

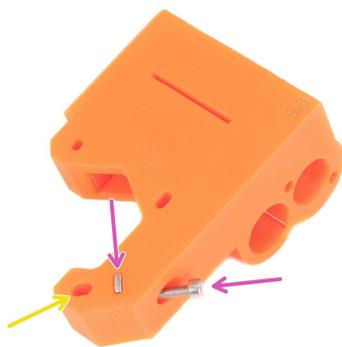
Threads

No, nothing to do with clothes, (though if you happen to need a natty WoSAG polo shirt, contact a member of the Area Group team). Threads are ‘helical ridges on cylindrical fasteners’ and are sufficiently complex area of engineering to have entire textbooks and entire chapters in engineering texts dedicated to them. Most railway modellers have a visceral understanding of threads, so we won’t be labouring the formal definitions here.



Classic machine screw threads are designed so that the thread rises by it’s own pitch for every time it goes around the cylinder it is on. These can be 3D printed, but most applications for machine screws are for relatively little screws, and printing detail at that scale is fraught with difficulties, and strength is poor, so it is rare to print screws/nuts in plastic. What can be done is to use a steel machine screw in an ‘oversnug’ hole, so that the screw cuts it’s own thread.

Another technique is to use metal machine screws and metal nuts where the metal nuts are contained in pockets in the 3D print. These pockets can be ‘blind’ that is to say invisible from the outside. That would involve printing the device up to and including the pocket. At this point the print pauses (using M0, M25, M225 or M600) and the nut or nuts are inserted manually. The print is then resumed and plastic is printed over the most of the nut leaving just the hole to take the screw.

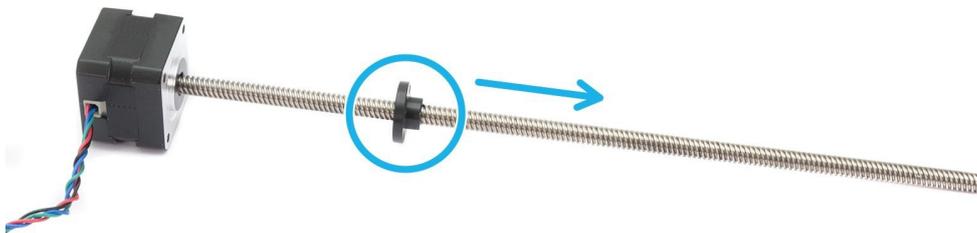


Non ‘blind’ nut and screw methods include designing a slot that runs across the run of the screw. This slot then has the screw slotted in to it and it is captured by the machine screw.

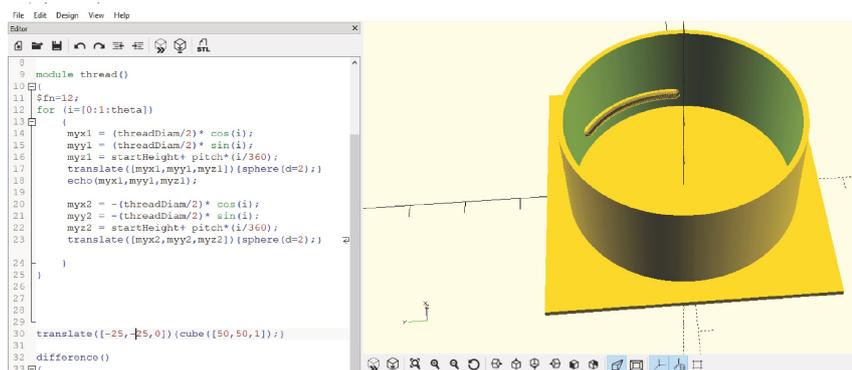
Lastly a snug open pocket to take the screw quite tightly allows threaded assemblies using metal fasteners.



We should also mention 'T Nuts'. The T stands for Trapezoidal, which is the shape of the thread pattern. These are used on so called 'Acme' threaded rods to convert rotary motion from a stepper or DC motor to linear motion. The advantage of the trapezoidal pattern being that it has the least amount of 'backlash', which is the 'lost' motion incurred when the direction of motion changes. Acme rods and T nuts are used on nearly all commercial 3D printers, they are cheap and easy and can provide accurate linear motion over long ranges, so they are also great for animations.



An interesting further use of the screw thread is in everyone's kitchen. The lids of jars, bottles and so on are a special type of threaded connector, and one that may hold interest for railway modellers. Where the 'classic' threaded connector described above fits together exactly one way, when the thread on the outer and inner cylinders are aligned. A jar lid thread may be aligned to fit three or four ways. And for the same reasons it typically only takes a third or a quarter turn to complete a snug fit. And the parts of the coupling are easy to design for 3D printing!





This lends itself to a number of possible railway modelling applications. First of all we can design custom jar lids. Imagine a jam jar of ballast that you could take the lid off of and screw on a lid that has slots and guides to dispense ballast.

Alternately imagine buildings or features on a lay-out that can be ‘screwed off’ by twisting through a quarter turn, either to remove for safe transport, or to reveal controls, servos, couplings or whatever. Jar threads may well represent opportunities for the railway modeller.

As ever, if you wish to discuss or try some of these techniques, whether or not you have a 3D printer, or if you have ideas or developments that occur to you, do not hesitate to contact myself, Davy the Area Group convener, or any of the 3D printing guys in the Area Group. We can be contacted by email, or in person at the Area Group meetings or at the informal Friday get-togethers in Prestwick.

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