

# TRIALS

## Competent experimental technology for demanding grinding jobs

### Rotor

Machine **Kel Vista**  
Part **Rotor**  
Material **C 45 soft**  
Machining **OD Grinding of 5 different diameters (except Rotor) in one only setting between centers**  
Grinding wheel **D 400 x 50 x 127 mm**  
Machine **Cmk > 1.33**  
capability index

**Results**  
Machine capability index:  
Cmk = 1.88 - 3.7 (depending on diameter)  
Total cycle time:  
5.2 min



### Shaft

Component **Shaft**  
Machine **Kel Varia**  
Control system **Kelco 120**  
Additional axes **C-Axis and B-Axis**  
Clamping **Between centres with 3-ja chuck**  
Material **CK45**  
Weight **55 Kilos**

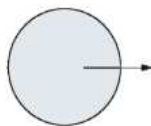
#### Grinding of complex components on cylindrical grinding machines

##### System structure of the C-axis

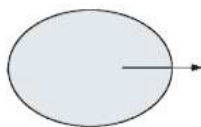
- Rotary encoder directly on the workhead Spindle
- Resolution of the C-axis 0.001 degrees
- 3.6 seconds
- Spindle driven by toothed belt
- Manual infeed permits optimal single-component grinding

The grinding of unround components not only poses highest requirements in terms of the mechanical structure of the machine, but also in terms of the control system, as well as the drive and clamping methods.

By "Unround grinding" a procedure is being described in which rotationally unsymmetrical components are created. Contrary to the situation with cylindrical grinding, the distance from the surface line to the axis is here not constant.

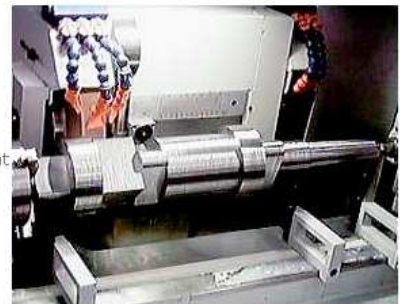


Constant distance - Cylindrical contour



Distance not constant - Unround contour

This part is being completed in one single operation using the additional B- and C-axes.



Clamping method



Pendulum Grinding of square component



Pendulum-grinding of three-edged component

## Thread

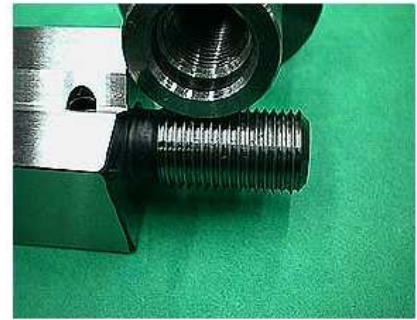
Component	<b>Thread</b>
Machine	<b>Kel Varia</b>
Control system	<b>Kelco 120</b>
Additional axes	<b>C-axis</b>
Clamping	<b>3-jaw chuck and intermediate pins</b>
Material	<b>16 MnCr5</b>

### Thread grinding

The use of a C-axis makes it possible to grind both **external and internal threads**. Threads are ground without tilting the wheelhead. During dressing of the grinding wheel, the resulting distortion is taken into account by the software. In the workpieces shown above, the external thread was match-ground.

### Grinding wheels

Multi-profile and single-profile wheels can be profiled. The **grinding wheel** shown above has a metric multi-profile..



External and internal threads

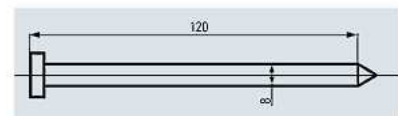


## Pipette

Component	<b>Pipette</b>
Machine	<b>Kel Varia</b>
Control system	<b>Kelco 120</b>
Additional axes	<b>B - axis</b>
Clamping	<b>Between centres</b>
Material	<b>1.2516</b>

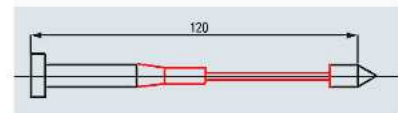
### Blank

Blank as it comes on to the machine



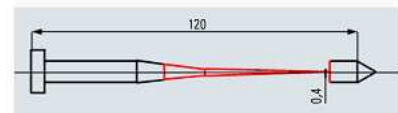
### 1st Operation

A straight grinding wheel is being used for the first operation, when the component area marked in red is preground.



### 2st Operation

The contour marked in red is being finish-ground, whereby two profiled grinding wheels are employed.



The tolerances required by the customer have been achieved.

### Detailed view of the profiled component area

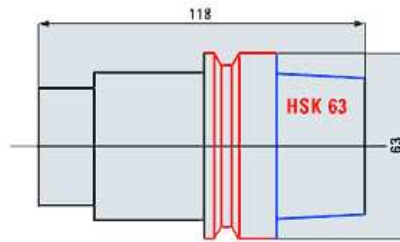


### Overall view of the finished component



## Workholder HSK - A 63

Component	<b>Workholder HKS - A 63</b>
Machine	<b>Kel Varia</b>
Control system	<b>Kelco 120</b>
Additional axes	<b>Diagonal wheelhead</b>
Clamping	<b>Between centres</b>
Material	<b>16 MnCr5</b>



These components are being completely ground in a 2-shifts operation. Grinding is carried-out using two wheels (areas marked red and blue)

Complete grinding time ( incl. dressing ) is 3.85 min. with a stock removal of 0.3 mm

Concentricity is less than 0.001mm

Surface requirement:  
Target value: Ra 0.2  
Actual value: Ra0.18

A measuring device is used on the taper.

Diagonal wheelhead

Wheelhead data

Grinding wheels	<b>Diameter 450mm x 80mm x 203.2mm</b>
Motor output	<b>9.2kW (one drive per grinding wheel)</b>
Peripheral speed	<b>40m/sek.</b>
Bearings	<b>Hydrodynamic bearings</b>
Gap eliminating method	<b>Contactless for both grinding wheels</b>

