From: **Denis Klimov** klimov@mbari.org
Subject: Re: Cable Termination for GeoSense OF Cable-RFQ
Date: May 10, 2024 at 12:18 PM
To: Mark Burgett mark@tmtlabs.com
Cc: Aaron Schnittger aschnittger@mbari.org, Phil Gibson phil@tmtlabs.com, Aaron Micallef amicallef@mbari.org, Alana Sherman alana@mbari.org

Hello All,
I took some notes, does not meant to be comprehensive, but something. Appreciate a productive discussion!

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Cable Termination for GeoSense OF Cable-RFQ
5/10/2024; 10:30-11:45; Zoom call
Participating: Aaron Schnittger; Aaron Micallef; Mark Burgett, Phil Gibson, Alana Sherman, Denis Klimov

Aaron S: Deployment and Recovery Concept: the Paull Plan (slides)
Aaron S: Cable Requirements During Deployment (Slides)
Mark B: post-stretchering after deployment?
Alana: this is not buried cable, more important to sit flat
Denis: we had extensive discussion on deployment, one of more critical issues is the cable would coil-up or not
Mark B: sometimes post-strengthening, using big winch, across the bay and so on
Aaron S: Mechanical Requirements Submitted to Vendors (slides)
Mark: outer sheath, bonding anything to the outer jacket? Primers for Urethane: 425, 420. Also, breaking fibers?
Phil: triple-armor?
Aaron S: Concept Cable (slides). Unusual design.
Phil: wire strands, no armoring machine, have the wire machine, so they would use that. If taken water, larger area, corrosion
Mark: have never this kind of cable
Phil: UK company two-layer armored cable; cable get into rust bucket. Are 8 fibers really needed?
Alana: no, we only need 4 fibers at the most.
Denis: Concept Cable could potentially be softer, less residual torque
Phil: to have torque-balanced cable; Winchester have 'the poor man' version. First 2 layers in one direction, and outer layer is different direction. In this cross-section they looks the same, so outer layer could dominate. Recovery, recovery per-conditioning, consider deploying with free end; or deploy to depth, tension gradient; at higher tension higher torque; torque gradient is not desired; end up with torque in the cable. Really like to have no torque in the cable. If need to balance the torque, might use different configuration than Winchester
Alana: gradient torque question, free-hanging cable
Phil: more load at the top of the cable. ATT, book, how many water depths to achieve stability?
Alana: un-spool from the ship in a great depth
Phil: pre-conditioning at depth. Weight at the end?
Alana: yes usually have weight. Go back to Winchester, and request update the structure?

structure?
Phil: adjust wire sizes. Pre-conditioning is good, run down and run equilibrium, back on the winch, will keep torque. May be doing twice?
Mark: placing the line on the jacket might be a good idea.
Phil: deployment with a steady tension?
Alana: the art, to not to have slack?
Mark: yes, trans-Atlantic cable, always moving slowly
Aaron S: Electronics Package (slides)
Mark: frame material?
Aaron S: galvanized steel
Mark: G10 alternative? Isolate termination from the socket?
Aaron S: steel socket.
Mark: Stainless or Ti usually.
Aaron: Socket-Fast on Francois cable
Phil: Socket-Fast modulus is less; resin sets.
Aaron S: retaining the plug
Mark: torque key during socketing process; socket moves in the first loading cycle
Phil: retaining plate.
Alana: some motion
Mark: the other thing, cone retaining plate, use as setting plate, will never move. As long as torque is above load.
Phil: use press to push on the resin.
Aaron S: is water block necessary?
Mark: K-tube isolated? Hard-pot, Urethane, bond to the same material, stainless-steel tube, fiber.
Alana:
Mark: one slide back, it all in the pocket behind the flange.
Phil: need to anchor the fiber tube as well. Otherwise, could coil-up
Alana: the length of fiber coming out, needs to be secured?
Mark: Swage-Lock, to pass the fiber tube, and mount together. Or, Boot Seal for additional seal from migration.
Aaron S: use oil compensation
Phil: think that optics have no pressure, if apply pressure will start moving, like a tooth paste.
Alana: first application like this, with lay-flat requirement
Mark: how to support the weight?
Phil: jacketed stainless-steel?
Mark: use tube between socket and junction box, to protect the tube?
Aaron: this could be easy way of doing it. Do not need J-box?
Mark: no, still use J-box. Literally PVC hose/ tube.
Alana: how connected to the socket?
Denis: any examples/ photos?
Mark: Teledine website, look at the photos there
Aaron S: electronic package connection (slides)
Phil: bend stiffener, will it bend at the socket? It will bend at the socket.
Aaron S: about 2 inch
Mark: Urethane, 75-80 durometer so plenty stiff. Run test, 10 ft bend stiffener, failed miserably.

