Screw Thread Identification

There is often a need to identify a screw thread so that the corresponding nut (or screw) can be obtained or possibly the appropriate tap or die purchased to allow the manufacture of an item. There are various ways to do this:

Comparison – This is basically checking the identity of an *unknown* item such e.g. *a nut* against an item of *known* identity such as a labelled pack of screws or possibly a tap which has the thread identity marked on the side. For identifying female threads of the sizes normally used by modellers, this is the only method possible. However male threads can be identified by measurement and comparison with thread data charts.

Measurement – This involves obtaining two measurements as follows:

- Major Diameter – This is the diameter measured over the top of the threads and is always slightly less than the Nominal Diameter which is just used for identification purposes. For example, using a M4 thread (typically used on model boat prop shafts). The `M' prefix means Metric and the `4' means a Nominal Diameter of 4 mm. However, a measurement taken over the top of the threads (Major Diameter) will give about 3.9 mm.

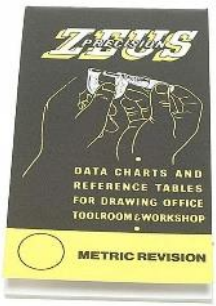
- The equipment needed to take this measurement is either a micrometer (0 to 25 mm or 0 to 1 inch) OR a digital caliper (0 to 150 mm or 0 to 6 inch). I personally prefer the latter,and at the press of a button the "reading" can be flipped from Imperial to Metric. *This example – just under £10 from Lidl.*

- Thread Pitch – This involves checking the pitch of the screw that you are endeavouring to identify against a Pitch Gauge. The term “pitch” is simply the distance between a point on one thread to the corresponding point on the adjoining thread.

- The equipment needed (Pitch Gauges) are available in Metric and Imperial (usually now in a combined set). They are basically a set of thread profiles which are held against the thread to achieve a correct match. For Metric threads the pitch is defined in millimetres but for Imperial threads the pitch is defined in Threads Per Inch (TPI)

NB – The Imperial range is often identified as “Whitworth”, which is the thread form. Typically, a set costs about £5 to £6

So once you have obtained the Major Diameter and Pitch for your “unknown thread” next comes the task of comparing this information with thread data charts. The internet is one source for this information but for a quick reference in the workshop I recommend a set of Zeus Tables. *About £6 to purchase.*



It should be noted that the list of thread types is pretty well endless. Certainly the Zeus Tables will list most that a modeller is likely to encounter but two others worth taking into consideration are British Association (BA) and Model Engineer (ME) threads. The BA system was in common use in the pre Metric days for small diameter threads below ¼ inch. They are a bit of an oddity as the `pitch' dimension of a BA thread does not follow the normal convention of either Metric or Imperial threads.

BA Threads

Size	Top Diameter		Pitch		Stock size (approx)		Clearance Drill Size		Tapping Drill Size			Hex Size A/F		Hex Size A/corners	
	inch	mm	TPI	mm	inch	mm	No.	mm	No.	mm	inch	inch	mm	inch	mm
0	0.2362	6	25.4	1.00		6	B	6	6	5.20		0.413	10.49	0.477	12.11
1	0.2087	5.3	28.2	0.90			4	5.3	15	4.60		0.365	9.27	0.421	10.71
2	0.1850	4.7	31.4	0.81	3/16		13	4.7	21	4.10		0.324	8.23	0.374	9.50
3	0.1610	4.1	34.8	0.73			20	4.1	29	3.50		0.282	7.16	0.33	8.27
4	0.1417	3.6	38.5	0.66			27	3.6	31	3.10		0.248	6.30	0.286	7.27
5	0.1260	3.2	43.1	0.59	1/8		30	3.2	36	2.75		0.220	5.59	0.254	6.45
6	0.1102	2.8	47.9	0.53			34	2.8	42	2.37	3/32	0.193	4.90	0.223	5.66
7	0.0984	2.5	52.9	0.48	3/32	2.5	39	2.5	45	2.10		0.172	4.37	0.20	5.04
8	0.0866	2.2	59.1	0.43			43	2.2	50	1.85		0.152	3.86	0.176	4.46
9	0.0748	1.9	65.1	0.39			48	1.9	52	1.60		0.131	3.33	0.151	3.84
10	0.0669	1.7	72.6	0.35			51	1.7	54	1.45		0.114	2.90	0.132	3.34
11	0.0590	1.5	81.9	0.31		1.5	53	1.5	56	1.25		0.103	2.62	0.12	3.02
12	0.0512	1.3	90.7	0.28			55	1.3	58	1.10		0.090	2.29	0.104	2.64
14	0.0394	1	110	0.23		1	60	1	66	0.82		0.083	2.11	0.096	2.43
16	0.0311	0.79	134	0.19			67	0.79	71	0.65		0.069	1.75	0.080	2.02
18	0.0240	0.62	169	0.15			73	0.62	76	0.50		0.062	1.57	0.07	1.82

Most organisations tended to use just the even numbers i.e. 0, 2, 4 BA etc. However, the good old Royal Navy and I think what was Post Office Telephones (later British Telecom) opted for the odd numbers i.e. 1, 3, 5 BA etc.

