COMBAT ZONE

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PARTS IS PARTS

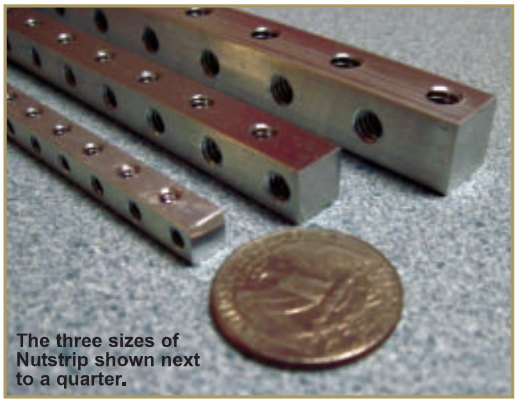
Kitbots Nutstrip

● by Mike Jeffries

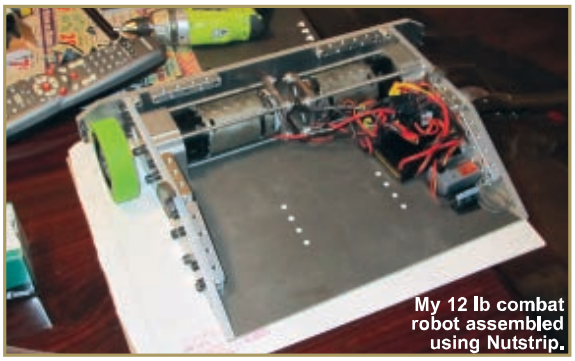
Nutstrip is a product Kitbots uses in several of their kits to allow easy assembly and reduce machining costs on the chassis components. Nutstrip is a simple and effective design. The product is made from square stock and has a series of evenly spaced tapped holes accessible from all sides. Kitbots offers three sizes of Nutstrip: Mini (1/4" stock, 6-32 threads), medium (3/8" stock, 10-24 threads), and large (1/2" stock, 1/4-20 threads).

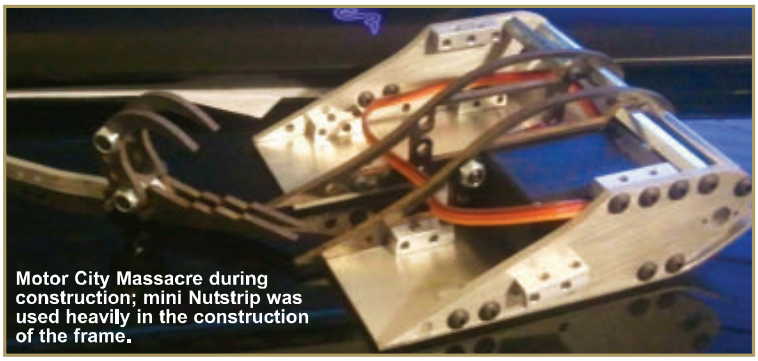
The primary benefits of using Nutstrip are that you only need to use through holes on your parts when you want to assemble them at right angles, and the threaded portion of the assembly can easily be replaced. This reduces the time and precision needed for most applications since threading takes additional time, and loose tolerances can be used with the through holes to allow for easy part fitting. In addition, if the threads are damaged the parts are much easier to replace.

I am currently using the mini and medium Nutstrip, and plan to use it as the primary means of assembling a 30 lb Sportsman class robot. In testing so far, the Nutstrip has held up to both the abuse of strong impacts and repeated fastener removal without any obvious signs of wear or damage. In my 1 lb robot, Motor City Massacre, the



The three sizes of Nutstrip shown next to a quarter.


My 12 lb combat robot assembled using Nutstrip.

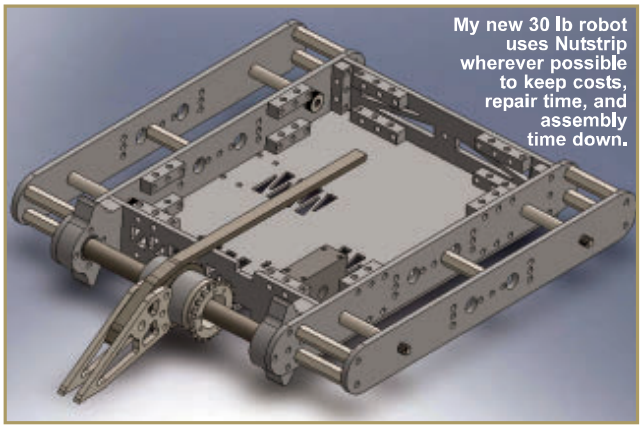

Motor City Massacre during construction; mini Nutstrip was used heavily in the construction of the frame.

Nutstrip is used to hold the chassis together along with threaded hex standoffs and to hold the thin steel cover over all of the electronics. At Dragon*Con Robot Battles, the steel cover was hit directly, taking a large chunk of material out of the armor and severely bending the side of the frame. During a post tournament repair, I determined that none of the Nutstrip on that side of the chassis sustained any damage and the only repairs needed were to the bent chassis member.

In addition to that, I've run my 12 lb combat bot through a robot hockey competition and the 12 lb class at Dragon*Con with no discernable wear or damage to any of the Nutstrip.

The positive results in testing have given me the confidence to begin work on that Sportsman class robot using the large Nutstrip as the main means of assembling the chassis. With the durability shown by the mini and medium Nutstrip, I am confident that the large version will be capable of handling the extra energy present in the 30 lb class.

By using Nutstrip in this build, I'm saving a great deal of time both in initial fabrication and repairs, as well as a great deal of money due to ease of fabrication and the reduced need for spare parts because both sides of the chassis can be assembled with identical hardware. **SV**


My new 30 lb robot uses Nutstrip wherever possible to keep costs, repair time, and assembly time down.

MANUFACTURING:

Designing for Waterjet

● by Mike Jeffries

When designing a robot, often the focus is on the weapon system or how much power you can cram into the drive system. Taking the time early on to think about how you'll make the chassis can heavily influence the design and be used to save money or time during a build.

In addition to the traditional machining processes of milling, turning, and drilling, there are processes that are considered non-traditional. These processes include waterjet, laser, and electrical discharge machining (EDM).

Each process has positives and negatives that must be considered, but when used correctly they can open up a wider range of design potential. While laser and EDM are both useful machining methods, the wide range of materials that can be cut using waterjet machining makes it a great option for experimenting with non-traditional processes.

Waterjet machining uses a very thin, high pressure jet of water, often with an abrasive material added to aid in cutting. This method of cutting means it is able to be used on a wide range of materials and thicknesses. Cutting with a fine jet of water also means that a small amount of material needs to be removed to cut the part to shape, reducing the machining time. Waterjet machining is a cold process so it eliminates the risk of heat-based part deformation.

The main drawback of waterjet machining is that you have to work exclusively with through holes for any portion of a part that will be cut with the waterjet. This drawback