The Birth of Hot Glue Splices
Originated from Tom Wilson on March 29, 2011

Orginated from: Thomas Wilson on March 29, 2011

Colleagues,

Dave Menzies kindly gave me permission to post this email exchange regarding the origin of hot-glue and heatshrink underwater splices. I thought it might amuse the elders and edify the youngsters.

If anyone else know more of the origins of this handy little technique please share. The inventor deserves a medal (made of hot glue gilded with metallic paint marker, naturally).

Tom

===== EMAIL TO DAVE =====

Hi Dave,

Trevor Young is a former student employee of mine who just started as a marine tech on the Kilo Moana at University of Hawaii. He sent me a text saying he taught them the hot glue and heatshrink splice for underwater cables and they loved it. I taught it to Trevor after learning it from Patrick Rowe of WHOI. Patrick gave a presentation on it at INMARTEC 2006 after trying it out I ditched using the Scotchkote and self-fusing rubber tape technique David Lucyk and I wrote up in 1994. Patrick credits you as teaching the hot glue technique to him. Just out of curiosity, did you work this out yourself? If not, who taught it to you?

Best regards,
Tom
Historian of underwater tips and tricks...

P.S. If you're interested, Rowe's presentation is at:
http://www.unols.org/meetings/2006/200610inm/SessionIV/SessionIV_Rowe_HOT%20GLUE.pdf

and my paper on the older technique is at:
http://www.unols.org/committees/rvtec/TechTopics/UWSPLICE.pdf

===== DAVE'S REPLY =====

Hi Tom, I just got back from a month of bird watching in the Philippines. That might be a clue to you

that I'm retired now (well, still doing some
part-time work for our UCSB group.) I'm CCing Stuart, who is taking over my position.

It was interesting to look at Patrick's presentation. He showed it pretty much as I had passed on to him. Guess the only difference is that I usually do not use hot glue on the individual wires, but I do use melt-liner heat-shrink. The best type of outer heat-shrink seems to be that Panduit HST stuff. It has plenty of outer thickness for toughness, but is still somewhat flexible. The melt-liner component of it seems to bond nicely with the hot-glue to form a "void free" splice. Another slight difference from Patrick's presentation is that I usually start the heating in the middle and work toward one end and then towards the other.
Go toward the biggest wire first.

Now to the history. You know, I just don't accurately remember. I know it was while I was working up at OSU with the Optical Oceanography group (I moved to UCSB in '87.) I remember Bob Bartz (who left OSU to form Sea Tech (transmissometers & fluorometers) showing me a method with
self-vulcanizing tape and regular heat-shrink for doing single pin Mecca connector leads. If I remember right, that lead into the hot-glue filling of the voids method. I don't remember it being anyone other that Bartz, but it could have been. I know the first time I used the Panduit HST stuff was in the Antarctic in the early 90's. I had just "requested" an
assortment of sizes of melt-liner heat-shrink, and the procurement person at ASA (or whatever company had the NSF support grant then) got me the deluxe stuff! So it was kind of accidental. So, it has sort of been a gradual refinement of technique. Patrick did nail the major points though:

1) Quick: back in the water 20 minutes after finishing the splice.
2) Scotchkote is very smelly and flammable. (No bigger mess than one can that leaked in an air shipment and got all over all my tools and equipment. I'm sure it is totally illegal to air ship now.) Layers take a long time to dry especially in high humidity or low temperature. Usually takes several days to get it all off of your hands though!
3) Compact splice: Not much fatter than the biggest wire and only a couple of inches longer than the wire splice areas. Most shorter than 6". With a tough outer layer like Panduit HST, no stiffener needed inside the splice.
4) (Not mentioned by Patrick.) Reliability! I made many splices of standard .322 wire to 4 single pin connectors that have gone to 4000 M repeatedly on CTD packages. I can think of only a couple of splices that have gotten water into them and thus failing. A lot more times I've torn a splice apart only to find that a pin or socket had come un-welded inside a multiple-pin commercial underwater connector.

So that's the scoop. Was fun to reminisce. I know I passed the method on to other techs on ships that I've sailed. Many picked it up, but also many wanted to stick to the old method because "that's the way we do it here." Oh well, no skin off my back. Always gave me a warm & fuzzy feeling when I'd see a splice that was the hot-glue/melt-liner method, and a sigh when I'd see one of the old Polish sausage sized Scotch 23 and
Scotchkote multilayer splices.

Cheers,
Dave

Reply from: Steve Poulos on March 29, 2011

Tom, This was presented at one of the RVTEC / Inmartech meetings. I recall it was well received. One of the points of discussion at that time
regarding the old way - was that one can do the splice without Scotch coat and just using vulcanizing tape. Scotch coat seemed over-kill or as
insurance if one was conservative and wanted to stick with historical ways. All one needs if not using hot glue is to have the vulcanized rubber
tape and regular electrical tape. The electrical tape is used to hold shape and chafing. No scotch coat material needed in that case either. I have used the rubber putty, vulcanized, and elec tape in various combos - and always with success (w/o the Scotch coat chemical) but I suspect having the hot glue use gives more versatility and might bemore forgiving.

Steve

Reply from: Brent Evers on March 29, 2011

I remember Bruce Felix - a USAP tech that often sailed on the LMG (Gould) showing me this - probably around 2003. Not sure he can be credited as the inventor, but I do remember Bruce as one who would always challenge the bounds of the customary and ordinary to come up with some good solutions down in the ice.

I usually sailed the NBP (Palmer) and remember using it once on our only trip to the Arctic, under much scrutiny, but eventual acceptance of a Scripps tech that was sailing onboard. While I thought it sometimes took longer to go the hot glue route, the end product was far more robust.

Possibly an 'independant parallel develoment' on Bruce's part, but who knows - maybe he was the ASA person referenced.

Brent Evers

Reply from: Stuart Halewood on March 29, 2011

Hi Guys,

I've used the old Scotch coat method back in the UK when I first started Marine Tech-ing and used a variety of methods through the years
including putty and externally heated molds, two-part expoxy etc.

I have been the willing recipient of Dave Menzies instruction on the Glue-gun method (as well as many other things!) and we are extremely

happy with that. It just reminds me that as now I'm taking over Dave's position, filling his shoes and picking up on all his experience is a
whole other matter!

This is a great forum for handy tips like this and the .PDF that Patrick produced is very useful, I'll be passing this on to whoever is interested.

Cheers,

Stuart

Reply from Bruce Felix on March 29, 2011

Hey Thanks for thinking of me Brent, but I too have to give credit to Mr. Menzies.

Thank you Dave! I think you showed me this on GLOBEC? Or some other cruise in the 2001 time frame.

We started buying the Panduit heatshrink shortly thereafter and it has been working well on the USAP vessels ever since.

Bruce

Bruce Felix
Andrew Nunn
Marine Electronic Technician Supervisors
