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Productivity+™ Active Editor Pro multi-axis: considerations for use

There are a number of areas that need consideration before using the multi-axis functionality provided by Productivity+™ Active Editor Pro. This document identifies *requirements* relating to machine tool structure and the use of co-ordinate systems, in addition to highlighting important functionality *considerations* that should be understood prior to the use of multi-axis functionality.

Requirements

Machine configuration

The functionality provided by the Productivity+™ Active Editor Pro multi-axis Technology Evaluation software is compatible with 3+2 axis machines: machines with 3 linear axes (X, Y, Z) and up to 2 rotary axes, (for example A, B or C) with a table/table configuration.

Articulating (nodding) head and compound angle machines (with rotary axes that are not at 90º to each other) are not supported.

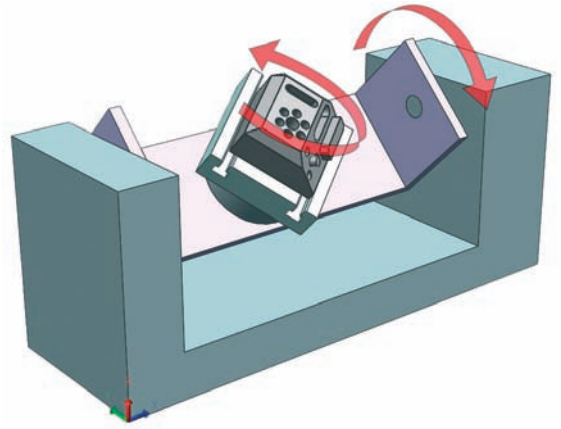


***Figure 1**: schematic of a compatible 3+2 axis table/table machine tool*

The software is also suitable for use on horizontal and vertical machines comprising a single rotary axis mounted on the machine bed (3+1 axis machines).

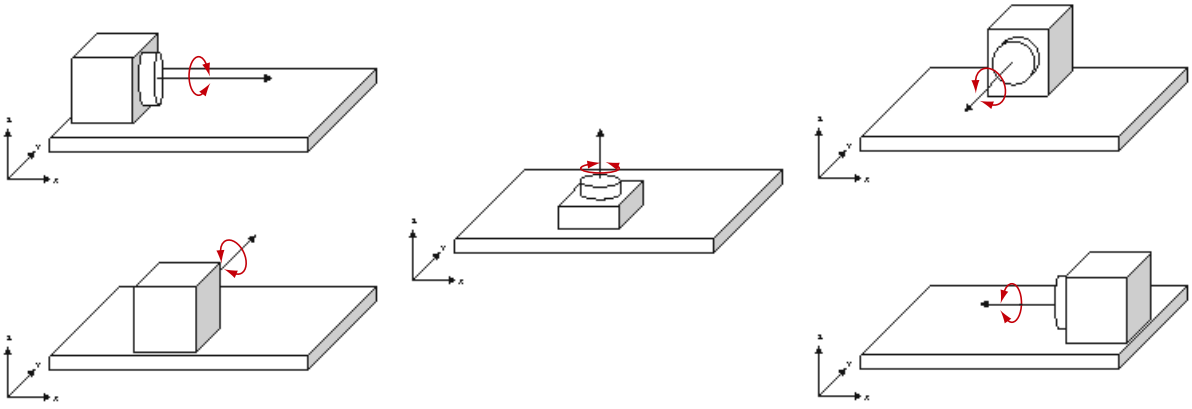


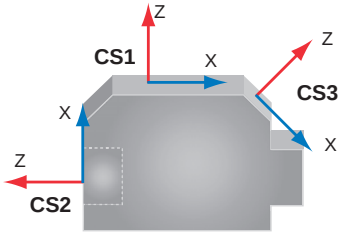
***Figure 2**: supported configurations of machine tools with a single, bed mounted rotary axis*

A summary of suitable machine configurations is shown on the final page of this document.

