

2-Corrected Lead Hobs-Table

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Corrected Lead Hobs

Understanding the need & machine settings

During our interactions with customers, we find the common challenge faced by customers about getting incorrect component parameters using Corrected Lead Hobs.

Today we will talk about what are corrected lead hobs, why it is necessary to design such hobs and what are the correct machine settings depending upon type of machine; CNC or Semi-CNC or manual.

What is Corrected Lead Hob?

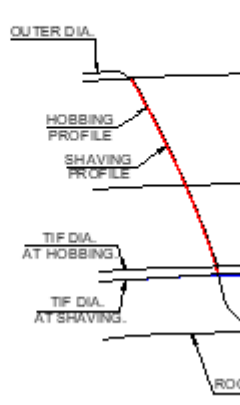

In Corrected Lead hobs, Module & Pressure Angle of Hob is different from that of component. If the Pressure angle of hob is less, then it is a Short Lead Hob and when Pressure Angle is more, then it is Long Lead Hob.

Why is it necessary to design Corrected Lead Hob?

When True Involute Form (TIF) diameter and Fillet Radius of component is not achieved with original Pressure Angle, then Pressure Angle is reduced or increased to obtain the correct TIF & Fillet Radius. This can be explained with the below example.

Standard Hob Design: Our requirement is that TIF Shaving should be below Required TIF Diameter. However, when hobs is designed in normal way, the TIF required & TIF shaving are almost at the same values as is visible from Picture 1.

Corrected Lead hob Design: We reduce the pressure angle of Hob from 20° to 18° and generate the component. As is evident from the below Picture 2, the required TIF diameter is above TIF shaving as per the requirement of the drawing.

NORMAL MODULE				GEN. MODULE			
COMP DATA				COMP DATA			
COMP DWG No.	P05167(0.022.2088.0) 40T			COMP DWG No.	P05167(0.022.2088.0) 40T		
NO OF TEETH	40	N MODULE		NO OF TEETH	40	GEN. MODULE	
NORMAL MODULE	3	N.P.A		NORMAL MODULE	3	GEN.PA	
NORMAL P.A.	20°			NORMAL P.A.	20°	SETTING ANGLE	
HELIX ANGLE/HAND	23° LH			HELIX ANGLE/HAND	23° LH		
OUTSIDE DIA	136.540/136.700			OUTSIDE DIA	136.540/136.700		
ROOT DIA	122.307/122.428			ROOT DIA	122.307/122.428		
DOP	HOBBING	140.72/140.75		DOP	HOBBING	140.72/140.75	
	SHAVING	140.57/140.60			SHAVING	140.57/140.60	
	PIN DIA	6			PIN DIA	6	
SHAV. ALL /FLANK	0.032			SHAV. ALL /FLANK	0.032		
RAD.CHAMF. SHAV.	0.2 x 40° (MAX.)			RAD.CHAMF. SHAV.	0.2 x 40° (MAX.)		
TIF DIA REQUIRED	125.450			TIF DIA REQUIRED	125.450		
TIF DIA AT HOBBING	125.94			TIF DIA AT HOBBING	125.60		
TIF DIA AT SHAVING	125.48			TIF DIA AT SHAVING	125.16		
FILLET RADIUS	1.150 (MIN.)			FILLET RADIUS	1.150 (MIN.)		
							
Picture 1 (Generation with Standard Design)				Picture 2 (Generation with Corrected Design)			

Hence, the corrected lead hobs are necessitated to be designed due to limitations in achieving the component data.

Machine Settings

Corrected lead design hobs bring new challenges at the time of setting on Hobbing Machines like understanding the correct machine settings depending upon the type of gear & machine, since all types of machines Manual, Semi-CNC & Fully CNC machines are being installed simultaneously by users.

Important Points to kept in mind while setting on Hobbing Machine.

Spur Gears: Lead Angle is same as Set Angle. Hence, only Lead Angle will be marked on Hob. Please refer Picture 3.

Helical Gears: Hob set Angle is different from Hob Lead Angle and both the angles are marked on Hob. Both the Lead Angle & Set Angle are marked on hob. But for setting on Machine, only Set Angle should be referred. Please refer Picture 4.



Picture 3 (Marking on Hob for Spur Gear)



Picture 4 (Marking on Hob for Helical Gear)

Specification	Manual Hobbing Machine	Semi-CNC Hobbing Machine	CNC Hobbing Machine
Characteristics	All settings are manual	All settings except Lead Angle is set Manually.	Lead Angle is calculated by Machine
Spur Gear (Set Angle is same as Lead Angle)	<ul style="list-style-type: none">Set Lead Angle as marked on Hob.Refer Picture 3, Lead Angle will be 1°18'06".	<ul style="list-style-type: none">Set Lead Angle as marked on Hob.Refer Picture 3, Lead Angle will be 1°18'06".	<ul style="list-style-type: none">No need to input Lead Angle.Input Corrected Module & PA in Hob Data File as marked on Hob. Refer Picture 3, Mod- 1.7196 & PA-17°.Input Standard Module & PA in Component Data File. Refer Picture 3, Mod 1.75 & PA 20°.
Helical Gear	<ul style="list-style-type: none">Set Angle (Not Lead Angle) to be setup on machine.	<ul style="list-style-type: none">Set Angle (Not Lead Angle) to be setup on machine.	<ul style="list-style-type: none">No need to input Lead Angle.

(Set Angle is different from Lead Angle)	<ul style="list-style-type: none">Refer Picture 4, Set Angle will be 20°38'.	<ul style="list-style-type: none">Refer Picture 4, Set Angle will be 20°38'.	<ul style="list-style-type: none">Input Corrected Module & PA in Hob Data File. Refer Picture 4, Mod-2.96415 & PA-18°.Input Standard Module & PA in Component Data File. Refer Picture 4, Mod-3 & PA-20°.Verify the Set Angle Calculated by machine with Set Angle Marked on Hob, which is 20°38 in Picture 4.
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In-correct settings or feeding in-correct values will lead to wrong component parameters like Root diameter and profile.

Hope the above article will help in bringing the clarity about the necessity to design, how to use Corrected Lead Hobs and understanding machine settings based on type of gear and machine.

If you happen to face any challenges in Gear Cutting, i can be reached at esgi@esgtools.com.