

## 13.2 MULTIPLE REPETITIVE CYCLE (G70 – G76)

There are several types of predefined canned cycles that make programming easier. For instance, the data of the finish work shape describes the tool path for rough machining. And also, a canned cycles for the thread cutting is available.

### 13.2.1 Stock Removal in Turning (G71)

There are two types of stock removals in turning : Type I and II.

• Type I

If a finished shape of A to A' to B is given by a program as in the figure below, the specified area is removed by  $\Delta d$  (depth of cut), with finishing allowance  $\Delta u/2$  and  $\Delta w$  left.

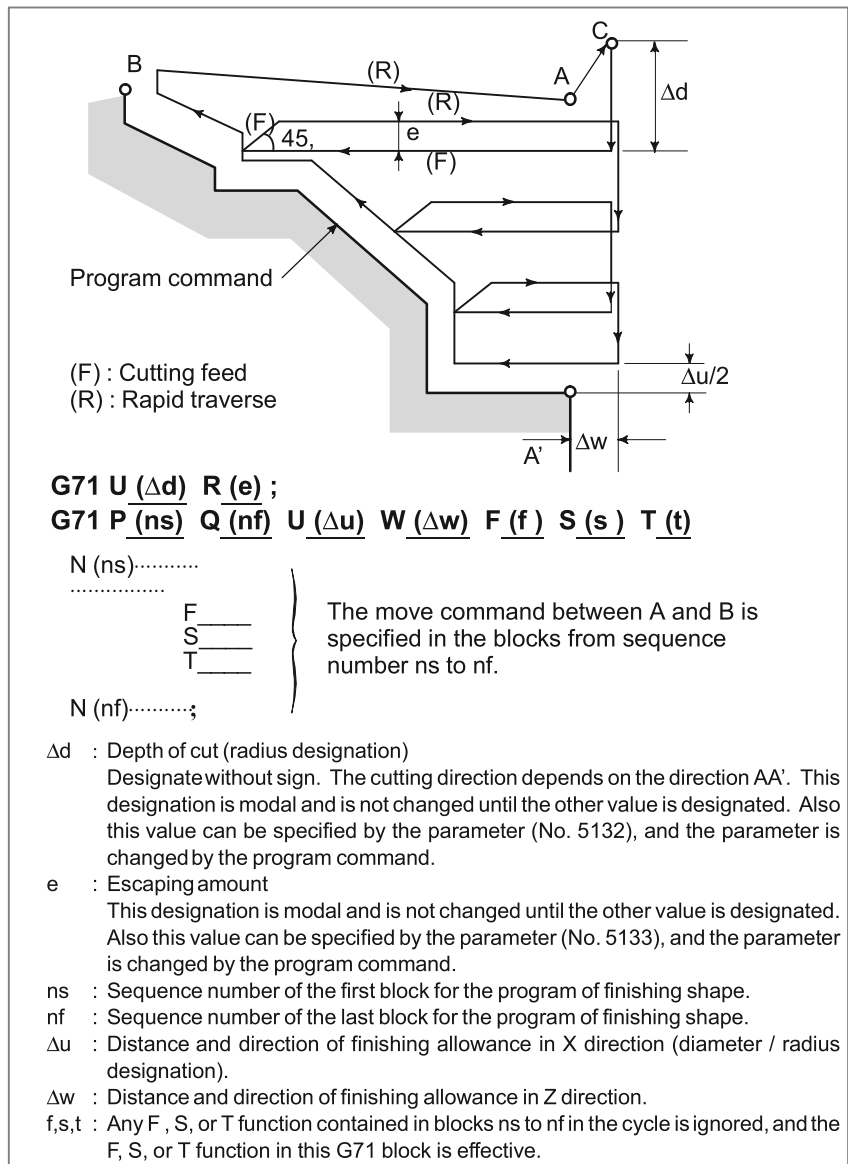


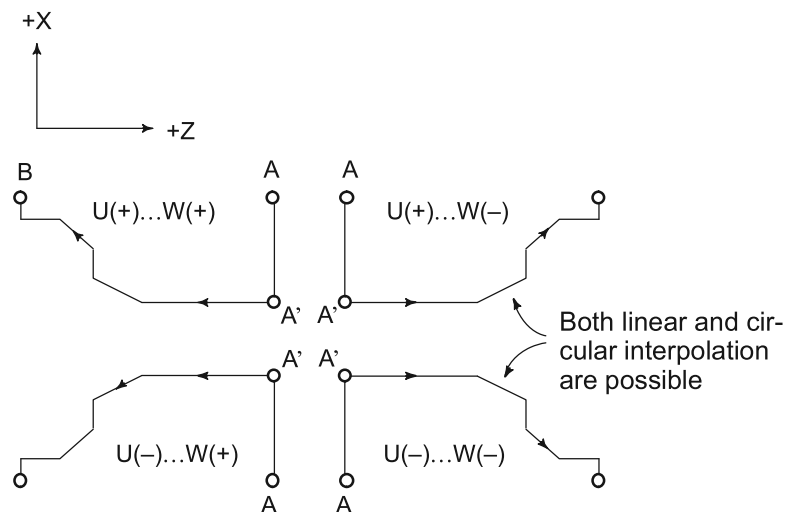
Fig. 13.2.1 (a) Cutting path in stock removal in turning (Type I)

