

2.1.4 Deep-hole drilling – CYCLE83



Programming

CYCLE83 (RTP, RFP, SDIS, DP, DPR, FDEP, FDPR, DAM, DTB, DTS, FRF, VARI, _AXN, _MDEP, _VRT, _DTD, _DIS1)



Parameters

RTP	real	Retraction plane (absolute)
RFP	real	Reference plane (absolute)
SDIS	real	Safety clearance (enter without sign)
DP	real	Final drilling depth (absolute)
DPR	real	Final drilling depth relative to reference plane (enter without sign)
FDEP	real	First drilling depth (absolute)
FDPR	real	First drilling depth relative to reference plane (enter without sign)
DAM	real	Degression: (enter without sign) Values: > 0 degression as value < 0 degression factor = 0 no degression
DTB	real	Dwell time at drilling depth (chip breaking) Values: > 0 in seconds < 0 in revolutions
DTS	real	Dwell time at starting point and for swarf removal Values: > 0 in seconds < 0 in revolutions
FRF	real	Feedrate factor for first drilling depth (enter without sign) Value range: 0.001 ... 1
VARI	int	Type of machining Values: 0 chip breaking 1 swarf removal
_AXN	int	Tool axis: Values: 1 = 1st geometry axis 2 = 2nd geometry axis or else 3rd geometry axis
_MDEP	real	Minimum drilling depth
_VRT	real	Variable retraction distance for chip breaking (VARI=0): Values: > 0 is retraction distance 0 = setting is 1 mm

2.1 Drilling cycles

_DTD	real	Dwell time at final drilling depth Values: > 0 in seconds < 0 in revolutions = 0 value as for DTB
_DIS1	real	Programmable limit distance on re-insertion in hole (VARI=1 for swarf removal) Values: > 0 programmable value applies = 0 automatic calculation

**Function**

The tool drills at the programmed spindle speed and feedrate to the programmed final drilling depth. Deep hole drilling is performed with a depth infeed of a maximum definable depth executed several times, increasing gradually until the final drilling depth is reached.

The drill can either be retracted to the reference plane+safety clearance after every infeed depth for swarf removal or retracted in each case by 1 mm for chip breaking.



Sequence of operations

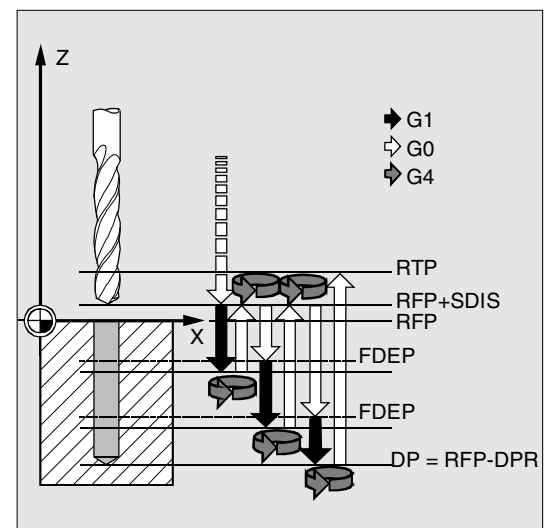
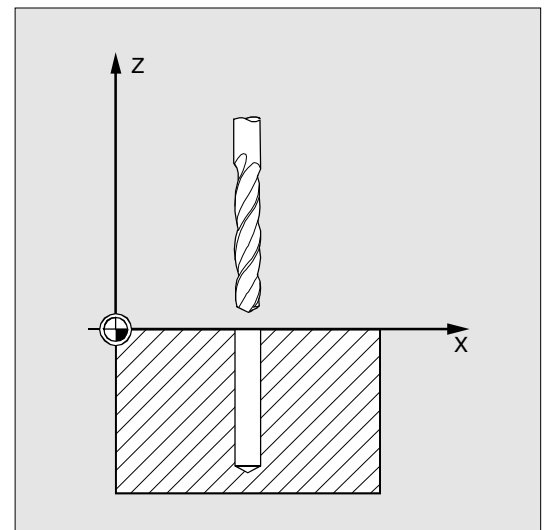
Position reached prior to cycle start:

The drilling position is the position in the two axes of the selected plane.

The cycle implements the following motion sequence:

Deep hole drilling with swarf removal (VARI=1):

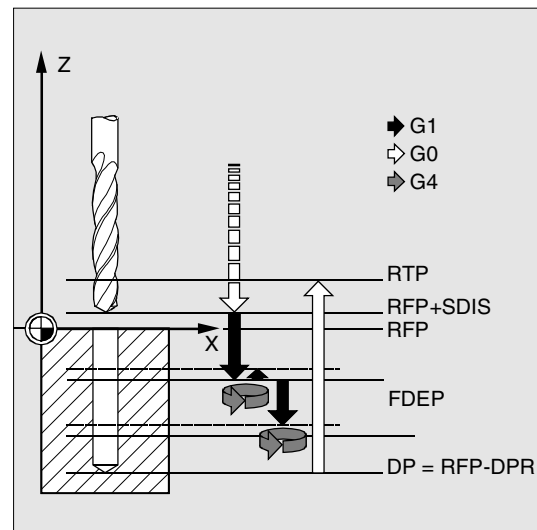
- Approach of the reference plane brought forward by the safety clearance with G0
- Traverse to the first drilling depth with G1, the feedrate for which is derived from the feedrate defined with the program call which is subject to parameter FRF (feedrate factor)
- Dwell time at final drilling depth (parameter DTB)
- Retraction to the reference plane brought forward by the safety clearance with G0 for swarf removal
- Dwell time at starting point (parameter DTS)
- Approach last drilling depth reached, reduced by the calculated (by cycle) or programmable limit distance with G0
- Traverse to next drilling depth with G1 (sequence of motions is continued until the final drilling depth is reached)
- Retraction to retraction plane with G0



