

**THE RIGGING COMPANY**

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**MENU**

## SWAGELESS MECHANICAL FITTINGS OR SWAGE TERMINALS...



...Which do you prefer?

When talking about **wire standing rigging** for sailboats, there are two primary ways to secure a fitting to the end of the cable, the swage fitting and the mechanical fitting. One requires a specialized, expensive machine (pictured below) that is used to essentially squeeze or hammer the fitting onto the wire, this is called the swage fitting. The other simply requires the use of some wrenches (a vise is a great tool here too), some thread locker, a bit of patience, and some experience wouldn't hurt either ;0). The latter is referred to as the mechanical or swageless fitting.

### SWAGE FITTINGS:



High quality swage fitting manufacturers used by The Rigging Company (TRC) include: **Hayn, Alexander Roberts Co., Stalok, C Sherman Johnson, Global BSI**, and up until recently Gibb a parent company of **Navtec**. A swage fitting has more length and is a slimmer design than the equivalent swageless fitting. Swage fittings have a long drilled shaft relative to the wire's diameter (diagram 1). The depth of the shaft dictates how much wire will end up buried inside of the fitting prior to swaging. Once the wire is inserted into the fitting, the fitting is then rolled through (or hammered by) a set of dies, to squeeze the fitting onto the wire. The machines used to do this can be very expensive, from \$5k to \$50k and up...dies not included.



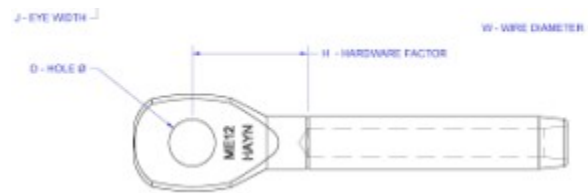


Diagram 1

Yes, there are a few other types of swaging techniques which we might save for another time. One of which we commonly refer to as the “Nico Press”, a generic term. This is an entirely different ‘box of frogs’ all together. If you are interested read more on that **here**, written by our friends at **Sailing Services**.

### Wiretechnik Roll Swaging Machines



### SWAGELESS (MECHANICAL) FITTINGS:



Our favorite high quality mechanical or swageless terminal manufacturers are: **Hayn Hi-mod** and **Stalok**. Let us not forget Noresman (Navtec), one of the more popular fitting manufacturers on the market up until recently, as they have since shut down production. A mechanical fitting is typically a three part fitting (**sometimes four**). This type of fitting does take a bit longer to execute than the swage fitting, even by the most experienced of rigging technicians. The real bonus here is it does not require a ridiculously expensive machine. Which makes it a very appealing product for the DIY project.

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### PROS AND CONS:

There does appear to be some controversy about which type of fitting is better, so I'll try to clear things up a bit. Let's take a moment to talk about the pros and cons regarding these two styles of wire terminals. Swage fittings require one of these expensive machines, so you will likely have to pay someone to do it for you. Whereas Mechanical fittings can

be the perfect solution for the DIY sailor. Swage fittings are substantially less expensive than mechanical fittings. For example, a swage stud for 1/4" wire with 1/2" thread retails for around \$25 and the comparable mechanical fitting retails around \$75. Multiply that times the amount of fittings you'll need and it can make quite a difference in price when replacing an entire rigging set.



The swage fitting is more likely to suffer from metal fatigue issues like **cracking** as the metal is being cold formed during the swaging process. Mechanical fittings do not have this problem. Therefore it is a general consensus that a mechanical fitting will last longer than its swage style counterpart. However, if I had to pull hairs I'd say that the wire strands are a bit more stressed with mechanical fittings (caused by the forming), instead of the fitting itself. Hayn tried to combat this with their Hi-mod design in using their "**Crown Ring**" to keep the cover strands straight instead of bending them over the end of the **cone (wedge)**.

Having said all of that, a properly made swage fitting will last about 7-20 years or roughly 25,000 nautical miles, depending on geographical region and use before replacement is recommended. Regular **inspection**, regardless of fitting choice, is always recommended with service intervals around every 3-5 years.



Mechanical (or swageless) fittings are not without their problems either. We just completed two recent jobs with mechanical fitting failure; one where the toggle straps cracked on multiple fittings, not so much where the wire goes into the fitting (**although that has also happened**), but the jaw of the fitting itself... fatigue. The other job was on a furler where the mechanical eye fitting at the top of the stay, came unscrewed by the spinning action of the furler. So, unfortunately there is no perfect solution.

*We, at TRC, recommend using swage fittings over mechanical fittings when the stay is rigged with a furler, i.e. forestay.*

There are also hybrid sets made, utilizing both types of fittings, with Swage fittings at the top of the stay and mechanical fittings at the bottom. This is the meet in the middle solution when price becomes a factor. Also this method is commonly practiced when building new masts.

