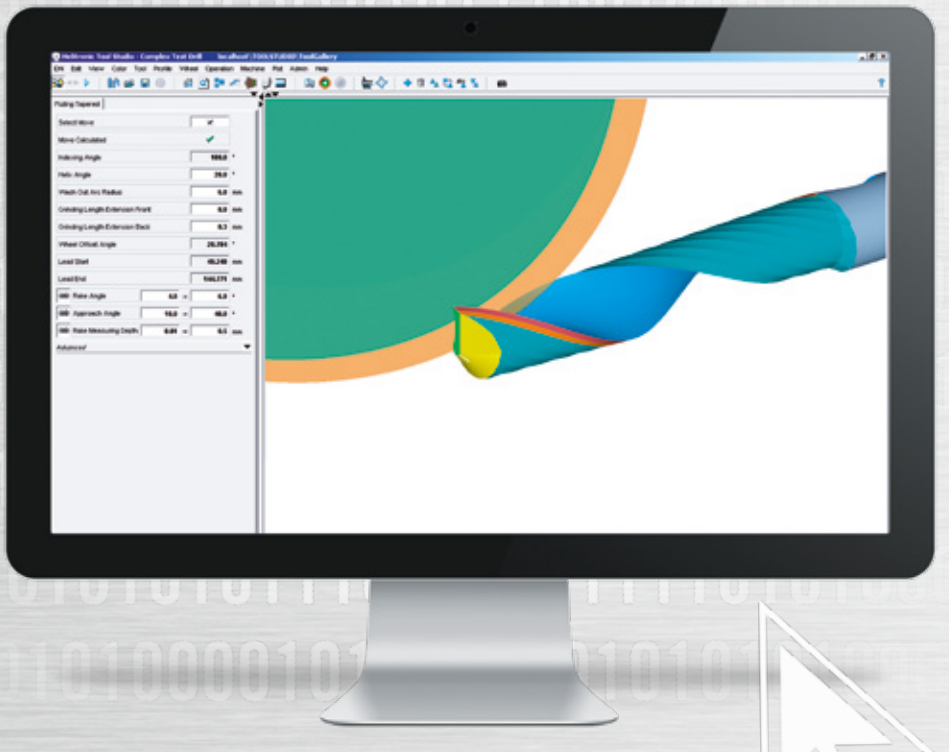
WALTER INFO 6/2018

TOOL BALANCER GRINDING SOFTWARE

Efficiency-enhancing solutions



Benefits

The Tool Balancer balances centre cutting tools including asymmetrical cutters or unevenly divided end milling cutters. With optimum runout, the durability of the tools is increased. In addition, it improves the surface quality of the material for machining and minimises the bearing load of the CNC machine.

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Performance Enhancing Solutions: Tool Balancer

- The tool is balanced while keeping the original geometry intact

- For a tool rotating at 30,000 rpm the unbalance force is reduced from 30 N to only 0.04 N with a few clicks

Background

Asymmetric cutting tools such as unequally indexed endmills have many desirable properties. But they pose certain disadvantages at high rpm. As the center of mass is off center, an unbalance force develops and leads to vibrations, chatter and excessive load on machine bearings.

Tool Balancer resolves these problems. The tool is automatically varied until it is balanced. Key aspects of the tool's geometry (unequal indexing/helix) are preserved. For instance, the flute length at the back can be changed without affecting the rest of the tool. Tool Balancer has two main functions: Mass Analysis and Automated Balancing.

Sample Analysis

An example of a tool suitable for balancing is a threeflute, unequally indexed end-mill (created via the ToolStudio Endmill Wizard). The center of mass and the geometric center of the blank are different (As shown on the upper right). This tool (D = 10 mm, L = 30 mm) rotating at 30,000 RPM will produce an unbalance force of approx 30 N. Vibrations and chatter will result.

To return the center of mass to the center line we need to balance the asymmetry of the unequally indexed flute. In this example, flute length is used as the strategy.

After the balancer is run on this tool, the unbalance force was reduced to 0.04 N with only minimal change to the tool's geometry (lower right).

Mass Analysis

The first step in the analysis calculates the center of mass. The precisely simulated solid model of the tool is used to determine its contained volume. From the contained volume, and assuming uniform density the theoretical position of centre of mass is calculated and expressed in axial offset and radial orientation. Further, the amount of unbalance force at the given rpm is evaluated.

This analysis is non-intrusive and will not change any of the tool's parameters; it simply evaluates the tool's suitability for high speed machining.

Automated Balancing

As opposed to Mass Analysis, Balancing adjusts the tool so that it is perfectly balanced. This feature automatically varies a set of parameters in order to reduce the misbalance to zero.

By selecting a balancing strategy, the user forms combinations of varied parameters that will most likely lead to a balanced tool. For example, the user may choose perflute flute length or per-flute core diameters as a means to influence the center mass of the tool. While Tool Balancer supplies some pre-configured strategies, it also allows the user to select an arbitrary set of parameters in order to achieve the desired result.

Once started, the automated balancing process will calculate values for the group of parameters such that the amount of misbalance force is minimized.

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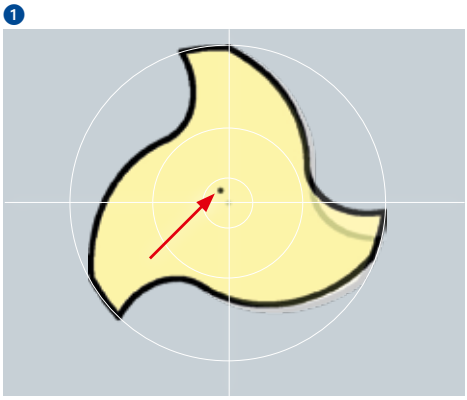

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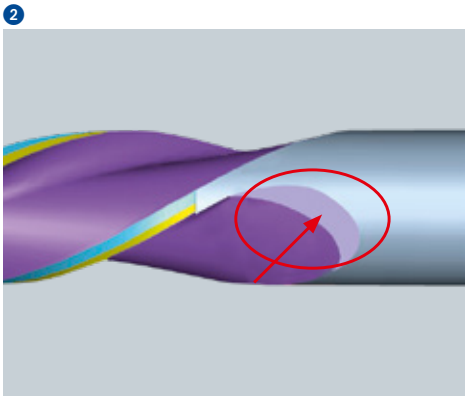

Advantages

Increase productivity – By performing design-time analysis the process of producing prototypes can be significantly shortened.

Produce better tools – Balanced tools have longer lifetimes, produce better quality surfaces and reduce wear.

Balance asymmetrical tools – Asymmetrical tools perform better in high-speed machining applications, up until the point the unbalance forces become significant. Being balanced allows the tool to be pushed to higher speeds.

Additional Services

- Pre-balanced chucks – Balance tool for use in a pre-balanced chuck.
- User defined strategies – Customize the parameters varied during automated balancing.

1 Center mass displacement due to unequally indexed flute.

2 Extra grinding length required to balance tool.

Walter Maschinenbau GmbH
Jopestr. 5 · 72072 Tübingen, Germany
Tel. +49 7071 9393-0
Fax +49 7071 9393-695
info@walter-machines.com

For worldwide contact details, please visit
www.walter-machines.com

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