edgecam

**DMG MORI**　**SANDVIK Coromant**　**HEXAGON** MANUFACTURING INTELLIGENCE

Edgecam Waveform Turning

Waveform roughing is a high speed machining technique that maintains a constant tool cutting load by ensuring consistent tool engagement into the material. The tool path moves in a smooth motion to avoid sharp changes in direction, maintaining the machine tool's velocity.
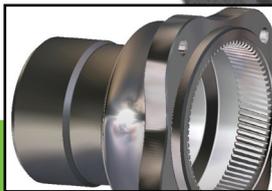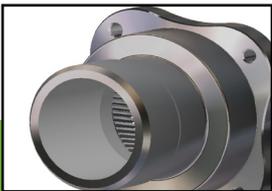
Cuts deeper, faster & smoother

Lengthens machine maintenance cycles

Keeps constant chip load – no "spikes"

Reduces cycle time with increased Material Removal Rate

Improves tool life - Less cutting forces & improved swarf management

Machining Data

Specification	Waveform Turning
Tool Details	Sandvik Coromant RNMG 12 04 00 4315
Material	EN8
Speed Vc (m/min)	300
Feed Fn (mm/rev)	0.9
Ap (mm)	2

Power Skiving - Technology advantages

- **High Flexibility**
- **Considerably reduced machining cycle time**
- **Non advanced tool production (solid tools)**
- **Manageable and predictable component machining (when synchronization is in place)**
- **Power skiving makes complete machining in one single set up, possible**

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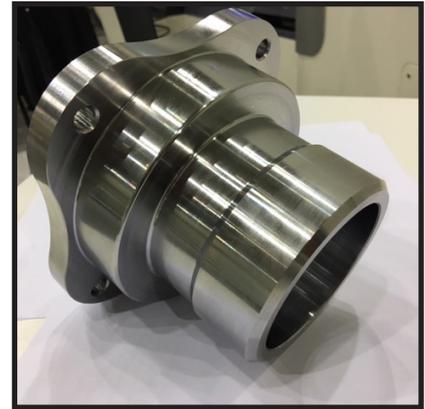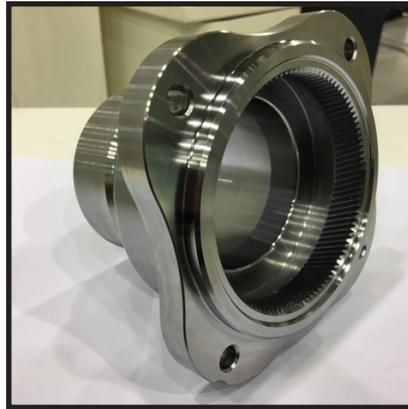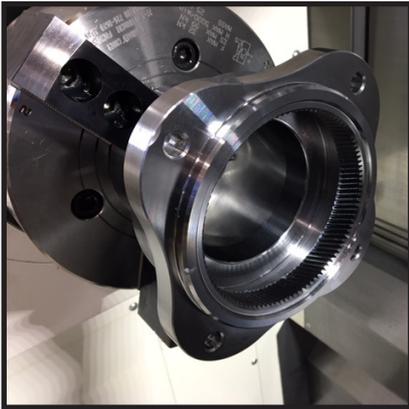
Constant Engagement

Although the Concentric pattern looks much simpler at the first glance the problem is that the tool "digs" into each corner causing the tool to overload, leading to reduced tool life or tool breakage. In reality the machine tool operator may have to reduce the cycle feed rate to compensate and thus, increase manufacturing time.

As Waveform maintains a constant engagement with the material, the feed rate can remain at the optimal value throughout the cycle. This will improve the tool life and greatly reduce the risk of tool breakage - it is very simple to switch from traditional roughing to Waveform to see the toolpath pattern.

Smooth Tool Path

By ensuring the cycle produces a smooth tangent tool path, the velocity of the machine can be maintained and the desired feed rates achieved. This also has the benefit of reducing shaking and vibration on the machine and component.

The Waveform Pattern

To maintain a constant chip load the cycle uses the philosophy that we machine from "Stock to part". This reduces the amount of intermittent cuts, particularly on external regions, which means the tool is engaged with the material for longer without lifting clear. Traditionally, cycles generally offset the component until they meet the stock. This can lead to the generation of sharp corners and discontinuous tool paths.

Adjusted Tool Engagement

To maintain the tool engagement and the chip load the tool path is automatically adjusted to compensate. When cutting into a concave area tool engagement is increased. The cycle adjusts the step over between the passes to compensate and maintain the desired engagement.

When cutting a convex area the opposite affect occurs. As the material falls away the tool path step over is increased to maintain the desired engagement.

Simple Interface

We have ensured that the cycle uses the information in the part and Code Generator where possible and kept the interface to only 3 modifiers that the user can adjust for the waveform pattern. This ensures the cycle is easy to apply and is integrated into the main Roughing cycle.

Benefits include:

- **Reduces cycle time**

- **Tool life maximised**

- **Minimum tool vibration**

- **Constant chip load**

- **Intelligent toolpath linking**

- **Cuts deeper and faster**

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