TRC has had great success with the longevity of our swage fittings over the years {knocking on wood}. I'd say this is attributed to the use of high quality fittings, wire, the right machines, as well as proper execution. We end up selling mostly complete rigging sets using swage fittings. When discussing options with our customers we can really only justify the additional cost of mechanical fittings when the boat is going to endeavor on high mileage journeys. This way the wire can be replaced, the fittings inspected, and re-used with new cones (wedges). One of the other big benefits of mechanical fittings is/was at sea repairs. As the sailor could use wrenches and some Loctite to terminate a new cable at sea if needed, but not without the purchase of some good quality wire cutters (not cheap). With developments in synthetics we think that this problem can be much easier overcome with the use of **Dyneema or Vectran**. We offer a TRC Spare Stay Kit specifically for this purpose...no tools required!





T.R.C. Spare Stay Kit.

Either fitting, if not made properly, will have issues and can cause failures. Conversely, when done properly, either of these fittings will provide the boat and its crew with many years of trouble free service. With either fitting, given that they were executed properly, age, geographical location, and wear are the biggest enemies for standing rigging longevity.

**RIGGERS TIPS FOR MAKING UP SWAGELESS TERMINALS :**

FIRST, WHEN CHOOSING A MECHANICAL FITTING ENSURE THAT IT IS FOR THE CORRECT WIRE TYPE BEING USED, I.E. 1×19, 7×19, AND **DYFORM/COMPACT STRAND**. YOU'LL NEED TO DISASSEMBLE THE MECHANICAL FITTING (WITH STA LOK YOU CAN LEAVE THE FORMER INSIDE OF THE FITTING) AND THEN READ THE DIRECTIONS WHICH SHOULD BE INCLUDED (OR CAN BE FOUND ONLINE). THE GENERAL GIST FOR ANY MECHANICAL FITTING (REGARDLESS OF MANUFACTURER) GOES AS FOLLOWS: START WITH A NICELY CUT END OF WIRE. THEN THE SOCKET PORTION OF THE FITTING GETS SLIPPED ONTO THE WIRE.



Diagram 2

NEXT, THE END OF THE WIRE MUST BE UNLAID







EVENLY (THE TRICKY PART), SO THAT THE CORE STRANDS ARE EXPOSED AND THE COVER STRANDS ARE EVENLY SPLAYED OPEN.



ONCE THAT IS DONE, THE CONE (OR WEDGE PIECE) IS PUSHED ONTO THE CORE STRANDS. WITH THE OUTER WIRES SURROUNDING THE CONE EVENLY, WORK THE SOCKET BACK UP TO THE END OF THE WIRE, AND RE-LAY THE COVER STRANDS ONTO THE CORE. DO THIS UNTIL THE OUTSIDE STRANDS PROTRUDE FROM THE END OF THE SOCKET EVENLY AND PARALLEL (AS PICTURED BELOW), AND THE SOCKET CANNOT SLIDE UP ANY FURTHER.



THIS IS ALL DONE WHILE KEEPING THE CONE (OR WEDGE) APPROPRIATELY SUBMERGED BELOW THE END OF THE CUT WIRE BY THE RECOMMENDED AMOUNT. THE AMOUNT OF CORE STICK OUT VARIES BY FITTING MANUFACTURER, SO READ THE DIRECTIONS AND FOLLOW THE GUIDELINES CLOSELY. THE OUTER WIRES CANNOT BE FLARED OUT (SEE DIAGRAM 2) AND MUST BE PARALLEL OR CURVED-IN SLIGHTLY. YOU WILL NOT BE ABLE TO ASSEMBLE THE FITTING PROPERLY (OR AT ALL) IF YOU DON'T GET THIS STEP RIGHT. NOW, (UNLESS USING A HI-MOD FITTING FOR WHICH YOU WILL NEED TO RIG THEIR "CROWN RING" IN PLACE) YOU ARE READY FOR THE FITTING TO BE SCREWED TOGETHER AND TO FORM THE WIRE. TO DO THIS WE USE **LOCTITE** PRIMER AND RED **LOCTITE** TO HELP LUBRICATE THINGS AS SHOWN IN THE VIDEO ABOVE.

***WARNING: STAINLESS ON STAINLESS WILL GALL (OR COLD WELD) WITH TOO MUCH FRICTION AND YOU'LL HAVE A FITTING THAT CAN'T BE SCREWED-ON OR OFF.***

ONCE SCREWED DOWN COMPLETELY WE RECOMMEND THAT THE FITTING BE UNSCREWED AGAIN BEFORE THE LOCTITE ACTIVATES (SO HURRY DEPENDING ON TEMP) AND CHECKED FOR PROPER



FORMING OF THE COVER (OUTSIDE) STRANDS. LASTLY, IF ALL LOOKS TO BE FINE, WE COAT THE THREADS WITH MORE RED LOCTITE AND THEN SCREW IT BACK TOGETHER TIGHT!



