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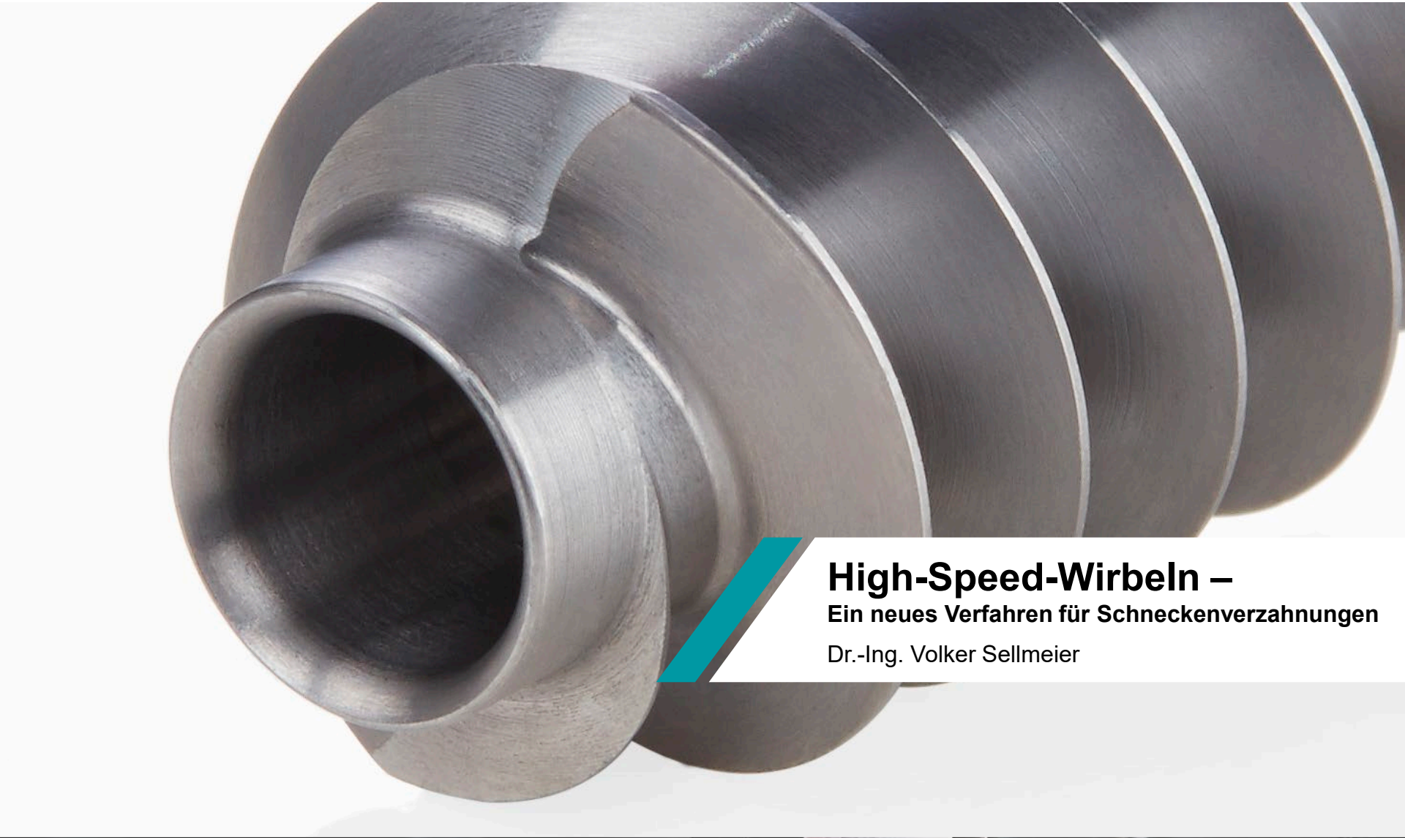

High-Speed-Wirbeln –

Ein neues Verfahren für Schneckenverzahnungen

Dr.-Ing. Volker Sellmeier

Arten von Schneckenverzahnungen

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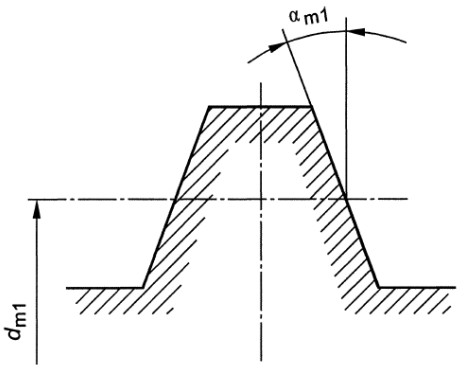
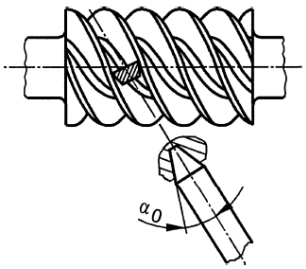
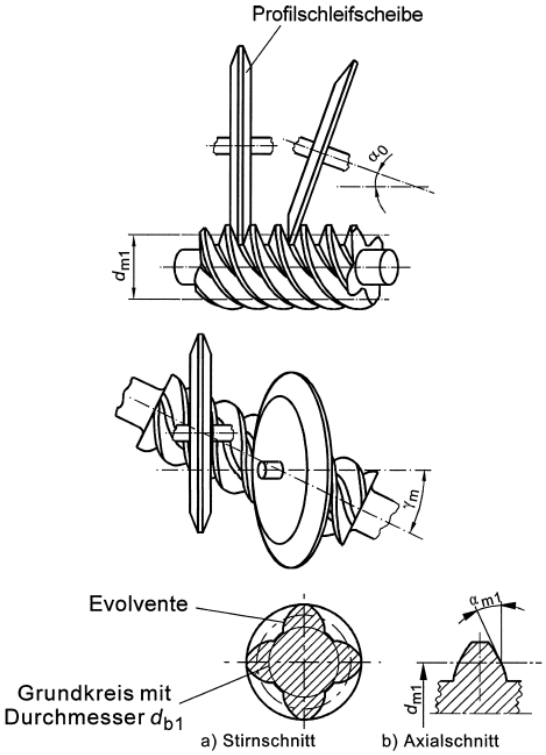
ZA-Schnecke
Gerades Flankenprofil im Axialschnitt