**NOTE**

- 1 While both  $\Delta d$  and  $\Delta u$ , are specified by address U, the meanings of them are determined by the presence of addresses P and Q.
- 2 The cycle machining is performed by G71 command with P and Q specification.  
F, S, and T functions which are specified in the move command between points A and B are ineffective and those specified in G71 block or the previous block are effective.

When constant surface speed control is enabled, G96 or G97 command specified in the move command between points A and B are ineffective, and that specified in G71 block or the previous block is effective.

The following four cutting patterns are considered. All of these cutting cycles are made paralleled to Z axis and the sign of  $\Delta u$  and  $\Delta w$  are as follows:



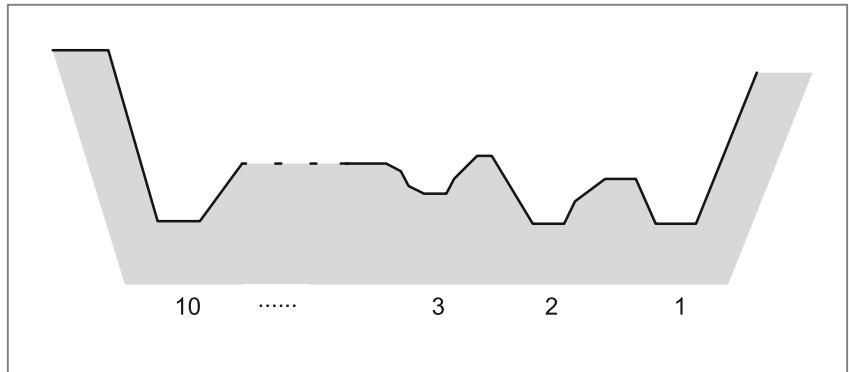
The tool path between A and A' is specified in the block with sequence number "ns" including G00 or G01, and in this block, a move command in the Z axis cannot be specified. The tool path between A' and B must be steadily increasing or decreasing pattern in both X and Z axis. When the tool path between A and A' is programmed by G00/G01, cutting along AA' is performed in G00/G01 mode respectively.

- 3 The subprogram cannot be called from the block between sequence number "ns" and "nf".

• **Type II**

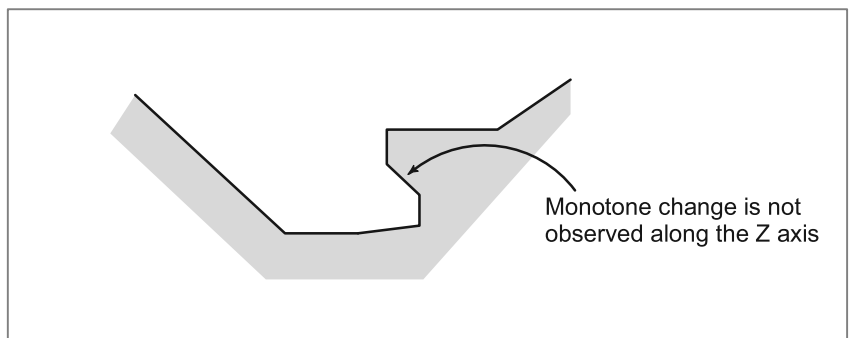
Type II differs from type I in the following : The profile need not show monotone increase or monotone decrease along the X axis, and it may have up to 10 concaves (pockets).

A P/S alarm (No. 068) is issued if 11 or more concaves are set.



