Grindaix

Needle Nozzles

Effective and efficient

Coolant Supply Systems

for Grinding Processes

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GENERAL INFORMATION

Coolant Supply Systems (Needle Nozzles)

The challenge

- Coolants do not adequately reach the grinding gap
- Grinding burn and other quality problems occur on ground components
- High amount of coolant need
- High coolant supply/disposal costs

Advantages of Needle Nozzles

- High exit speed of the coolant
- Directed laminar coolant supply into the cutting zone
- Profile adapted nozzle shape
- Reduction of coolant demand
- Cost savings for pumps and filtration systems
- Reduction of thermal component damage

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GENERAL INFORMATION

Coolant Supply Systems (Needle Nozzles)

Customer related adaptation

Based on your process and part information we design …

- Nozzle profile
- Nozzle width
- Needle length
- Needle inner diameter
- Coolant connection thread, plug-in connectors
- Nozzle clamping
- Coolant flow regulation
- …

Standard Nozzles

ND-100-E

ND-50-E

ND-28-E

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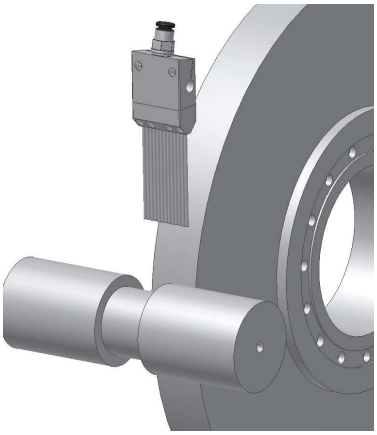
External cylindrical grinding

Efficient and effective use of coolant – with needle nozzles



ND-28-E	linear
ND-50-E	linear
ND-100-E	linear
ND-SK-B-Nr.	different width and profiled

External cylindrical-/ noncircular grinding

- By external cylindrical grinding various parts are machined either by the circumference, or the face part of the grinding tool. Hereby different grinding wheel profiles are used.
- **Needle nozzles** can be used in linear order for the **cylindrical** machining or can be adapted for **face** machining and grinding with **complex profiles**.
- **Sample applications :** shaft parts, chuck parts, gear shafts, camshafts, crankshafts, injection nozzles, etc.

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CENTRELESS GRINDING

Efficient and effective use of coolant – with needle nozzles

Centreless grinding

- Mostly, in centreless grinding high amounts of coolant are used. By the use of needle nozzles it is possible to reduce the coolant flow rate by up to 70%.
- Furthermore, there is the challenge to reach a sufficient supply along the whole grinding gap.
- With the needle nozzle system the total length of the grinding gap can be covered by several single nozzles. Each nozzle is supplied by a distribution block and its flow rate can be regulated separately (e.g. for roughing and finishing zone).
- Grindaix offers the whole system with nozzle block, distribution block and machine clamping device.
- The system can be applied for cylindrical and profiled parts in plunge and through feed centreless grinding.

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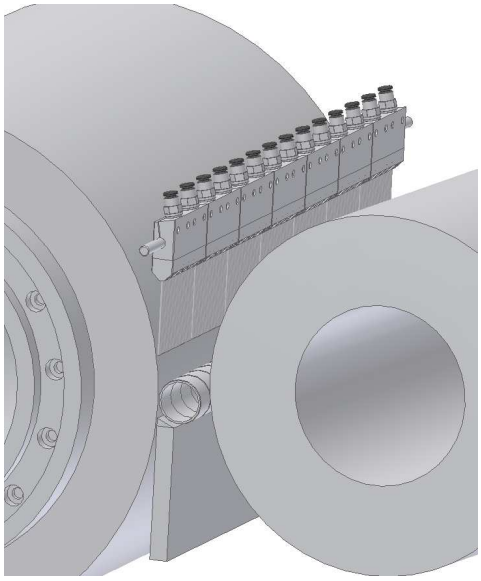
CENTRELESS GRINDING

Efficient and effective use of coolant – with needle nozzles



Single nozzles

ND-28-E	linear
ND-50-E	linear
ND-100-E	linear
ND-SK-B-Nr.	different width and profiled

Set (examples)

ND-250k-SS-E	linear
ND-400k-SS-E	linear
ND-600k-SS-E	linear
ND-660k-SS-E	linear
VB-250	distribution block
VB-400	distribution block
VB-600	distribution block
VB-660	distribution block
ND-MB	clamping