ZN-Schnecke
Gerades Flankenprofil im Normalschnitt



ZI-Schnecke
Evolvente im Stirnschnitt



Quelle:
DIN 3975-1 Begriffe und Bestimmgrößen für Zylinder-Schneckengetriebe mit sich rechtwinklig kreuzenden Achsen

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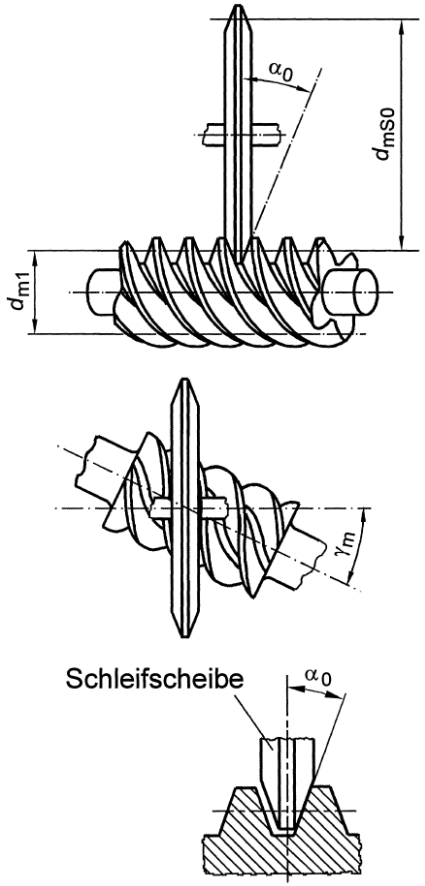
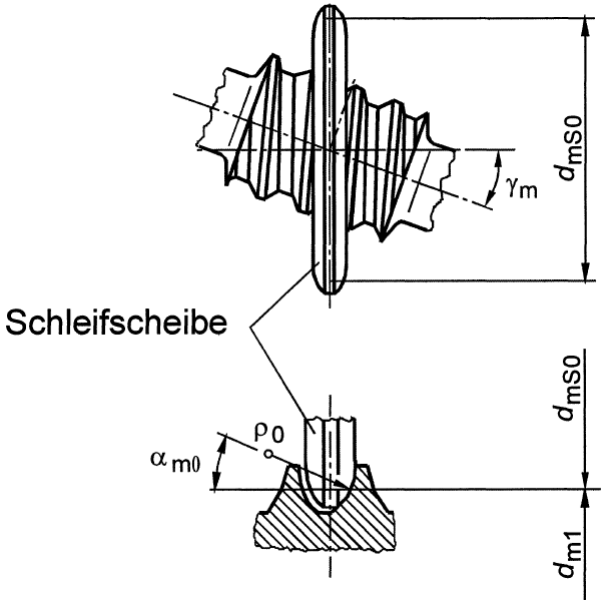
ZK-Schnecke

Konvexes Flankenprofil im Axialschnitt



ZC-Schnecke

Konkaves Flankenprofil im Normalschnitt



Quelle:
DIN 3975-1 Begriffe und Bestimmgrößen für Zylinder-Schneckengetriebe mit sich rechtwinklig kreuzenden Achsen

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Fertigungsverfahren für Schnecken

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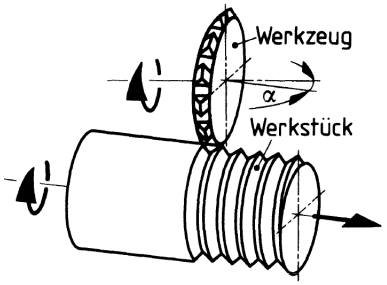
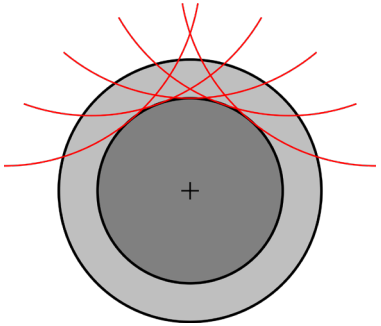
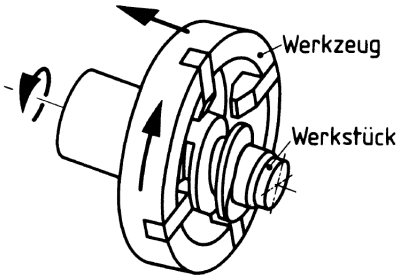
Fräsen

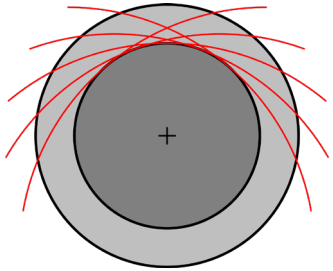




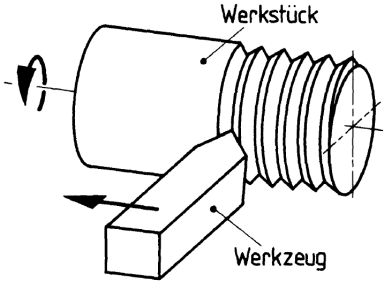
Wirbeln

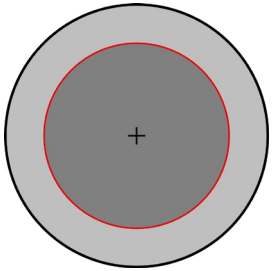
$n_{Wst} << n_{Wkz}$





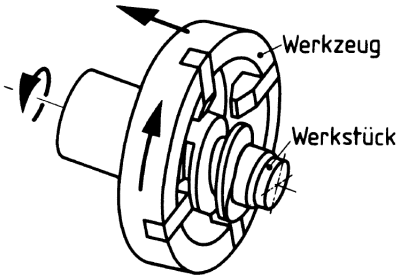
Strehlen

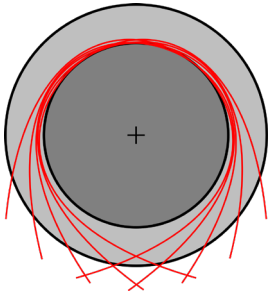




High-Speed-Wirbeln

$n_{Wst} = n_{Wkz} \cdot z / g$





Quelle:
DIN 8589-1 Fertigungsverfahren Spanen
DIN 8589-3 Fertigungsverfahren Spanen