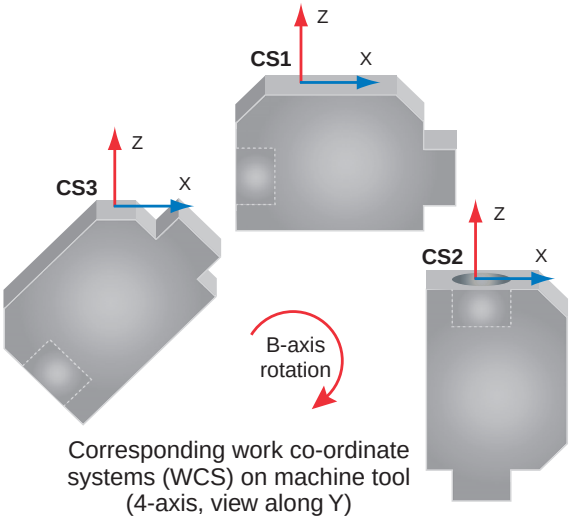
Co-ordinate systems

When using the multi-axis Technology Evaluation, Productivity+™ Active Editor Pro requires a unique co-ordinate system for each part orientation on the machine tool. For example, a component with five faces that require probing needs at least five co-ordinate systems to be created. For each co-ordinate system used within Productivity+™ Active Editor Pro, an approximate work co-ordinate must be set on the machine tool.

The image below illustrates the correlation between co-ordinate systems in Productivity+™ Active Editor Pro and on a machine tool.



Co-ordinate systems in Active Editor Pro



Corresponding work co-ordinate systems (WCS) on machine tool (4-axis, view along Y)

***Figure 3**: multiple co-ordinate systems within Productivity+™ Active Editor Pro (left), and on a machine tool (right)*

Considerations

Orientation of co-ordinate systems

Productivity+™ Active Editor Pro performs a safety check to ensure that the actual machine position matches its calculated machine position. This check is performed to prevent the unexpected modification of a rotary axis during an update, and the resulting possibility of a machine crash.

To avoid a requirement to disable this safety check, it is recommended that the solid model within Productivity+™ Active Editor Pro matches the component alignment when the machine axes are in their default position (i.e. with no rotations in the work offset table). When this is the case, Productivity+™ Active Editor Pro will be able to calculate the position of the machine axes following a rotation, and perform machine updates in this new position.

For some set-up scenarios it may be necessary to disable this alarm, however this may cause update operations to behave unexpectedly in some situations: we recommend users seek the advice of a Renishaw applications engineer before disabling this alarm.

Component levelling operations

It is only possible to level features in a direction where a rotary axis lies parallel to the axis of rotation. This may not always be the case. For example, when a trunnion A-axis is rotated by an angle, the table C-axis now points in a combination of Y and Z directions: a levelling operation using the C-axis is no longer possible without affecting other axes.

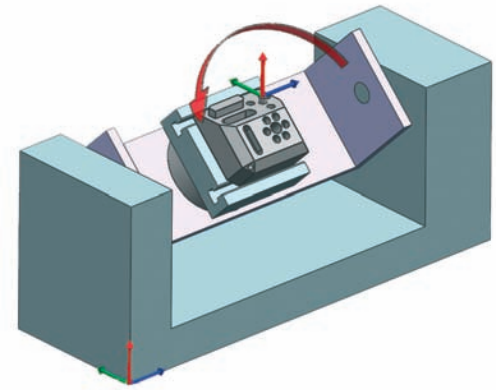


Figure 4*: machine position where rotation of the C-axis would affect X, Y and Z axes of the co-ordinate system (rotation/levelling around X is acceptable in this situation as it is aligned with the trunnion/A-axis)*

Post processors

Existing Productivity+™ post processors will require upgrading in order to support multi-axis functionality. In the majority of cases the software will perform this upgrade automatically, however it may be necessary for users to contact their local Renishaw representative for configuration advice or information.

Co-ordinate rotations

Built in co-ordinate rotation techniques such as TRAORI, G68.4, Cycle 800 and Cycle 19 are not supported: whilst it is possible to measure and report with these active, it is only possible to perform tool length/diameter and variable updates. It is not possible to perform WCS or rotary axis updates.