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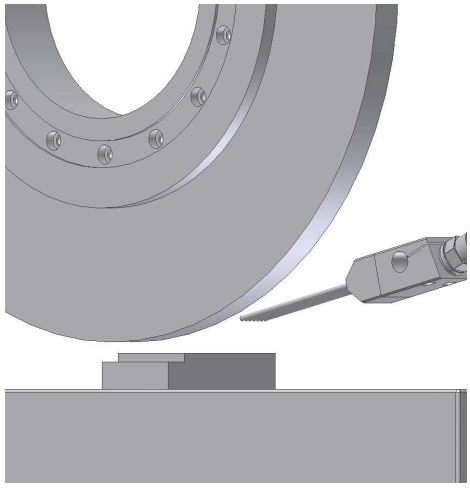
SURFACE GRINDING

Efficient and effective use of coolant – with needle nozzles

Single nozzles

ND-28-E	linear
ND-50-E	linear
ND-100-E	linear
ND-SK-B-Nr.	different width and profiled



Surface grinding

- In surface grinding of slots or planar surfaces high material removal rates and surface qualities are demanded.
- The use of needle nozzles enables a highly productive machining avoiding simultaneously thermal part damages in deep and pendulum grinding.
- **Sample applications**:

  guideways, functional surfaces …

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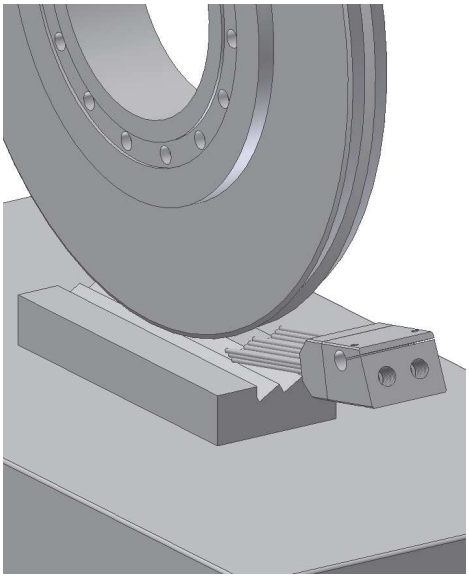
SURFACE PROFILE GRINDING

Efficient and effective use of coolant
– with needle nozzles



Single nozzles

ND-SK-B-Nr.	different width and profiled

Surface profile grinding

- In surface profile grinding there are often large contact areas between grinding wheel and a component.
- Due to complex profiles the coolant supply is highly difficult.
- By the use of profiled needle nozzles a profile adapted coolant stream is supplied to the contact zone accurately..
- **Sample applications :**

  guideways, turbine components …

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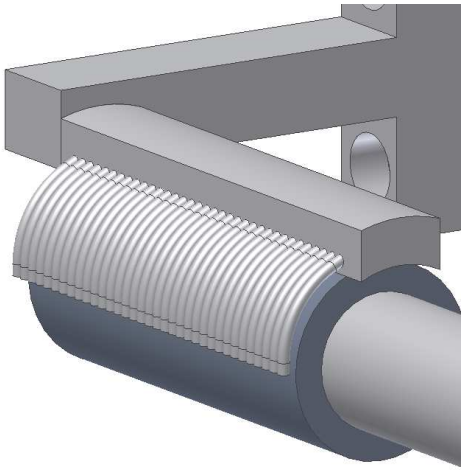
INTERNAL GRINDING

Efficient and effective use of coolant – with needle nozzles

Single nozzles

ND-IR-50	linear
ND-IR-100	linear
ND-SK-IR-B-Nr.	different width and profiled



Internal grinding

- High contact lengths lead to a high thermal load in internal grinding.
- In connection with hard to reach contact zones the coolant supply figures out to be very difficult.
- Conventional coolant nozzles lead to an irregular contribution of coolant to the grinding zone.
- Special needle nozzles are fed into the bore together with the grinding wheel and enable an optimal coolant supply.
- **Sample applications :**
  Bores, bearings …

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TOOL GRINDING

Efficient and effective use of coolant – with needle nozzles

Single nozzles

NDR-K	round, small
NDR-G	round, big
ND-SK-B-Nr.	profiled

Tool grinding

- In tool grinding there are changing contact areas at the grinding wheel due to complex component geometries (e.g. drill slots).
- By round or profile adapted needle nozzles it is ensured that the total relevant grinding zone is supplied with coolant sufficiently.
- Needle nozzles enable simultaneously the reduction of coolant amount as well as higher part quality and productivity.