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Prozesskinematik

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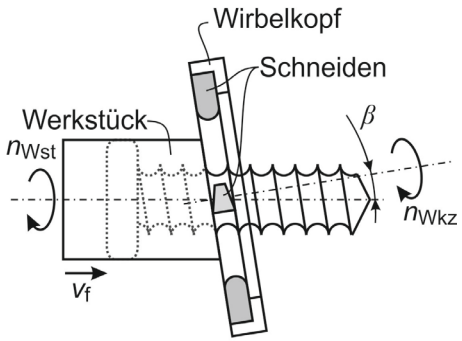
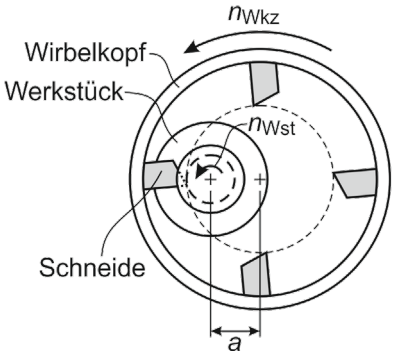
Konventionelles Wirbeln

Seitenansicht

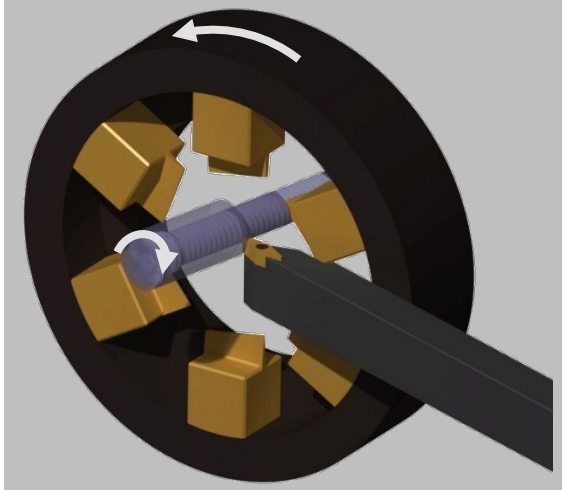


Vorderansicht



$n_{Wst} << n_{Wkz}$

High-Speed WIRBELN®



$$n_{Wst} = n_{Wkz} \cdot z / g + n_f$$

n_{Wst}	Drehzahl Werkstück
n_{Wkz}	Drehzahl Werkzeug
z	Zähnezahl
g	Anzahl der Gänge
n_f	Vorschubdrehzahl

Alt: Wirbeln | Drehen

Neu: High-Speed-Wirbeln | Paralleles Drehen

Zeitersparnis

- Paralleles Drehen wird ermöglicht
- Deutliche Verringerung der Fertigungszeiten
- Die Effizienz des Wirbelprozesses wird erhöht

Video

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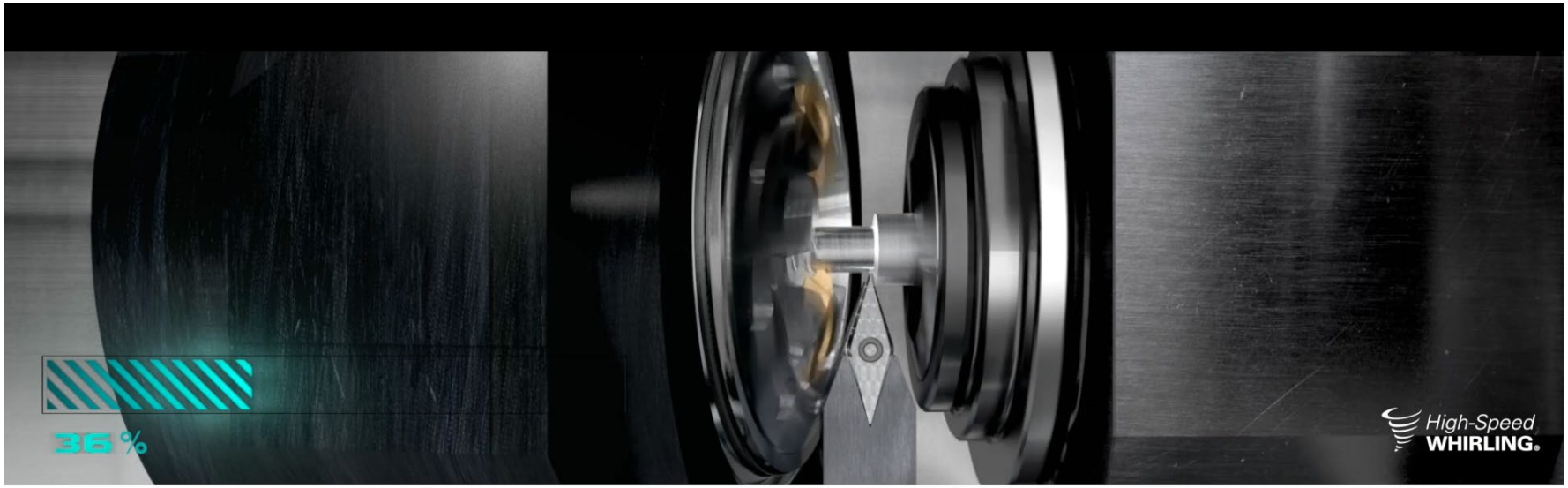

