

# Acme Thread Cleaning Kit

Glenn Johnson

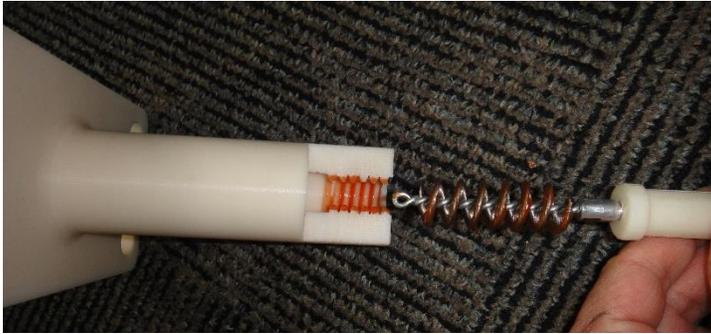
There are big threaded nuts on the outside of the station that hold down various equipment. Sometimes the bolts jam going in or going out of those nuts. NASA is not sure why but it seems to be related to the dry film lube used on them. NASA has built brushes on orbit to clean out these nuts but it takes astronauts time to build those. They could be made much easier and better on the ground but they are not seen as a required tool but as a nice to have. NASA saw this as an opportunity for both the students and NASA to spread around the engineering know how and the tool building capability to students with great ability and high potential.



In the coming months NASA plans to change out all of the batteries that store the electricity coming from the solar panels due to their age. The bolts and nuts holding these batteries to the station have the potential to jam. The brushes built by the HUNCH students will get used to clean out and lubricate the nuts if there is a jam.

NASA HUNCH students were asked to design and build tools that would clean out the threads, lubricate the threads and then check the threads to make sure there wasn't other damage. All of the tools were designed to fit on the PGT—Pistol Grip Tool—a specialized battery powered drill. Design work was done by students from Cypress Woods High School in Cypress Texas who worked with EVA Specialists at Johnson Space Center to understand the problem and come up with the appropriate tools. Student from Austin High School in Decatur Alabama worked with engineers from Marshall Space Flight Center to machine the brushes from the drawings and exacting specifications to make the tools a reality.

The EVA Spiral Brush Socket attaches to the PGT and cleans out the threads of the nut. The brush design is similar to brushes used for cleaning out a shot gun but differs by being materials that are approved for the harsh environment of a space walk and also the direction of the spiral. Because there is no good way to clean the particulates off the brush and we don't want to contaminate another nut with particles from first, each brush will be trashed after use.



The EVA Spiral Sleeved Brush Socket uses the same brush and is also used on the PGT but will have a special lubricant put on it so that when it is spun into the threads, it will leave an even coating of lubricant on the threads so the new bolts slide into place without jamming. The sleeve (visible in the first picture) is to

prevent the lubricant from getting on the space suit and other hardware. This one will also be trashed after use.

The EVA Acme Thread Tester is a large Acme style NASA built bolt with a student designed socket pinned to it. It will be run into the nut after lubrication to ensure the nut is not damaged and will be able to be cleaned and reused. Only 3 were built.

There were plenty of skeptics in the beginning about whether HUNCH students could design and build tools that could go “out the hatch” because of the strict requirements and dangers associated with a spacewalk but after seeing the elegance and simplicity of the design as well as the quality of the work building the tools and the attention to detail, HUNCH students have impressed many. The final test will be when a set of these tools get used. To be frank, NASA hopes they don’t have to be used but they will be just as excited as these student to use them when the time comes.

The first 3 sets of tools will go out on the EVA this coming January 6, 2017. The ones built by the students of Austin High Schools may launch as early as March in anticipation for other battery change outs and other replacements on the outside of the station. We will provide more launch and use information as it becomes known.



These EVA Spiral Sleeved Brush Sockets were assembled and prepared for flight using the parts machined by students from Austin High School in Decatur Alabama.



Peggy Whitson displays the Acme Thread Cleaning Kit attached to the Tool Caddy before attaching the Tool Caddy to the commander's EMU. The Tool Caddy holds the tools and prevents them from getting bumped floating away.

The Acme Thread Cleaning Kit was taken out on EVA on Jan 6 and Jan 13, 2017 but were not used as all the bolts threaded correctly. This is good news for the ISS but not as fun for HUNCH students who worked on them. HUNCH doesn't want the crew to have trouble with the bolts but we would like to see our hardware get used.