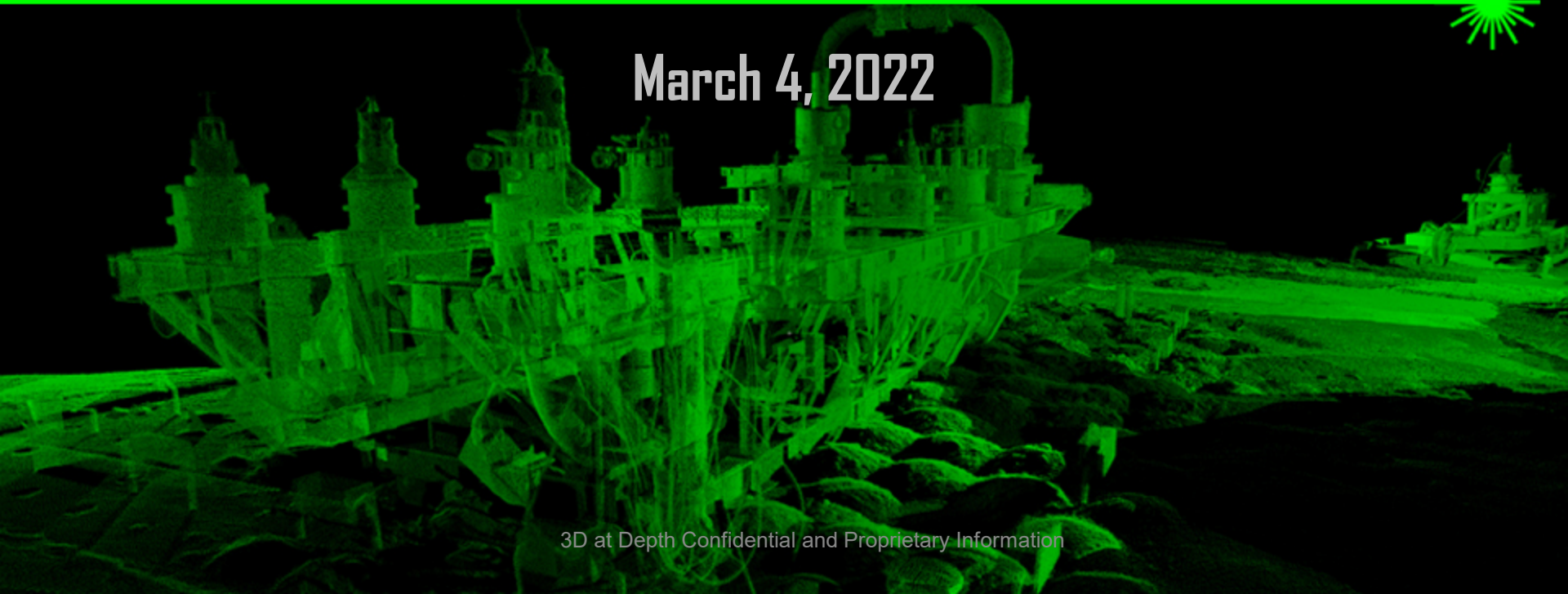


MBARI WIDE SWATH LIDAR G2 UPDATE

March 4, 2022

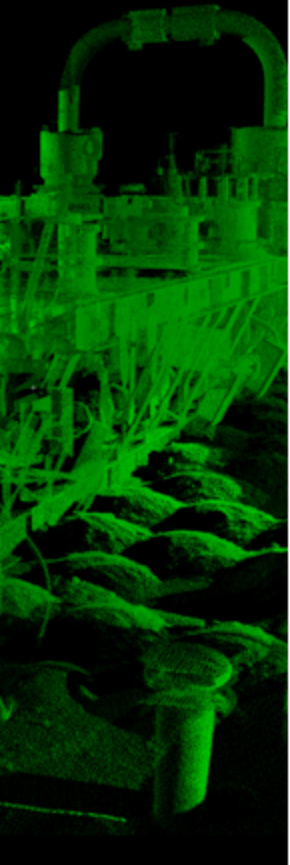




TOPICS



- Proprietary Information
- Requirements
- Point Spacing Calculations
- Design Architecture Goal
- Housing Initial Analysis
- Software CCI and Data Outputs
- MBARI input and feedback





PROPRIETARY INFORMATION



NOTICE: This presentation contains 3D at Depth Confidential and Proprietary information.

In order to better describe some of the design decisions and options, this presentation contains details about the internal architecture and design decisions for 3D at Depth's current 3D laser scanning products. Therefore, this information should ONLY be shared with MBARI employees who need to read and evaluate the presentation. 3D at Depth appreciates our customers taking the appropriate safety measures when distributing this information internally.