Schneidenflugbahnen

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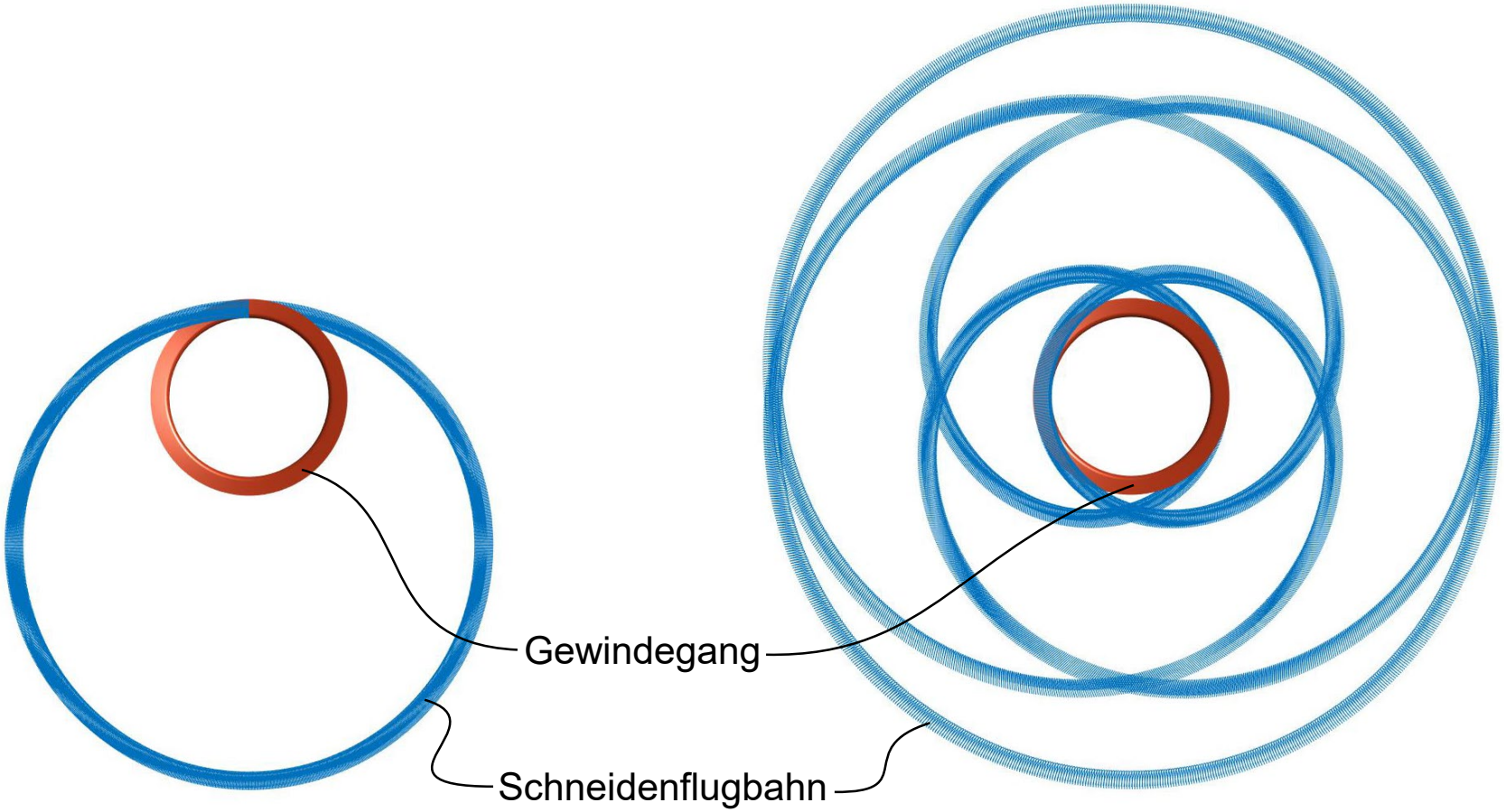
Konventionelles Wirbeln

High-Speed WIRBELN®



Schneidenflugbahnen

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Anzahl Schneiden *z*

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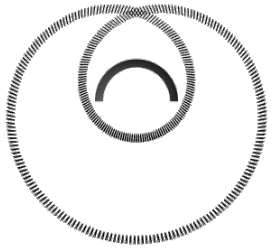
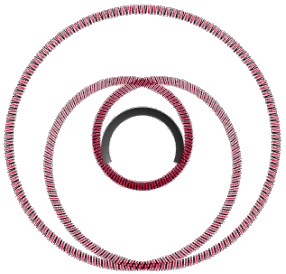
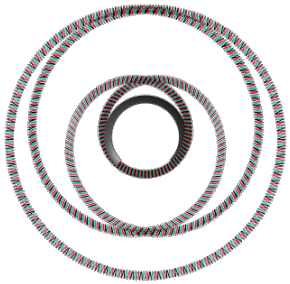
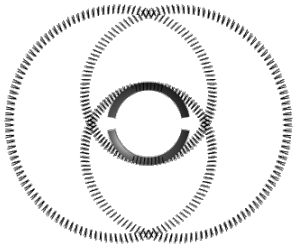
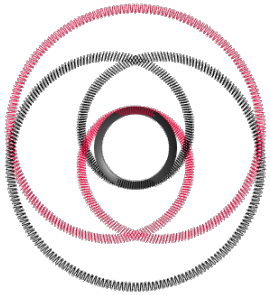
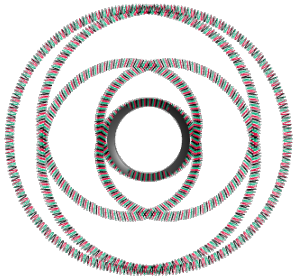
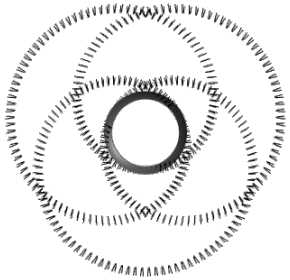
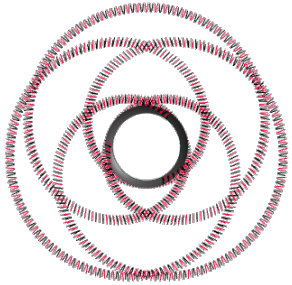
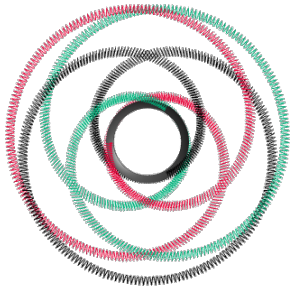
1			
2			
3			

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Schneidenflugbahn (2 Gänge, 2 Schneiden)