Phil: on the left side, could make larger, constant. What would be radius. Gradual transition
Denis: mechanical limiters?
Phil: yes, like bell or springs inside the urethane.
Mark: might not need this level of sophistication here. How long the deployment?
Alana: several months. What aspect?
Mark: U-Joint is expensive. Spherical ball.
Aaron S: Urethane is going to be simpler and easier
Denis: during deployment, hard to predict the orientation and loads, especially is dragging the electronics package
Mark: during deployment, do you know which side is going to be top?
Aaron S: not really. About 300 lb wet weight. Section size 26x26 inch.
Mark: did you think, lowering electronics by itself, then un-spool the cable? By ROV?
Alana: might be a bit too heavy. Add removable buoyancy? Time constrain. Big field experiment. New ship. Do not want to be too dependent on ROV.
Phil: two winches on the deck. Deployed, tipped over, calculate the bend stiffener, load. What curvature of the cable is going to be.
Mark: company makes attachment, bend limiter, some adds floats to make sure to maintain bend radius.
Denis: deployment loads and orientation hard to predict.
Mark: modeled in the test tank? How tips over?
Aaron S: not really.
Phil: if Winchester said 6" radius, not really big bend limiter
Alana: time to terminate?
Mark: who makes the socket?
Aaron S: prefer to make socket here. Need design review on this.
Mark: do not forget about the fasteners. Can be expensive.Turn-around time, about 2 weeks.
Phil: what is on the other end?
Aaron S: different socket, optical termination
Denis: use the same socket on the other end for simplicity?
Alana: need to pass the winch, so might need to be smaller
Mark: lead time for the cable. Some 30-40 weeks.
Phil: which winch use, upper end of the cable?
Alana: McCartney winch, pick up instrument itself, pay-out,
Mark: when deploy, position A to position B?
Alana: Should be orientation independent.
Denis: package free to rotate, clocking when touches the ground is unpredictable
Alana: approximate termination cost?
Mark: about $8k per side, NTE $24k. Both ends, package, everything. Better ship directly.
Denis: location?
Mark: Huntington Beach. Can terminate on-site, too.
==========

thanks,

Denis Klimov

From: "Mark Burgett" <mark@tmtlabs.com>
To: "Aaron Schnittger" <aschnittger@mbari.org>
Cc: "Phil Gibson" <phil@tmtlabs.com>, "Aaron Micallef" <amicallef@mbari.org>, "Alana Sherman" <alana@mbari.org>, "Denis Klimov" <klimov@mbari.org>
Sent: Friday, May 10, 2024 10:02:07 AM
Subject: RE: Cable Termination for GeoSense OF Cable-RFQ

Great!

Mark E. Burgett
Senior Program Manager-Subsea Defense Systems

TMT Laboratories
Tension Member Technology
5721 Research Drive, Huntington Beach, CA 92649-1616
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ISO 9001:2015 and AS9100D Registered ITAR, Quality Management System

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From: Aaron Schnittger <aschnittger@mbari.org>
Sent: Friday, May 10, 2024 9:57 AM
To: Mark Burgett <mark@tmtlabs.com>
Cc: Phil Gibson <phil@tmtlabs.com>; Aaron Micallef <amicallef@mbari.org>; Alana Sherman <alana@mbari.org>; Denis Klimov <klimov@mbari.org>
Subject: Re: Cable Termination for GeoSense OF Cable-RFQ

Hi Mark,

Yes the plan is to meet in about 30 minutes.

Thanks Denis for resending that zoom link!

See you all soon,

Aaron Schnittger
Associate Engineer
Monterey Bay Aquarium Research Institute
Phone: (831)775-1765
Email: aschnittger@mbari.org

From: "Mark" <mark@tmtlabs.com>
To: "Aaron Schnittger" <aschnittger@mbari.org>, "Phil Gibson" <phil@tmtlabs.com>
Cc: "Aaron Micallef" <amicallef@mbari.org>, "Alana Sherman" <alana@mbari.org>, "Denis Klimov" <klimov@mbari.org>
Sent: Friday, May 10, 2024 7:58:38 AM
Subject: RE: Cable Termination for GeoSense OF Cable-RFQ

Good morning, Aaron.

I am back in California.

Did you set up a zoom meeting?

Thanks!

Mark E. Burgett
Senior Program Manager-Subsea Defense Systems

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From: Aaron Schnittger <aschnittger@mbari.org>
Sent: Tuesday, May 7, 2024 12:27 PM
To: Phil Gibson <phil@tmtlabs.com>; Mark Burgett <mark@tmtlabs.com>
Cc: Aaron Micallef <amicallef@mbari.org>; Alana Sherman <alana@mbari.org>; Denis Klimov <klimov@mbari.org>
Subject: Re: Cable Termination for GeoSense OF Cable-RFQ

Hello all,

It appears that we all are available to meet this Friday, May 10th around 10am.