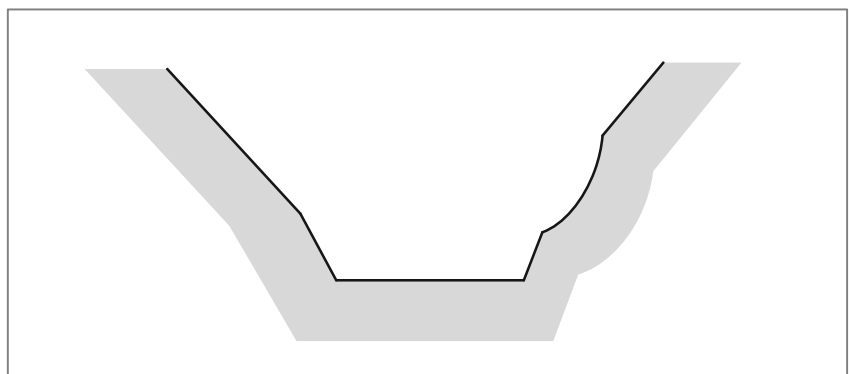
**Fig. 13.2.1 (b) Number of pockets in stock removal in turning (Type II)**

Note that, however, the profile must have monotone decrease or increase along the Z axis. The following profile cannot be machined:



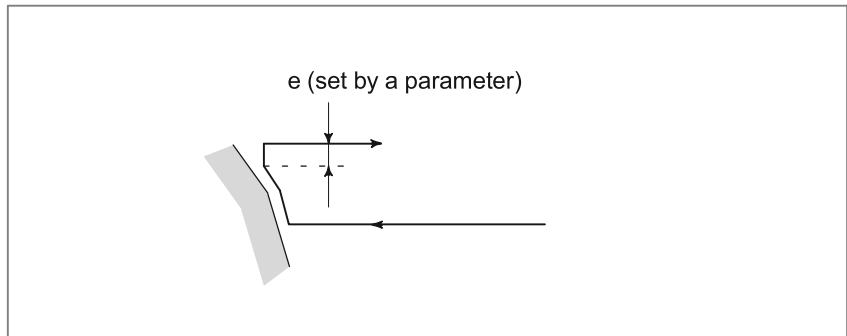
**Fig. 13.2.1 (c) Figure which cannot be machined in stock removal in turning (Type II)**

The first cut portion need not be vertical ; any profile is permitted if monotone change is shown along the Z axis.



**Fig. 13.2.1 (d) Figure which can be machined (Monotonic change) in stock removal in turning (Type II)**

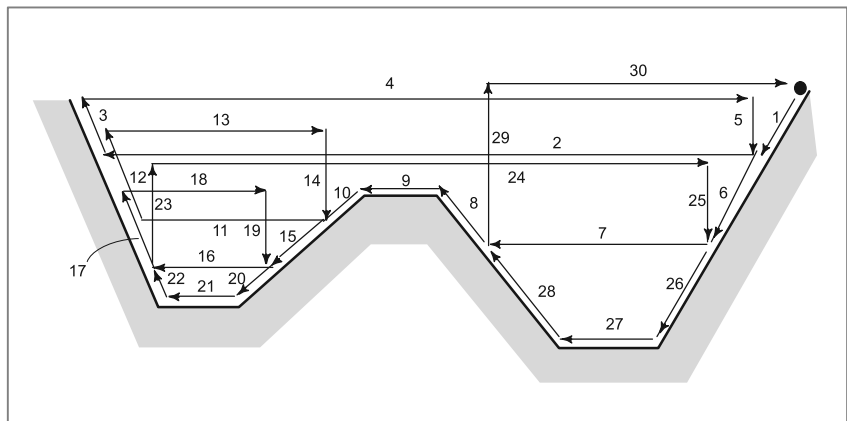
After turning, a clearance is provided by cutting along the workpiece profile.



**Fig. 13.2.1 (e) Chamfering in stock removal in turning (Type II)**

The clearance  $e$  (specified in R) to be provided after cutting can also be set in parameter No. 5133.

A sample cutting path is given below:



**Fig. 13.2.1 (f) Cutting path in stock removal in facing**

The offset of the tool tip radius is not added to finishing allowances  $\Delta u$  and  $\Delta w$ . In turning, the offset of the tool tip radius is assumed to be zero.

$W=0$  must be specified ; otherwise, the tool tip may cut into one wall side. For the first block of a repetitive portion, two axes X(U) and Z (W) must be specified. When Z motion is not performed, W0 is also specified.

• **Distinction between type I and type II**

When only one axis is specified in the first block of a repetitive portion -- Type I

When two axes are specified in the first block of a repetitive portion -- Type II

When the first block does not include Z motion and type II is to be used, W0 must be specified.

(Example)

TYPE I	TYPE II
G71 V10.0 R5.0 ;	G71 V10.0 R5.0 ;
G71 P100 Q200.....;	G71 P100 Q200.....;
N100X (U)___;	N100X (U)___ Z(W)___;
:	:
:	:
N200.....;	N200.....;