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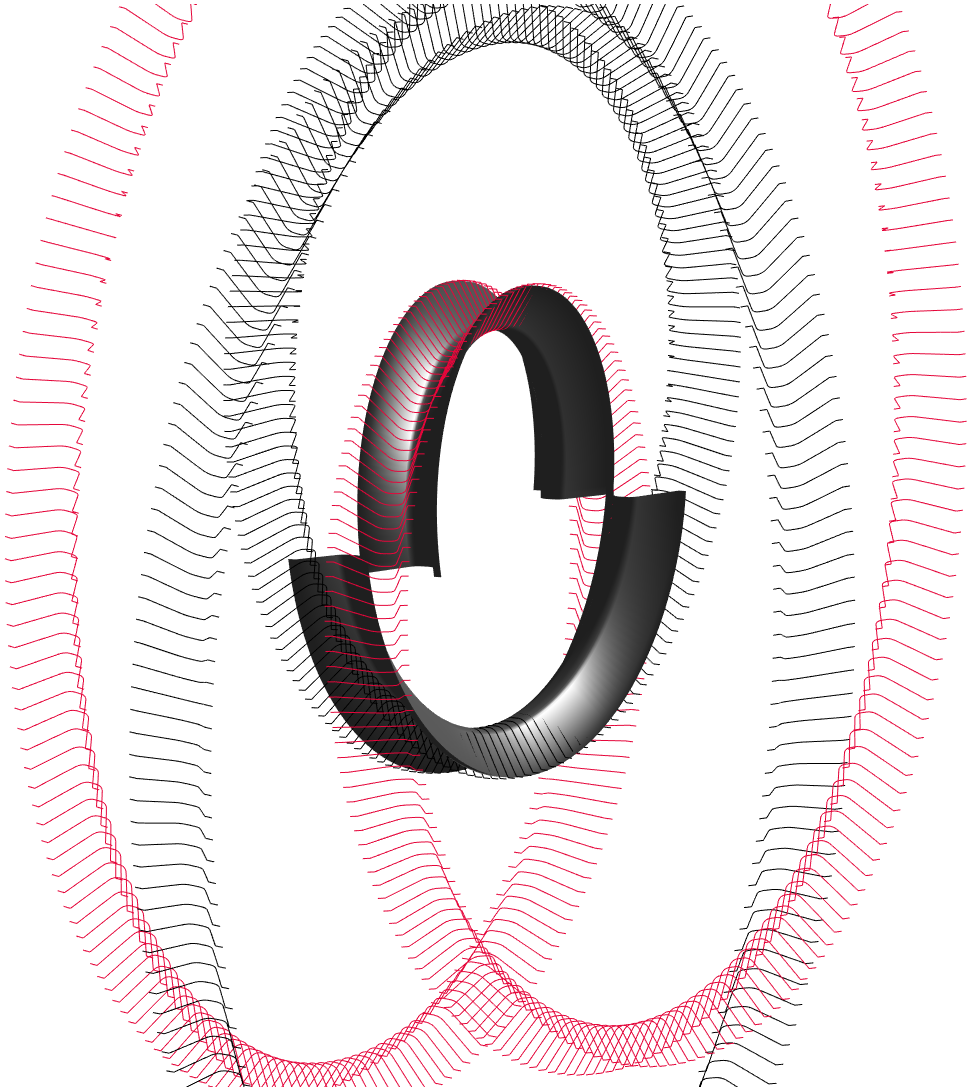

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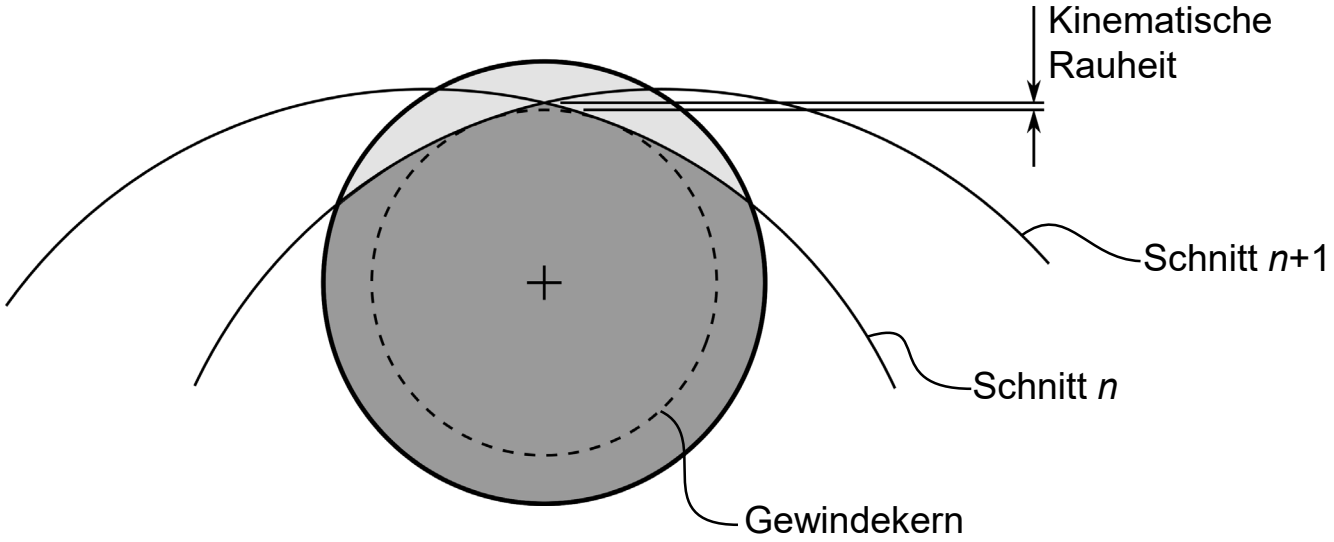