Phil and Mark, Given that we will be discussing terminating an electronics frame to an armored cable the dynamic forces will be at play. I thought a zoom meeting might be most useful. This way, I can easily show you some models for a better visual understanding. However, if zoom isn't ideal, I can send you the information before hand and we can stick to the conference call.

Please let me know your preference.

Thanks,

Aaron Schnittger
Associate Engineer
Monterey Bay Aquarium Research Institute
Phone: (831)775-1765
Email: aschnittger@mbari.org

From: "Denis Klimov" <klimov@mbari.org>
To: "Aaron Micallef" <amicallef@mbari.org>
Cc: "Alana Sherman" <alana@mbari.org>, "Aaron Schnittger" <aschnittger@mbari.org>, "Paul McGill" <mcgill@mbari.org>, "Richard Henthorn" <henthorn@mbari.org>
Sent: Monday, May 6, 2024 8:50:08 PM
Subject: Re: Cable Termination for GeoSense OF Cable-RFQ

Count me in.

Denis Klimov

From: "Aaron Micallef" <amicallef@mbari.org>
To: "Alana Sherman" <alana@mbari.org>
Cc: "Aaron Schnittger" <aschnittger@mbari.org>, "Denis Klimov" <klimov@mbari.org>, "Paul McGill" <mcgill@mbari.org>, "Richard Henthorn" <henthorn@mbari.org>
Sent: Monday, May 6, 2024 8:26:00 PM
Subject: Re: Cable Termination for GeoSense OF Cable-RFQ

Thanks Aaron, I will be happy to join if it is during your morning.

Best wishes,

Aaron

From: "Alana Sherman" <alana@mbari.org>
To: "Aaron Schnittger" <aschnittger@mbari.org>
Cc: "Aaron Micallef" <amicallef@mbari.org>, "Denis Klimov" <klimov@mbari.org>, "Paul McGill" <mcgill@mbari.org>, "Richard Henthorn" <henthorn@mbari.org>
Sent: Monday, 6 May, 2024 19:18:27
Subject: Re: Cable Termination for GeoSense OF Cable-RFQ

I am interested in joining.
Sent from my iPhone

> On May 6, 2024, at 6:23 PM, Aaron Schnittger <aschnittger@mbari.org> wrote:
>
> Hi all,
>
> Phil from TMT is requesting a conference call. Next week is looking better for Phil and Mark to both attend and I am gauging interest from within our group. If any of you are interested let me know, I know Aaron M. will be out of town.
>
> Talk to you all tomorrow.
>
> Thanks,
>
> _____
> Aaron Schnittger
> Associate Engineer
> Monterey Bay Aquarium Research Institute
> Phone: (831)775-1765
> Email: aschnittger@mbari.org
>
> ---
>
> **From:** "Phil Gibson" <phil@tmtlabs.com>
> **To:** "Aaron Schnittger" <aschnittger@mbari.org>, "Mark" <mark@tmtlabs.com>
> **Sent:** Monday, May 6, 2024 3:35:31 PM
> **Subject:** RE: Cable Termination for GeoSense OF Cable-RFQ
>
> Aaron,
>
> Thank you for sending the cable and termination drawings.
>
> I have some questions about the cable and the cable handling equipment. I think it would be best to have a conference call to discuss the matter.
>
> As you know, Mark is on travel and will be out of town until Friday. I suggest we wait for his return.

I can be available on Friday after 10AM our time. Mark will let us know his availability.

Next week might be better.

Best regards,

Phil Gibson
President

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From: Aaron Schnittger <aschnittger@mbari.org>
Sent: Monday, May 6, 2024 1:48 PM
To: Mark Burgett <mark@tmtlabs.com>; Phil Gibson <phil@tmtlabs.com>
Subject: Cable Termination for GeoSense OF Cable-RFQ

Hello Mark and Phil,

My colleague, Francois Cazenaze forwarded your contact info regarding the termination of a steel armored fiber optic cable.

Here at MBARI we are developing a prototype for a portable Distributed Acoustic Sensing(DAS) system that can be deployed on the seafloor. During the experiment, we'll utilize 1 km of cable to monitor sedimentary flows on the seafloor. The cable requires a balance between sensitivity to capture the seismic and acoustic waves generated by these flows, and sufficient strength/weight to remain stable on the seafloor and to deploy/recover the instrument package. The ends of the cable will need to be terminated to the steel wire via speltzer sockets.

Our team has selected two potential cable designs from different vendors. While one option aligns with standard practices, the other is considered unique according to some of mbari's marine operations people that I have talked to and have extensive experience in deploying sub-sea cables and applications. I have attached cut sheets of the two cables under consideration along with a drawing of the speltzer socket that will terminate the cables ends.

We would appreciate any feedback that may have regarding the termination of these specific wire and wire rope configurations.

I look forward to discussing this upcoming project with you in more detail.

Kind regards,

_____

Aaron Schnittger
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Phone: (831)775-1765
Email: aschnittger@mbari.org