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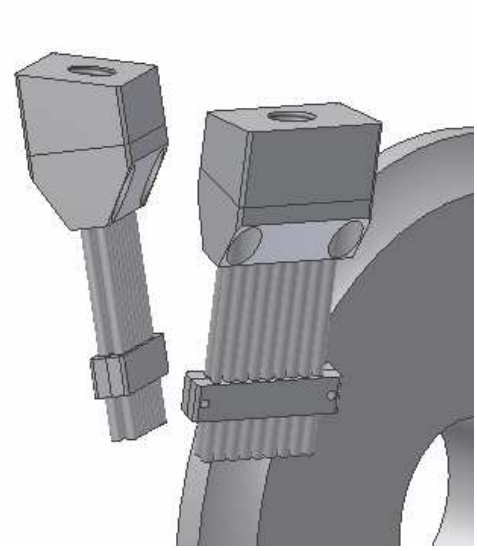
GRINDING OF GEARS

Efficient and effective use of coolant – with needle nozzles

Single nozzles

ND-ZF-28	linear
ND-ZF-50	linear
ND-ZF-100	linear
ND-SK-B-Nr.	profiled



Gear grinding

- In gear machining by profile grinding or hob grinding the whole profile has to be supplied with coolant.
- Needle nozzles ensure an optimum coolant supply of tooth flanks.
- This lead to longer tool life and part machining free of damage.

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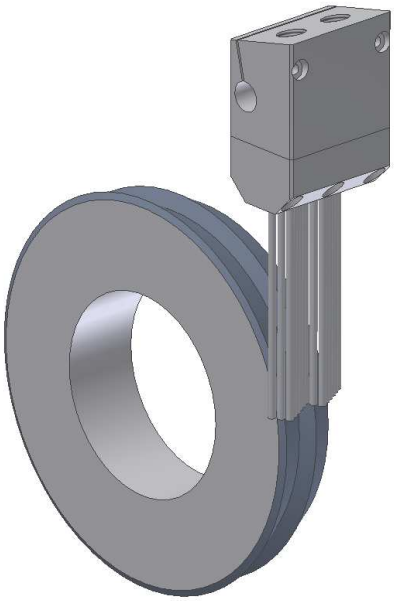
DRESSING

Efficient and effective use of coolant – with needle nozzles

Single nozzles

NDR-D-F	form rollers
NDR-D-E	single diamonds
NDR-D-A	dressing tiles
ND-SK-B-Nr.	profiled



Dressing

- The coolant supply in dressing operations is very often neglected.
- This leads to an increase of dressing tool wear by high temperature load and to instable dressing results.
- The application of needle nozzles for dressing allows an optimised coolant supply for non-rotating dressing tools as well as for form and profile rollers.

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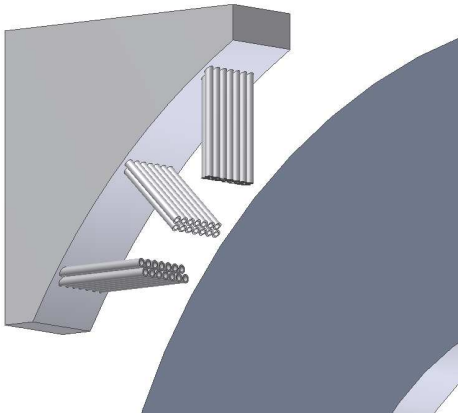
CLEANING NOZZLE

Efficient and effective use of coolant
– with needle nozzles

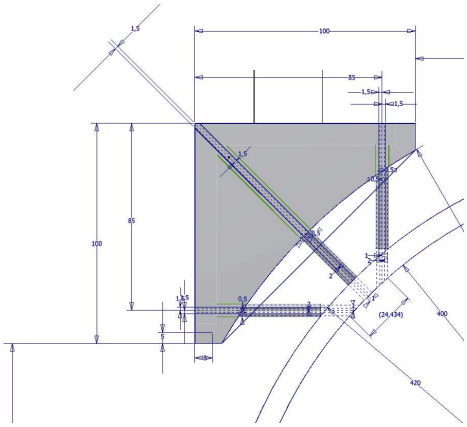
Adaptation for customers - parameters:



a) Supply pressure,
b) Supply angle
c) Supply area
d) Duration of supply
e) Distance of nozzle
f) Impulse at nozzle exit
g) Dynamic chip load
h) …

Cleaning

- Especially when ductile materials are ground swarfs lead to clogging of the pores thus the grinding wheel.
- An increased friction leads to a temperature rise and to grinding burn.
- Cleaning nozzles based on the principal of needle nozzle clean the grinding wheel optimally and avoid clogging.



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We are looking forward to your request:

Grindaix GmbH
NADELDÜSEN
Dr.-Ing. Bastian Maier
Steinbachstrasse 25
52074 Aachen
Germany

Phone:	+49 (0)241-802 7373
Fax.	+49 (0)241-806 27373
Email:	b.maier@grindaix.de
Web:	www.grindaix.de

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