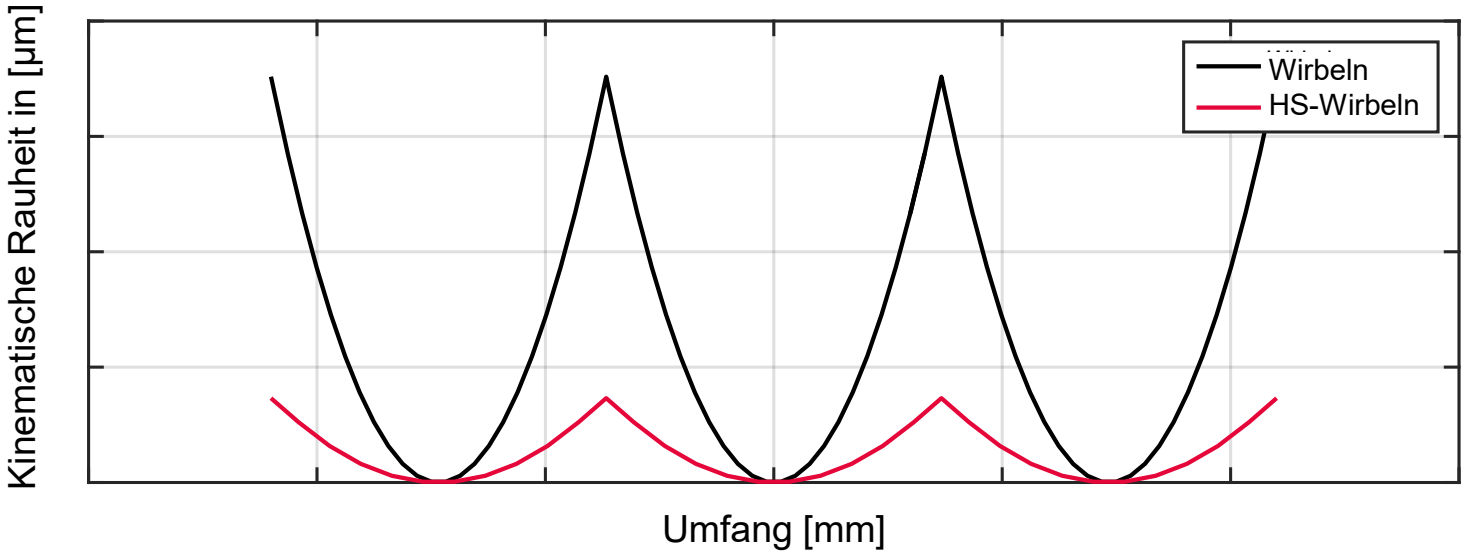

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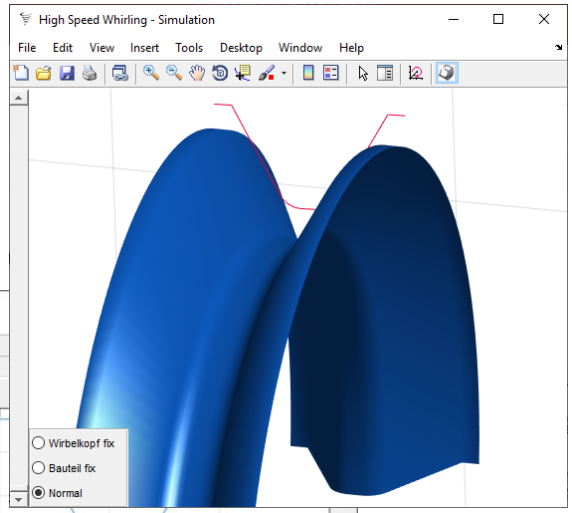
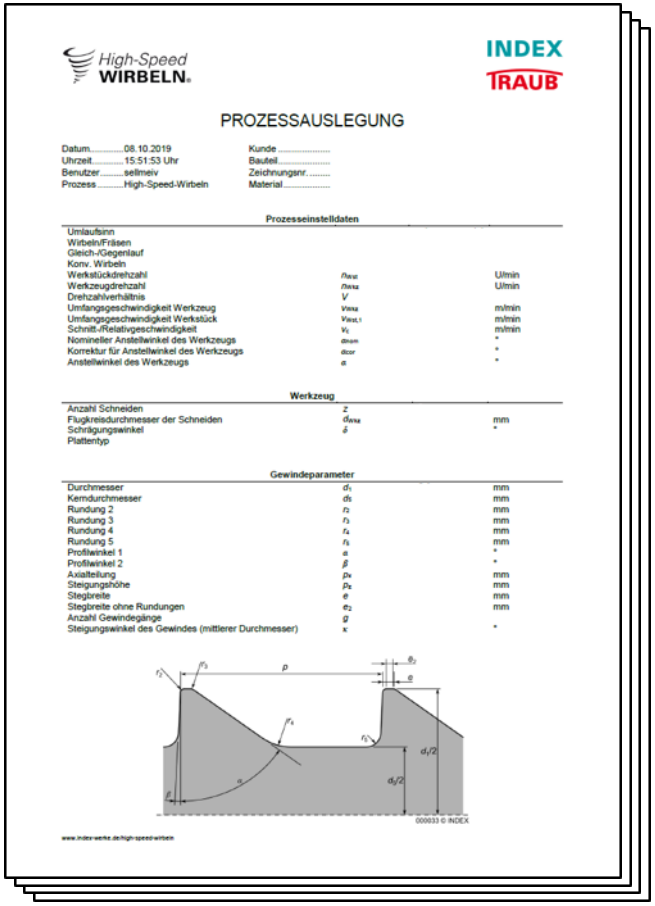
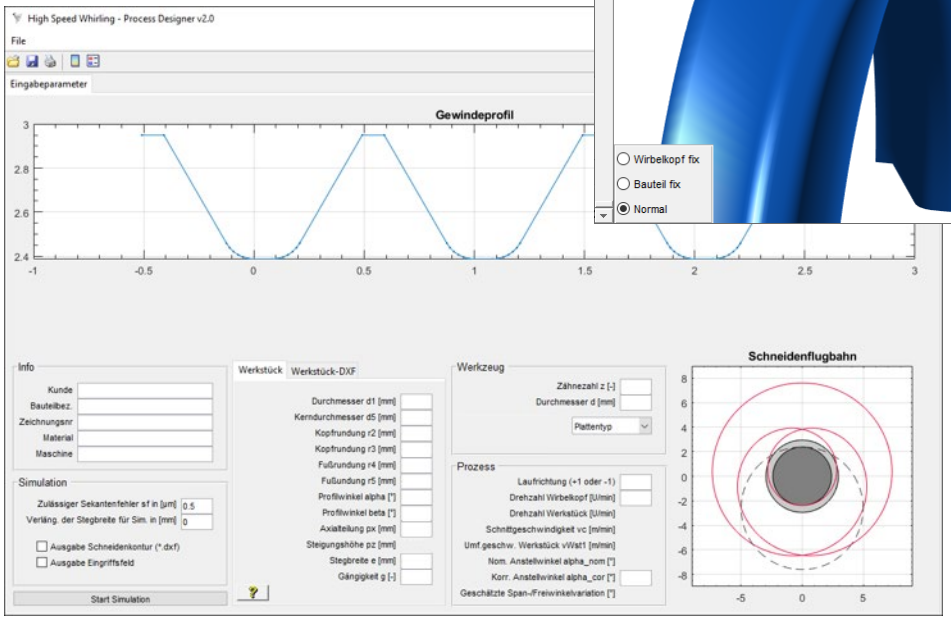
Simulation