SOME MANUFACTURERS RECOMMEND THE USE OF SEALANTS ALONG WITH LOCTITE INTO THE FITTING BEFORE THE FINAL ASSEMBLY TO MITIGATE WATER INTRUSION AND TO HELP SECURE THINGS. RECENTLY IT SEEMS THAT MOST MANUFACTURERS ARE GETTING AWAY FROM THIS, PERHAPS BECAUSE OF OXYGEN DEPRIVATION CAUSING CORROSION. SO AGAIN, PLEASE **FOLLOW THE INSTRUCTIONS AND GUIDELINES** THAT COME WITH THE FITTINGS THAT YOU HAVE.



...SO THERE IT IS IN A NUTSHELL. AS I ALWAYS SAY, SEEK THE COUNCIL OF YOUR LOCAL RIGGER FOR PRODUCT SPECIFIC INFORMATION AS WELL AS ANY TIPS AND TRICKS SO THAT YOU HAVE IT RIGHT.

*THANKS FOR THE READ AND LEAVE US YOUR  
COMMENTS BELOW.*

*~T.R.C.*

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## 8 THOUGHTS ON “SWAGELESS MECHANICAL FITTINGS OR SWAGE TERMINALS...”

**PRISCILLA**

February 17, 2017 at 21:37

I used a lot of Stalok fittings for a (not boat-related) job, and although they are straight-forward I found them rather tedious to make-up. For that reason alone I chose to try Hayn Hi-MOD for my boat, and ohm-igosh they are fast and easy compared to the Stayloks! I started off with one: had a kinked shroud – it was easy to run a new shroud with a swaged stemball fitting and put the Hayn fitting on the bottom. Great! My boat was missing two shrouds so I did two more – easy peasy!! Next time I renew the shrouds I’ll do them all!!!

Fast forward a few thousand very stormy miles later (why me??): I pulled the mast and couldn’t remove those three shrouds because the crown rings and wires were STUCK inside the fitting housing. I tried all sorts of penetrating oils, heat, banging, LOTS of heat ... and by then the fittings and wire were so abused they were no longer seaworthy so I let everybody (riggers included) try anything they wanted. The boat needs all new shrouds before I go offshore again and when I cut those fittings off I’m going to send them to Hayn and ask for a refund. :-(

It would have been interesting to have had a Staylok fitting or two on the boat for comparison. I *really* like the Hayn Hi-MOD fittings, but can’t recommend them for blue water (ab)use – I’ll stick with swaged fittings. Plus, with the advancements and reliability of synthetic rigging that’s a MUCH better way to go for emergency repairs and having spare shrouds

aboard. And lookie! Someone has already invented a ready-make spare stay kit!! Brilliant. :-)

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## REPLY

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### THE RIGGING COMPANY, LLP

February 20, 2017 at 10:57

Very interesting story about those crown rings. To be honest we haven't had to take many apart as they are relatively new to the US market still. Well about 10 years now (If I really think on it), man time flies. Thanks for the heads up though. I will keep an eye out next time we take one apart.

Priscilla I would like to send you one of our shirts if you like. What Size are you and what is your **shipping address?**

...and let us know if you need one of our spare stay kits or more information on them.

~T.R.C.

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## REPLY

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### PRISCILLA

February 20, 2017 at 20:00

Serious bumner about the Hi-MODs, one would be ho-hum, but all three?! All are on 3/8" upper spreader shrouds (dbl spreader cutter rig), two port one stbd, five or six years old (yeah *where* does the time go?), installed at different times on wires from different rigging companies. Not sure when I'll pull the mast again, hopefully within a year. I want so much to cut one in half to look, but Hayn needs to figure out the problem and fix it so (unless they say otherwise) I'll send them all three. You read it here first so of course I'll keep TRC posted ... and I won't forget, women never forget anything, and don't argue about that because we are always right. :-D

Ooh, a shirt! I'll proudly be a walking billboard for TRC – this is a very impressive web site, educational, good annotated pictures – a true (sailing) community service. I'll wear your shirt to our boat show next month – the local riggers will find out I'm cheating on them. hahaha!

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**REPLY**

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**THE RIGGING COMPANY, LLP**

February 21, 2017 at 10:05

..Can't wait until everybody sees your new shirt :-0

~T.R.C.

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**REPLY**

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**VIKI MOORE**

November 16, 2016 at 16:38

Great tips! Thank you. I always learn lots when I read your posts. :)

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**REPLY**

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**THE RIGGING COMPANY, LLP**

November 16, 2016 at 16:44

Thanks Viki. I was wondering how you fared down there through that rough weather? Is everyone safe?

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**REPLY****VIKI MOORE**

November 17, 2016 at 02:17

Having a few issues with big earthquakes at the moment... but we are ok :)

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**REPLY**

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**THE RIGGING COMPANY, LLP**

November 18, 2016 at 10:47

Good to hear. I heard that it was very close to where sent those shirts!  
~T.R.C.

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**REPLY**

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