

## Programming counter-spindles in G-code

Standard lathes have a spindle into which the workpiece is chucked and then machined with turning or milling tools. To allow the workpiece to be completely machined (including the “back” side) it must be rechucked by hand – a process in which errors can often be made at the expense of the precision of the workpiece. By using machines with counter-spindles, this process is automated, allowing a much higher level of precision to be achieved. These counter-spindles pick off the workpiece from the main spindle with positional accuracy so that it can be completely machined on one machine. The operator can simply program takeover of the workpiece with ShopTurn in one cycle. If ShopTurn is not available, synchronization must be programmed via G-code. The following example describes this sequence:

### Synchronous takeover at 1000 rpm

COUPDEF(S3,S1,1,1,“NOC“,“DV“ S3 is counter-spindle

COUPON(S3,S1) S1 is main spindle

G95 S1000 M4

### Handover

M? Open M-function to counter-spindle chuck with spindle rotating

G0 Z2=300 Preliminary position of counter-spindle absolute dimension

G94 G1 Z2=280 F1000 Pick-off position absolute dimension approach at 1000 mm/min

G4 F0.5 Dwell time

M? Close M-function to counter-spindle chuck with spindle rotating

G4 F0.5 Dwell time

M? Close M-function to main spindle chuck with spindle rotating

G4 F0.5 Dwell time

G0 Z2=600 Pull-back position counter-spindle absolute dimension

### Pull-back position counter-spindle absolute dimension

COUPOF(S3,S1)

COUPDEL(S3,S1)

M1=5

M3=5

MIRROR Z0 Mirror the machining, programming in Z minus direction

SETMS(3) Select master spindle for counter-spindle

#### Note:

With the mirror command, the control system automatically resets the path correction commands (G41/G42 and/or G42/G41) in keeping with the change in machining direction – that is, G42 external machining is also programmed on the counter-spindle.

### Machining on the counter-spindle

G55 Zero point of counter-spindle

MIRROR Deselect mirroring

M30