Protokoll



Eingabemaske



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Eingabemaske

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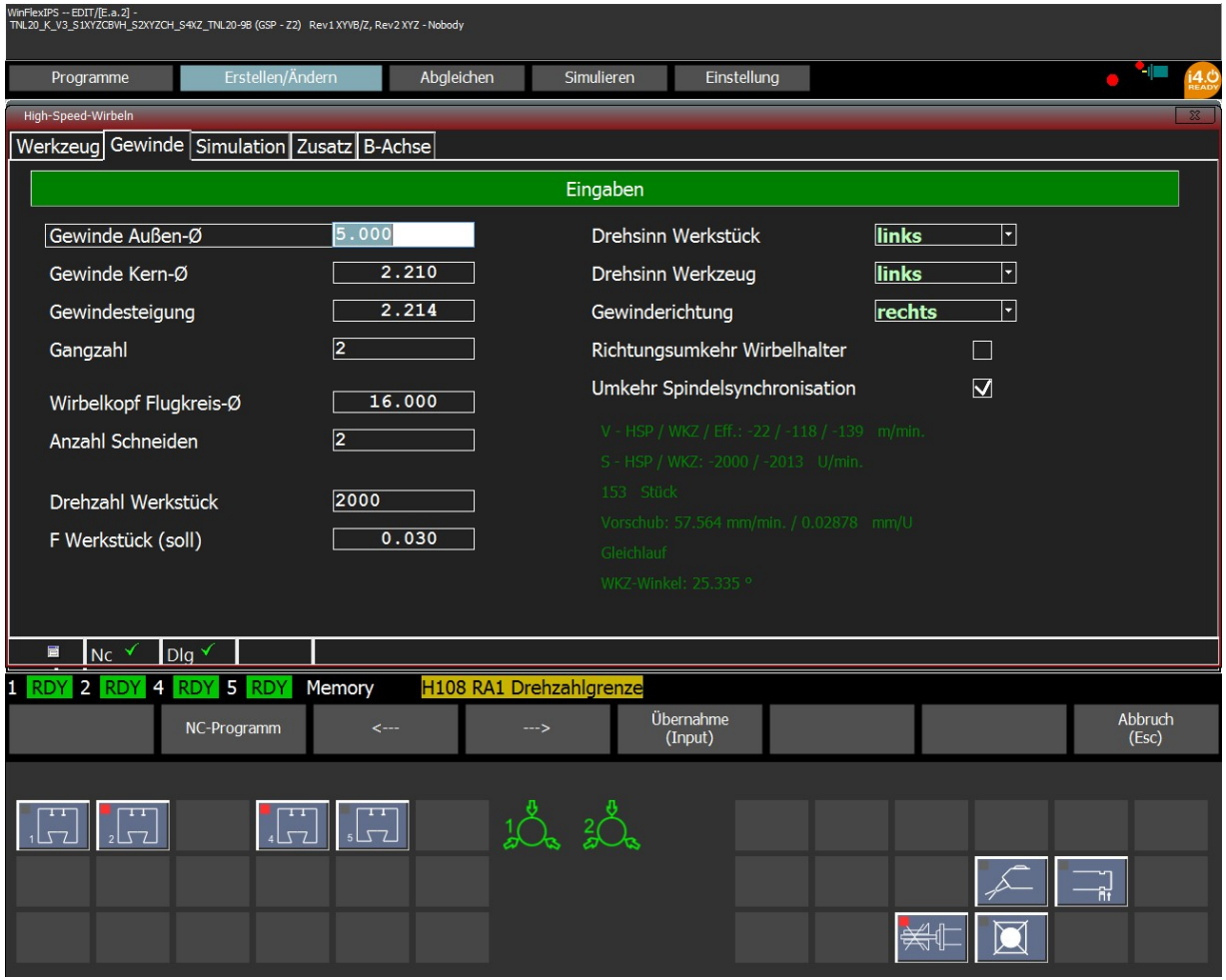

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Anwendungsbeispiel ZI-Antriebsschnecke