2.1 Drilling cycles

Deep hole drilling with chip breaking (VARI=0):

- Approach of the reference plane brought forward by the safety clearance with G0
- Traverse to the first drilling depth with G1, the feedrate for which is derived from the feedrate defined with the program call which is subject to parameter FRF (feedrate factor)
- Dwell time at final drilling depth (parameter DTB)
- Retraction by 1 mm from the current drilling depth with G1 and the feedrate programmed in the calling program (for chip breaking)
- Traverse to next drilling depth with G1 and the programmed feedrate (sequence of motions is continued until the final drilling depth is reached)
- Retraction to retraction plane with G0



Description of parameters

See Section 2.1.2. (Drilling, Centering – CYCLE81) for a description of parameters RTP, RFP, SDIS, DP, DPR

FDEP and DAM (final drilling depth_1, abs and degression value)

DAM=0 no degression

DAM>0 degression as value

The current depth is derived in the cycle as follows:

- In the first step, the depth parameterized with the first drilling depth is traversed as long as it does not exceed the total drilling depth.
- From the second drilling depth on, the drilling stroke is obtained by subtracting the amount of degression from the stroke of the last drilling depth, provided that the latter is greater than the programmed amount of degression.
- The next drilling strokes correspond to the amount of degression, as long as the remaining depth is greater than twice the amount of degression.
- The last two drilling strokes are divided equally and traversed and are therefore always greater than half of the amount of degression.

- If the value for the first drilling depth is incompatible with the total depth, the error message 61107 "First drilling depth incorrectly defined" is output and the cycle is not executed.

DAM<0 (-0.001 to -1) degression factor

The current depth is derived in the cycle as follows:

- In the first step, the depth parameterized with the first drilling depth is traversed as long as it does not exceed the total drilling depth.
- From the second drilling depth on, the drilling stroke is obtained from the stroke of the last drilling depth minus the last drilling depth multiplied by the degression factor, provided that the drilling stroke is greater than the minimum drilling depth (MDEP).
- The next drilling strokes are calculated from the last drilling stroke multiplied by the degression factor for as long as the stroke remains larger or equal to the minimum drilling depth.
- The last two drilling strokes are divided equally and traversed and are therefore always greater than half of the amount of degression.
- If the value for the first drilling depth is opposed to the total depth, error message 61107 "First drilling depth incorrectly defined" is generated and the cycle not executed.

FDPR (final drilling depth_1)

The parameter FDPR has the same effect in the cycle as parameter DPR. If the values for the reference and retraction plane are identical, the first drilling depth can be defined as a relative value.

DTB (dwell time)

The dwell time at final drilling depth (chip breaking) is programmed in DTB in seconds or revolutions of the main spindle.

- 0 in seconds
 < 0 in revolutions

DTS (dwell time)

- The dwell time at the starting point is only performed if VARI=1 (swarf removal).
 Value > 0 in seconds
 Value < 0 in revolutions

2.1 Drilling cycles

FRF (feedrate factor)

With this parameter you can enter a reduction factor for the active feedrate which only applies to the approach to the first drilling depth in the cycle.

VARI (machining mode)

If parameter VARI=0 is set, the drill retracts 1 mm after reaching each drilling depth for chip breaking. When VARI=1 (for swarf removal), the drill traverses in each case to the reference plane moved forward by the safety clearance.

_AXN (tool axis)

By programming the drilling axis via _AXN, it is possible to omit the switchover from plane G18 to G17 when the deep hole drilling cycle is used on lathes.

_MDEP (minimum drilling depth)

You can define a minimum drilling depth for drill stroke calculations based on degression factor. If the calculated drilling stroke becomes shorter than the minimum drilling depth, the remaining depth is machined in strokes equaling the length of the minimum drilling depth.

_VRT (variable retraction value for chip breaking with VARI=0)

You can program the retraction path for chip breaking in seconds or revolutions.

Value > 0 retraction value

Value = 0 retraction value 1 mm

_DTD (dwell time at final drilling depth)

The dwell time at final drilling depth can be entered in seconds or revolutions.

Value > 0 in seconds

Value < 0 in revolutions

Value = 0 dwell time as programmed in DTB

_DIS1 (programmable limit distance when VARI=1)

The limit distance after re-insertion in the hole can be programmed.

Value > 0 position at programmed value

Value = 0 automatic calculation