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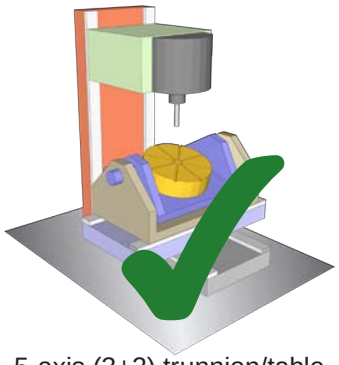
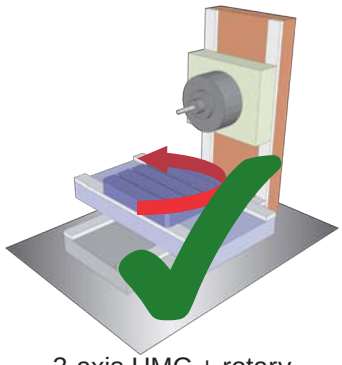
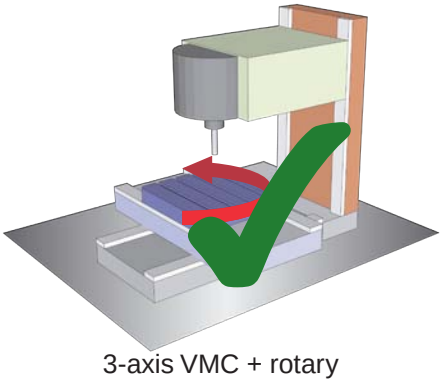
Summary of configuration compatibility (see cover page for further information)



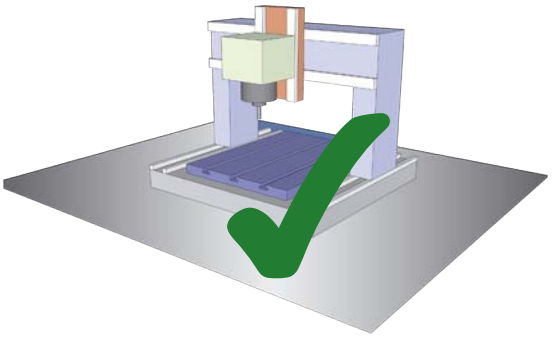
5-axis (3+2) trunnion/table



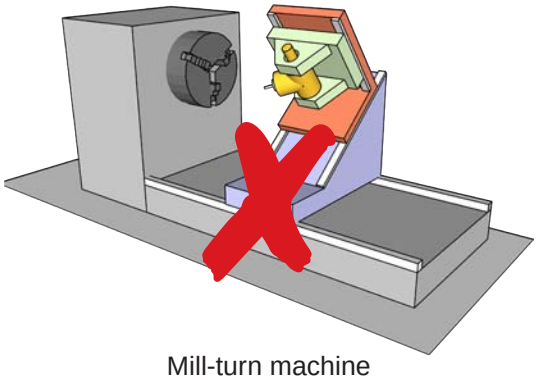
3-axis HMC + rotary



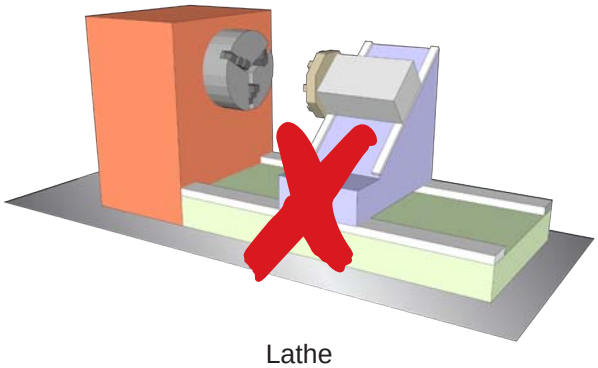
3-axis VMC + rotary



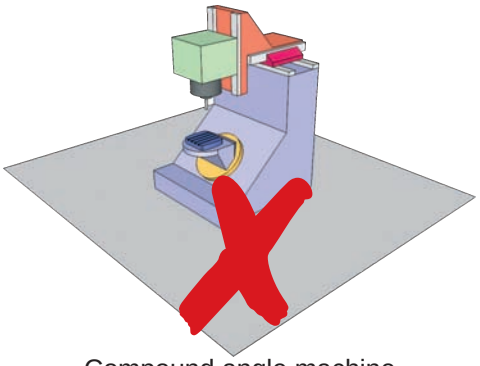
Vertical gantry



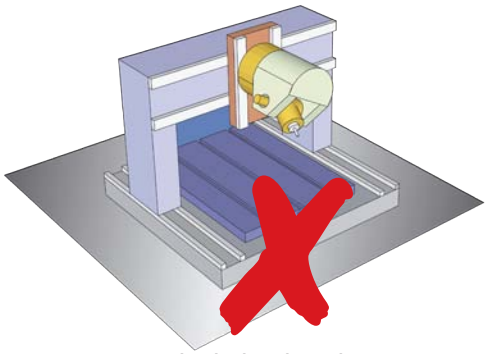
Mill-turn machine



Lathe



Compound angle machine



Articulating head

Issued May 2010 Part no. H-5226-8113-01-A