ATLANTIC
SCHLEIFSCHEIBEN + HONSTEINE
kreativ & dynamisch

APPLICATION INFORMATION

Creep Feed grinding with continuous dressing (CD grinding)

Main criteria for application performance

1st Workpiece surface must be free of thermal damage

2nd Profile accuracy (contour / radius)

3rd Surface finish

4th Grinding time

5th Grinding wheel wear rate as a function of dressing infeed and wheel rpm

Application parameters

Cutting rate

- Total stock removal is normally distributed over 3 to 5 single passes
- The greatest amount of stock should be removed in the first pass(-es)
- Stock removal for the final pass should be max. 0,05 mm

Direction at point of contact

- The final pass in same direction will effect a better surface finish and less thermal damage
- The first cut(-s) with higher stock removal can be ground in counter direction, but with regard to thermal damage, the process is easier to control in the same direction

Dressing

- Minimum dressing infeed for continuous dressing operations should be 0,4 µm per wheel rotation
- Values smaller than 0,4 µm per wheel rotation will result in a loss of profile control
- The higher the stock removal per pass the higher the dressing infeed

ATLANTIC GmbH
Gartenstrasse 7-17
53229 Bonn (Germany)

TÜV CERT DIN EN ISO 9001 Zertifikat: 01 100 6472
TÜV CERT DIN EN ISO 14001 Zertifikat: 01 104 000427

Phone +49 228 408 0
Fax +49 228 408 290
Internet www.atlantic-bonn.de

Creep feed grinding with continuous dressing

Dressing ratio

- Dressing ratio between the grinding wheel and the dressing roll should be around +0,8 (same direction at point of contact)

Traverse Speed

- For roughing passes between 250 and 450 mm/min
- In same direction higher traverse speeds can be achieved
- For final pass use higher traverse speed (600 to 1000 mm/min)

Wheel speeds

- The faster the wheel speed the better is the profile holding capability of the grinding wheel when using high stock removal rates
- The slower the wheel speed the longer the wheel life
- The slower the wheel speed the less thermal damage will occur
- For roughing passes ~ 25 m/s (4,700 sfpm)
- For finishing passes ~ 16 m/s (3,000 sfpm)

Coolant

- Synthetic coolant is generally used

Coolant nozzles

- Nozzle shape and position must be optimised in relation to the workpiece profile

Coolant volume

- 350 to 500 litres per minute

Grinding wheels

ATLANTIC specification for CD creep feed grinding wheels
(Recommendation can be different reg. application parameters)

EK8 60H-D12 WVY 407

EK8	Grain type, fused pink aluminium oxide
60H	Grain size in mesh, av. 200 to 300 µm
D	Grinding wheel hardness, very soft
12	Grinding wheel structure, extremely open
WVY	**A T L A N T I C** creep feed grinding bond (V = vitrified)
407	Grinding wheel porosity

ATLANTIC
SCHLEIFSCHEIBEN + HONSTEINE
kreativ & dynamisch

ATLANTIC GmbH

Atlantic Products, Meeting Higher Demands

The materials used in modern turbines possess the physical properties that allow the demanding performance criteria to be met, however these materials can be difficult to process as they are sensitive to thermal damage. Additionally, the components in modern turbines are often thin and geometrically complex in order to reduce weight. These highly plastic, advanced alloys produce long chips when ground, which in combination with their low thermal tolerance requires the use of high porosity vitrified abrasive products. Higher porosity levels ensure that there is good coolant penetration into the grinding zone even on deep profiles reducing the grinding temperature and the likelihood of burning and surface cracking. The larger pore size also plays an important role in the formation of the chip and swarf removal, an increase in pore size allows the wheel to remove larger chips without the wheel loading and the associated risk of thermal damage. The ability to remove larger chips can be converted into deeper cuts or higher feed rates reducing the grinding time per part. Greater porosity levels can reduce the strength of the bonding grain matrix, resulting in a softer acting wheel, the disadvantages of a softer product are, an impaired ability to retain a profiled form, plus a tendency to prematurely release abrasive grain which can be dragged across, or embedded into the work piece causing damage to the surface. The selection of the correct bonding system is vital in order that a product can be manufactured with the necessary porosity levels and form holding capabilities that allow it to maintain tight geometrical tolerances at the same time as producing high stock removal rates. The selection of these specialised bonding systems and manufacture of products meeting the above requirements demands both expertise and experience.

High porosity products are typically classified as having a pore volume of between 40 – 50% and a hardness co-efficient, or E-Module of > 20 KN/mm^2. This lower limit on the E-module value arises from a tendency, when using a non-specialised bonding system, for the product to undergo an uncontrolled shrinkage during the firing process, altering the percentage and distribution of pores as well as the density and hardness making quality control and repeatable manufacture difficult. Atlantic's WVY high glass-phase amorphous bonding system can guarantee highly repeatable manufacture of products with E-Module values of under 20 KN/mm^2 and a well distributed pore content of 50% and above. The greater durability of the WVY system's matrix allows the wheel speed to be reduced to between 16 and 25m/s whilst still maintaining the complex geometry of the deepest profile cuts to demanding tolerance levels. When used in conjunction with continuous-dressing systems where typical dressing in-feed rates are 0.4 – 0.8 µm/rev the slower wheel speed extends the wheel life by as much as 20-30% allowing users to reduce wheel changeover times and the abrasive cost per part. The WVY system's higher stock removal capability enables the number of cuts in multiple pass operations to be considerably reduced or facilitates an increased in-feed rate for single pass operations.

ATLANTIC which has been producing bonded abrasive products at its facility in Bonn, Germany for over eighty years, has a range of specialised bonding systems that have been tried and tested across a wide range of materials and applications. ATLANTIC products either conventional or superabrasive, marketed worldwide under the trade name Atlantic , are part of a complete service package. ATLANTIC provides first class products suitable for the most demanding applications and the most modern manufacturing techniques, combined with flexibility, short lead times, consultant application engineering and a solution tailored to meet each customers unique requirements, the Atlantic product range offers more quality and service for the perfect finish.