

Design tips for hobbing cutter starts and flutes

1. Standard criteria for hobbing cutter starts and flutes

Part NT	Starts	Flutes	Use
20 and smaller	1	1 0 ~ 1 2	Finish, Preshaving
	2	1 2 ~ 1 4	Preshaving
Over 21	1	1 0	Finish, Preshaving
	2 ~ 3	1 2 ~ 1 4	Preshaving
	4 ~ 5	1 4 ~ 1 7	Preshaving

Formula for advisable design of hobbing cutter starts is " $(NT \text{ of workpiece} / \text{number of starts}) \geq 9$ "
The appropriate value differs depending on the hobbing machine cutting load and cutting method.

2. Comparison of hobbing cutter design, Starts

Greater starts

Pros	(1) The machining productivity improves due to the higher table rotation speed (2) The cutter wear resistance improves due to the thicker cutting chips.
Cons	(1) Hobbing accuracy tends to be one rank lower. (2) Chipping is likely to occur. (3) Tool price is relatively higher

In case of increasing the number of starts, make sure that the number of starts x axial feed speed (mm / t.rev.) does not exceed 8.

Fewer starts

Pros	(1) Better hobbing accuracy (tooth profile, pitch) (2) Better hobbing cutter accuracy (3) Tool price is relatively lower.
Cons	(1) The machining productivity declines due to the lower table rotation speed. (2) The cutter wear resistance will decline in case the cutting speed increases.

3. Comparison of hobbing cutter design, Flutes

Greater flutes

Pros	(1) Hobbing polygonal tooth profile error decreases. (2) Cutting force on hob axis can be slightly reduced which allow the axial feed can be fewer increased. (3) If the axial feed is the same, the cut part tooth lead accuracy is slightly improved.
Cons	(1) Resharpener stock decreases in case the hob cutter outer diameter doesn't change. (2) Cutter tooth rigidity decreases. (3) Resharpener cost increases. (3) Tool price gets higher.

Fewer flutes

Pros	(1) Resharpener stock increases in case the hob cutter wear doesn't change. (2) Chips become thicker and hob wear does not increase, but rather decreases.
Cons	(1) Cutting force on hob axis can be slightly increased which increases cut part tooth lead error. (1) Hobbing polygonal tooth profile error increases.

NIDEC MACHINE TOOL CORPORATION