REQUIREMENTS – WISSL GEN 2



- Reference WiSSL Upgrades Wishlist_R1_1.PDF

Highlighted Requirements	Must	Goal
Depth Rating	4000m	
Size	< 20" diameter, < 3ft long	6.25" diameter, < 17.5" long
Field of View (FoV)	80°	100°
Range	1-meter to 7-meter NADIR, (10-meter LOS max)	1-meter to 7-meter NADIR, (11-meter LOS max)
Range Precision	Same as Gen 1	
Angular Accuracy	Same as Gen 1	
Electrical Interface	• 18-36VDC • Isolate all peripherals	
Timing Requirements	Same as Gen 1	
Software Interface	SL3 plus updates as defined in Documentation	
Scan Rate	< 1cm spacing at 0.5m/s. Current surveys at 3m altitude and 0.2m/s	< 9mm spacing at 0.5m/s at max altitude < 5mm spacing at 0.5m/s at 3m altitude
Temperature		-2.5° C to 350° C per pulse Precision: +/-1° C





POINT SPACING CALCULATIONS



Desired

FOV = 100°

NADIR = 7 meter

Speed = 0.5m/s

Desired Point Spacing = 5mm

Calculations

LOS = 10.9m

Swath = 16.7m

Number of points per Swath = 3,337

Number of Forward Track Points per Second = 100

Goal PRF = 350kHz

Given scanner implementation:

Forward Track Point Spacing = 5mm

Cross Track Point Spacing = 8.5mm at 7m altitude

Cross Track Point Spacing = 6.1mm at 5m altitude

Cross Track Point Spacing = 3.7mm at 3m altitude (could slow scan speed to match 5mm if desired)





DESIGN ARCHITECTURE GOAL



- Primary Design Goal
 - Single housing capable of full 100° FOV that includes both optical components and electronics This bottle connects to the ROV/AUV.
- ROV /AUV Connection: 1x 13 pin connector
 - 18 – 36 VDC (4 wire)
 - 10/100 TCP/IP Ethernet connection (2 twisted pair)
 - 1PPS Timing connection (1PPS twisted pair)
- NOTE: If can implement PTP timing then can switch to 1Gbps TCP/IP Ethernet connection with same connector



HOUSING INITIAL ANALYSIS





PHYSICAL CHARACTERISTICS



- * Estimated length: 17.5"
 - * Including endcaps
 - * May change (shorter or longer)
- * ID: 5.625"
- * OD: 6.25"
- * Wall thickness: 0.3125"
- * Material: TI-6AL-4V Grade 5
- * Window dimensions
 - * Thickness about 0.5 cm
 - * Arc length about 6.5"
 - * Width about 1.4"

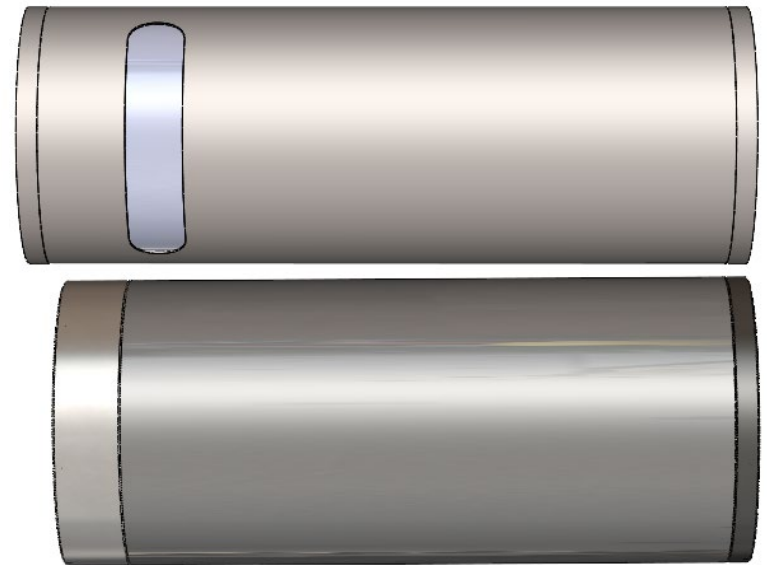




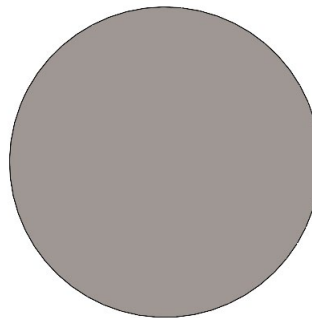
COMPARISON TO FIRST MBARI OPTICAL SENSOR



- ★ New sensor estimated to be longer but narrower and lighter
- ★ OD: 6.94" -> 6.25"
- ★ Length: 16.6" -> 17.5"
- ★ Housing mass: 42 -> 30 lbs.