M E Threads

Major diameter	tpi	Pitch P	Triangular height h	Actual Depth d	Rounding depth D	Crest & Root Shortening h/6	Crest & Root Radius r	Effective Diameter E	Tapping Drill inch	Tapping Drill mm	Clearance Drill inch	Clearance Drill mm	BA A/F inch
1/8	32	0.0313	0.030	0.020	0.0023	0.005	0.0043	0.1050	0.0930	2.36	0.135	3.43	0.219
5/32	32	0.0313	0.030	0.020	0.0023	0.005	0.0043	0.1362	0.1242	3.16	0.166	4.22	0.273
3/16	32	0.0313	0.030	0.020	0.0023	0.005	0.0043	0.1675	0.1555	3.95	0.198	5.02	0.328
7/32	32	0.0313	0.030	0.020	0.0023	0.005	0.0043	0.1987	0.1867	4.74	0.229	5.81	0.383
1/4	32	0.0313	0.030	0.020	0.0023	0.005	0.0043	0.2300	0.2180	5.54	0.260	6.60	0.438
9/32	32	0.0313	0.030	0.020	0.0023	0.005	0.0043	0.2612	0.2492	6.33	0.291	7.40	0.492
5/16	32	0.0313	0.030	0.020	0.0023	0.005	0.0043	0.2925	0.2805	7.12	0.323	8.19	0.547
3/8	32	0.0313	0.030	0.020	0.0023	0.005	0.0043	0.3550	0.3430	8.71	0.385	9.78	0.656
7/16	32	0.0313	0.030	0.020	0.0023	0.005	0.0043	0.4175	0.4055	10.30	0.448	11.37	0.766
1/2	32	0.0313	0.030	0.020	0.0023	0.005	0.0043	0.4800	0.4680	11.89	0.510	12.95	0.875
1/8	40	0.0250	0.024	0.016	0.0018	0.004	0.0034	0.1090	0.0994	2.52	0.135	3.43	0.219
5/32	40	0.0250	0.024	0.016	0.0018	0.004	0.0034	0.1402	0.1306	3.32	0.166	4.22	0.273
3/16	40	0.0250	0.024	0.016	0.0018	0.004	0.0034	0.1715	0.1619	4.11	0.198	5.02	0.328
7/32	40	0.0250	0.024	0.016	0.0018	0.004	0.0034	0.2027	0.1931	4.91	0.229	5.81	0.383
1/4	40	0.0250	0.024	0.016	0.0018	0.004	0.0034	0.2340	0.2244	5.70	0.260	6.60	0.438
9/32	40	0.0250	0.024	0.016	0.0018	0.004	0.0034	0.2652	0.2556	6.49	0.291	7.40	0.492
5/16	40	0.0250	0.024	0.016	0.0018	0.004	0.0034	0.2965	0.2869	7.29	0.323	8.19	0.547
3/8	40	0.0250	0.024	0.016	0.0018	0.004	0.0034	0.3590	0.3494	8.87	0.385	9.78	0.656
7/16	40	0.0250	0.024	0.016	0.0018	0.004	0.0034	0.4215	0.4119	10.46	0.448	11.37	0.766
1/2	40	0.0250	0.024	0.016	0.0018	0.004	0.0034	0.4840	0.4744	12.05	0.510	12.95	0.875

<u>Metric Thread System</u> – Like it or loathe it the Metric system is here to stay, especially with more and more bits and bobs used by modellers originating from China. For that reason here are some basic facts:

- Preferred Sizes – As with all thread systems some sizes (diameters) are preferred and some non-preferred. For example, in the range between M4 and M12, the following are non-preferred M7, M9 and M11, which means that obtaining a nut or screw in those sizes is unlikely.

- Thread Pitch – For each of the preferred sizes there is normally a range of three different pitches available which could be termed as Coarse, Medium and Fine. Using an M10 thread as an example, the three pitches available are 1.5, 1.25 and 1.00. The normal (or standard) thread is always the Coarse pitch, and the convention is that if it is the standard thread the it is just defined as M10. So if you go into Wickes or B&Q and see a pack of M10 nuts, the thread is actually M10 X1.5. The other pitches in the M10 range are M10 X 1.25 and M10 X 1.0. Where applicable e.g. on an engineering drawing, the full thread description is defined e.g. M10 X1.25.

Finally – There are examples where two different threads are very close with regard to both Major Diameter and Pitch with M6 and 0BA being a good example. These are identical in both Major Diameter and Pitch but have different thread profiles. For modelling purposes, it is perfectly reasonable to `clean-out' one thread to suit the other. The easiest way is to run a tap through the nut to match the thread on the screw.

David Marks – August 2020