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Werkstück

Modul	1,8 mm
Eingriffswinkel	18°
Anzahl Gänge	2
Länge	30 mm

Werkzeug

Anzahl Schneiden	2
Durchmesser	25 mm

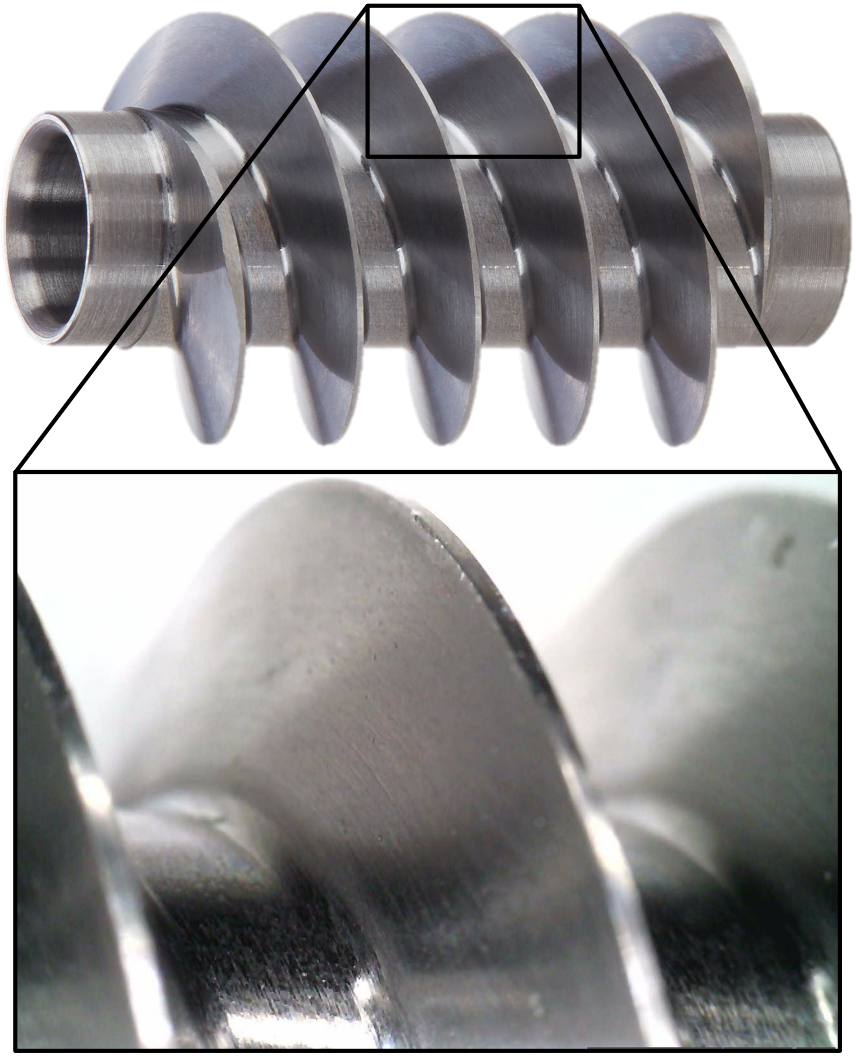
Prozess

Schnittgeschwindigkeit	297 m/min
Vorschubgeschwindigkeit	55 mm/min

Bearbeitungsdauer HSW **36 s**

↓

-45%



Zusammenfassung

Werkzeug-
technologiepartner:
HORN
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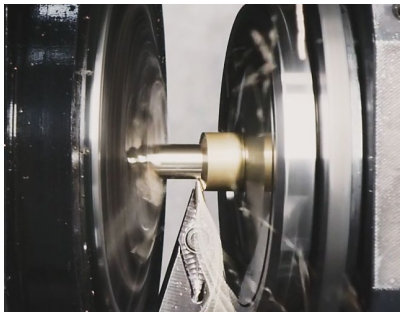
Produktivität

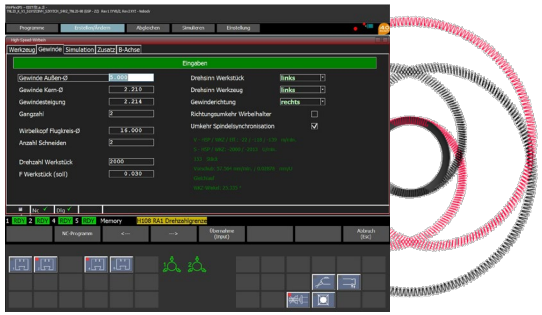


- Paralleles Drehen
- Bessere Späneabfuhr
- Deutlich höhere Vorschübe
- Geringere Stückkosten
- Rund 40% produktiver

Qualität

- Bessere Anschmiegung der Schneidenflugbahn
- Deutliche bessere Oberflächenqualität

Variabilität



- Einfache Erzeugung mehrgängiger Schnecken durch Änderung des Drehzahlverhältnisses

Kontakt

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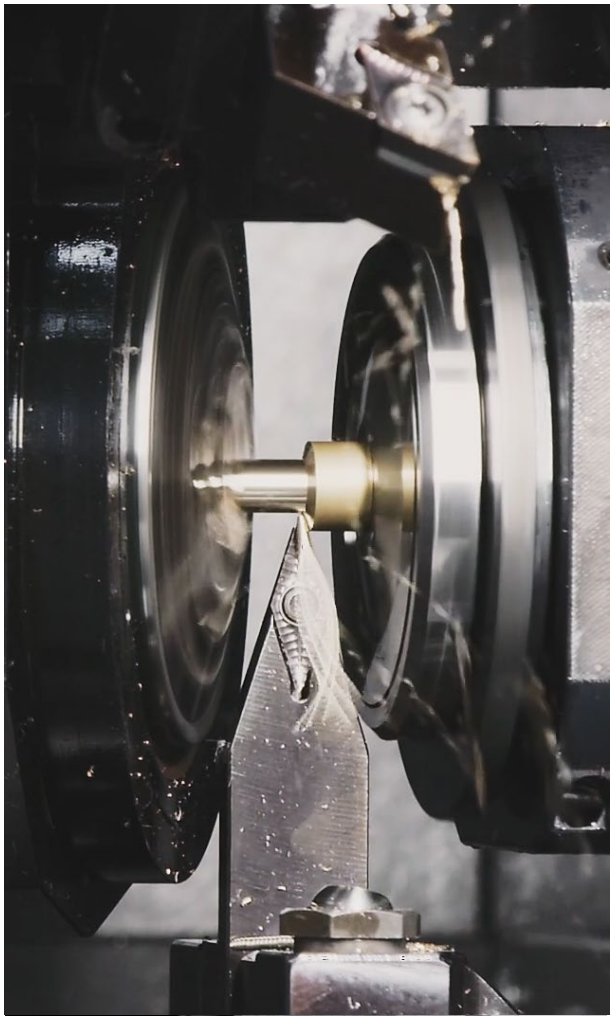

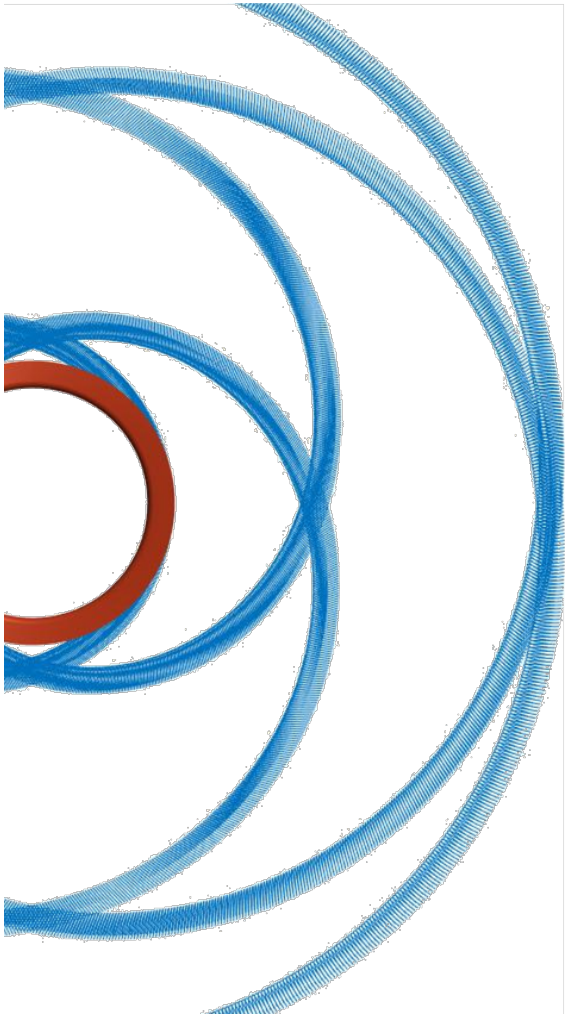

Internet
www.index-werke.de/high-speed-wirbeln

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