Pro Tips: Installing Helicoil Inserts

We often notice that some of our partners have difficulty doing helicoil installs, possibly from lack of exposure to this type of feature. Here are a few tips:

1. Make sure the hole size and depth are correct as defined by the manufacturer's specification chart (see example below). This chart will also give you appropriate tap depth defined by the tap type you are using to account for the lead of the tap.
2. When tapping the threads, make sure to use an STI (screw thread insert) tap. Bottoming for non-through holes, plug for through holes.
3. There are two fundamental types of helical inserts: tangless and tanged

The insert on the left is tangless - install inserts like this to depth and then back out the tool. The insert on the right has a drive tang that must be broken off after installation using a punch.

4. When installing the insert, the top should be $^{3}/_{4}$ to 1 $^{1}/_{2}$ turns *below* the surface of the part. The threads tapped into the part prior to installing the insert will hold the insert in place. If there is no material holding the insert, it will bend and pull when screws are installed by the customer.

Example manufacturer's specification chart (Emhart helicoil catalog PDF downloadable from Emhart.com):

Heli-Coil drilling data – inch

The **minimum** drilling depths shown below allow for the following recommended practices:

1. Countersinking the drilled hole to prevent a feather edge at the start of the tapped hole.
2. 3/4 – 1-1/2 pitch of insert **"set-down"** to allow for maximum production tolerance.

Dimensions are shown for both plug and bottoming taps.

(Note: Plug taps 5/16" or M8 and smaller have a male center and the drilled hole depth dimensions allow for this length (one half of the diameter of the bolt). Calculation of dimension "F" is as follows:

TABLE V – INCH DRILLED HOLE DIMENSIONS

Nominal Thread Size	Suggested Drill Size		"F" MINIMUM DRILLING DEPTH FOR EACH INSERT LENGTH									
			Plug Taps					Bottoming Taps				
	Aluminum	Steel, Magnesium, Plastic	1 Dia.	1-1/2 Dia.	2 Dia.	2-1/2 Dia.	3 Dia.	1 Dia.	1-1/2 Dia.	2 Dia.	2-1/2 Dia.	3 Dia.
UNIFIED COARSE												
1 (.073)-64	#47 (.0785)	#46 (.0810)	.203	.240	.276	.313	.349	.136	.172	.209	.245	.282
2 (.086)-56	3/32 (.0938)	#41 (.0960)	.236	.279	.322	.365	.408	.157	.200	.243	.286	.329
3 (.099)-48	#36 (.1065)	7/64 (.1094)	.273	.323	.372	.422	.471	.182	.232	.281	.331	.380
4 (.112)-40	#31 (.1200)	#31 (.1200)	.318	.374	.430	.486	.542	.212	.268	.324	.380	.436
5 (.125)-40	3.4mm (.1339)	#29 (.1360)	.338	.400	.462	.525	.588	.225	.288	.350	.412	.475
6 (.138)-32	#26 (.1470)	#25 (.1495)	.394	.464	.532	.602	.670	.253	.332	.401	.470	.539
8 (.164)-32	#17 (.1730)	#16 (.1770)	.434	.516	.598	.680	.762	.289	.371	.453	.535	.617
10 (.190)-24	13/64 (.2031)	#5 (.2055)	.535	.630	.725	.820	.915	.357	.452	.547	.642	.737
12 (.216)-24*	#1 (.2280)	#1 (.2280)	.574	.682	.790	.898	1.006	.383	.491	.599	.707	.815
1/4 (.2500)-20	H (.2660)	H (.2660)	.675	.800	.925	1.050	1.175	.450	.575	.700	.825	.950
5/16 (.3125)-18	Q (.3320)	Q (.3320)	.801	.957	1.113	1.269	1.425	.534	.690	.846	1.002	1.158
3/8 (.3750)-16	X (.3970)	X (.3970)	.750	.938	1.125	1.312	1.500	.625	.812	1.000	1.188	1.375
7/16 (.4375)-14	29/64 (.4531)	29/64 (.4531)	.867	1.086	1.305	1.524	1.743	.724	.943	1.162	1.381	1.600
1/2 (.5000)-13*	33/64 (.5156)	17/32 (.5312)	.962	1.212	1.462	1.712	1.962	.808	1.058	1.308	1.558	1.808
9/16 (.5625)-12*	37/64 (.5781)	19/32 (.5938)	1.062	1.343	1.624	1.905	2.186	.895	1.176	1.457	1.738	2.019
5/8 (.6250)-11	21/32 (.6562)	21/32 (.6562)	1.170	1.483	1.795	2.108	2.420	.989	1.301	1.614	1.926	2.239
3/4 (.7500)-10	25/32 (.7812)	25/32 (.7812)	1.350	1.725	2.100	2.475	2.850	1.150	1.525	1.900	2.275	2.650
7/8 (.8750)-9	29/32 (.9062)	29/32 (.9062)	1.542	1.979	2.417	2.854	3.292	1.319	1.757	2.194	2.632	3.069
1 (1.000)-8	1-1/32 (1.0312)	1-1/32 (1.0312)	1.750	2.250	2.750	3.250	3.750	1.500	2.000	2.500	3.000	3.500
1-1/8 (1.1250)-7	1-11/64 (1.1719)	1-11/64 (1.1719)	1.982	2.545	3.107	3.670	4.232	1.696	2.259	2.821	3.384	3.946
1-1/4 (1.2500)-7	1-19/64 (1.2969)	1-19/64 (1.2969)	2.107	2.732	3.357	3.982	4.607	1.821	2.446	3.071	3.696	4.321
1-3/8 (1.3750)-6	1-27/64 (1.4219)	1-27/64 (1.4219)	2.375	3.062	3.750	4.437	5.125	2.042	2.729	3.417	4.104	4.792
1-1/2 (1.5000)-6	1-35/64 (1.5469)	1-35/64 (1.5469)	2.500	3.250	4.000	4.750	5.500	2.167	2.917	3.667	4.417	5.167
UNIFIED FINE												
2 (.086)-64	2.35mm (.0925)	2.35mm (.0925)	.223	.266	.309	.352	.395	.149	.192	.235	.278	.321
3 (.099)-56	#37 (.1040)	#36 (.1065)	.256	.305	.355	.404	.454	.170	.220	.269	.319	.368
4 (.112)-48	3mm (.1181)	#31 (.1200)	.293	.349	.405	.461	.517	.195	.251	.307	.363	.419
6 (.138)-40	#26 (.1470)	#25 (.1495)	.357	.426	.495	.564	.633	.238	.307	.376	.445	.514
8 (.164)-36	#17 (.1730)	#16 (.1770)	.413	.495	.577	.659	.741	.275	.357	.439	.521	.603
10 (.190)-32	#7 (.2010)	13/64 (.2031)	.472	.568	.662	.758	.852	.315	.410	.505	.600	.695
1/4 (.2500)-28	G (.2610)	6.7mm (.2638)	.589	.714	.839	.964	1.089	.393	.518	.643	.768	.893
5/16 (.3125)-24	21/64 (.3281)	21/64 (.3281)	.718	.874	1.030	1.186	1.342	.479	.635	.791	.947	1.103
3/8 (.3750)-24	25/64 (.3906)	25/64 (.3906)	.625	.812	1.000	1.187	1.375	.542	.729	.917	1.104	1.292
7/16 (.4375)-20	29/64 (.4531)	29/64 (.4531)	.738	.957	1.176	1.395	1.614	.638	.857	1.076	1.295	1.514
1/2 (.5000)-20	33/64 (.5156)	33/64 (.5156)	.800	1.050	1.300	1.550	1.800	.700	.950	1.200	1.450	1.700
9/16 (.5625)-18	37/64 (.5781)	37/64 (.5781)	.895	1.176	1.457	1.738	2.019	.784	1.065	1.346	1.627	1.908
5/8 (.6250)-18	41/64 (.6406)	41/64 (.6406)	.958	1.271	1.583	1.896	2.208	.847	1.160	1.472	1.785	2.097
3/4 (.7500)-16	49/64 (.7656)	49/64 (.7656)	1.125	1.500	1.875	2.250	2.625	1.000	1.375	1.750	2.125	2.500
7/8 (.8750)-14	57/64 (.8906)	57/64 (.8906)	1.304	1.741	2.179	2.616	3.054	1.161	1.598	2.036	2.473	2.911
1 (1.000)-14	1-1/64 (1.0156)	1-1/32 (1.0312)	1.429	1.929	2.429	2.929	3.429	1.286	1.786	2.286	2.786	3.286
1 (1.000)-12*	1-1/64 (1.0156)	1-1/32 (1.0312)	1.500	2.000	2.500	3.000	3.500	1.333	1.833	2.333	2.833	3.333
1-1/8 (1.1250)-12*	1-9/64 (1.1406)	1-5/32 (1.1562)	1.625	2.187	2.750	3.312	3.875	1.458	2.021	2.583	3.146	3.708
1-1/4 (1.2500)-12*	1-17/64 (1.2656)	1-9/32 (1.2812)	1.750	2.375	3.000	3.625	4.250	1.583	2.208	2.833	3.458	4.083
1-3/8 (1.3750)-12*	1-25/64 (1.3906)	1-13/32 (1.4062)	1.875	2.562	3.250	3.937	4.625	1.708	2.396	3.083	3.771	4.458
1-1/2 (1.5000)-12*	1-33/64 (1.5156)	1-17/32 (1.5312)	2.000	2.750	3.500	4.250	5.000	1.833	2.583	3.333	4.083	4.833

*Standard size drills are suggested even though in these sizes they vary slightly from minor diameter specifications in NASM33537.

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