Old



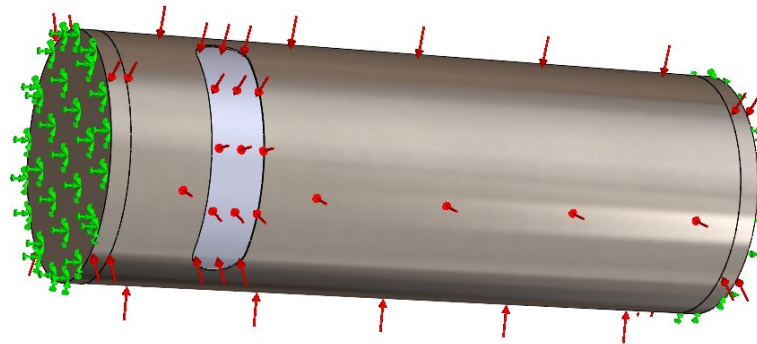
New



MECHANICAL ANALYSIS AT 4,600M



- * Analysis pressure
 - * 4,600m at 6,723 psi (15% margin)
- * Tube
 - * Factor of safety of buckling: 1.24
 - * Factor of safety of yield: 1.96
- * Tube and window deflections are at least as good as SL3 sensor and MBARI WiSSL Gen 1



SW CCI AND DATA OUTPUTS

Separate Document





MBARI FEEDBACK



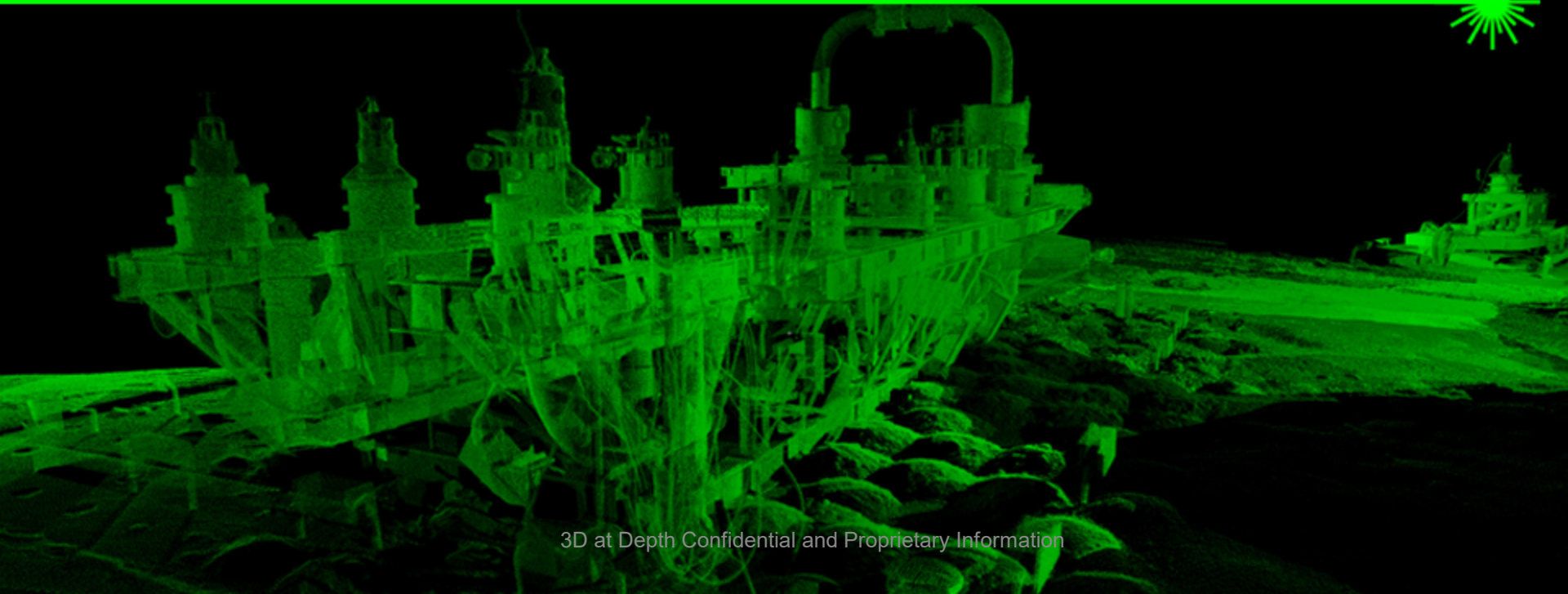
- Send step file of housing to Eric – Jeremy
- PPS to PTP conversion devices – send to Eric
- Eric send dimensions of MBARI pressure test vessel
- Move ahead with suggest Point Spacing design from slide 5

SW Topics

- Still need to decide 2 or 3 points
- Must be able to run on only 100Mb/s in case of network or vehicle issues
- Like the option to reduce number of returns or range bit resolution to reduce bandwidth requirements.
- Prefer to flag data as opposed to delete data. Can create our own definitions
- Add in the SW document that SL4 is Linux but RTV and 3D Collect are Windows based



3D at Depth



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