Who We Are and How We Add Value

"Coating Management & Afloat Repair Solutions for the Shipping Industry"

Subsea Global Solutions

Harun Duzgoren
Executive Director, Business Development & Strategy

Competency Delivered Underwater

Subsea Global Solutions History

SGS was…

A group of independent local diving companies operating since late 1970s, known as Miami Diver LLC, Miami Diver Panama, Miami Diver International (East Coast USA), Parker Diving Service LLC (West Coast USA).

SGS has become…

One of the world's leading commercial diving companies by consolidating under the **"Subsea Global Solutions"** brand in 2011 with 100+ divers.

All-Sea Group Acquisition…

A critical step towards becoming a truly global underwater services provider, this acquisition was completed in March 2017, adding further strength on our global foot print with new home stations in Canada, US, and South Korea, an enhanced diver / technician base (150+ divers), and an unparalleled technical capability to deliver turn-key repair solutions.

SGS will…

Continue to focus on developing new underwater technologies, adding value on its clients' operations and strive to be their "one source for global underwater solutions".

SGS Home Stations
SGS Vetted Partners
SGS Network Partner
Locations served in the Americas and Caribbean
• Miami
• Tampa / Port Canaveral
• Houston
• Long Beach
• Seattle
• New York
• Norfolk / Chesapeake Bay
• Vancouver (Canada)
• Halifax (Canada)
• St. John, Newbrunswick (Canada)
• Alaska
• Curacao
• Trinidad
• Kingston (Jamaica)
• Freeport (Bahamas)
• San Juan (Puerto Rico)
• Cozumel (Mexico)
• Barbados
• Panama
• Peru
• Brazil
• Uruguay
Locations served in Europe
• Rotterdam (Netherlands)
• Antwerp (Belgium)
• Malta
• Greece
• Canary Islands & Algeciras (Spain)
• Livorno & Civitavecchia (Italy)
Locations served in ME & Africa
• Cape Town & Durban (S Africa)
• Mozambique
• Egypt
• Ivory Coast
Locations served in Asia Pacific
• Sri Lanka
• Singapore
• Taiwan
• Qingdao, Dalian, Shekou (China)
• Hong Kong
• Busan (South Korea)
• Perth, Sydney & Melbourne (Australia)
• New Zealand

Diverse Service Range

- Fixed pricing for maintenance contracts
- Pre-planned underwater maintenance to ensure compliance with safety, international regulations, and local environmental regulations
- Yearly scheduling based on technical evaluation of efficiency reports and swim-out reports
- Dedicated Program Manager and point of contact
- Regularly scheduled technical review meetings

Hull Maintenance

- Hull Cleaning
- Coating Management
- Propeller Polishing
- In-Water Surveys
- Fleet Contracts
- Key Account Management

Underwater Repairs

- Tunnel Thruster Maintenance and Repairs
- Underwater Seal Replacement
- Rudder Repairs and Straightening
- Propeller Maintenance and Repairs
- Hull repairs (cracks , grounding)
- Class approved "A Class" wet welding
- Stabilizer fin Repairs and Extraction

- Propeller blade seal replacement / Blade Repair
- Gear Lash and gear inspections
- Shaft seal repair and replacement
- Complete thruster extraction
- Class approved Underwater Wet Welding
- Propeller blade seal replacement
- Propeller Blade straightening and repair
- Hydrodynamic Propeller Upgrades
- Propeller blade re-profiling
- EnergoProfin, PBCF and other finned Boss caps Installed
- Blohm and Voss, JMT, Deep Sea Seal, Cedervall and Manufacturer seal systems installed and serviced

- FPSOs
- Drill Ships
- Semi Submersibles
- Pipe Laying vessels and Barges
- Offshore Construction vessels
- Anchor Handlers
- Platform Supply Vessels
- Complete thruster extraction and installation
- Hyperbaric and Atmospheric cofferdam Thruster Repairs
- Wet Repairs as applicable

Support Services to Offshore Assets

- Retractable Azimuthing Thrusters
- Demountable Azimuthing Thrusters

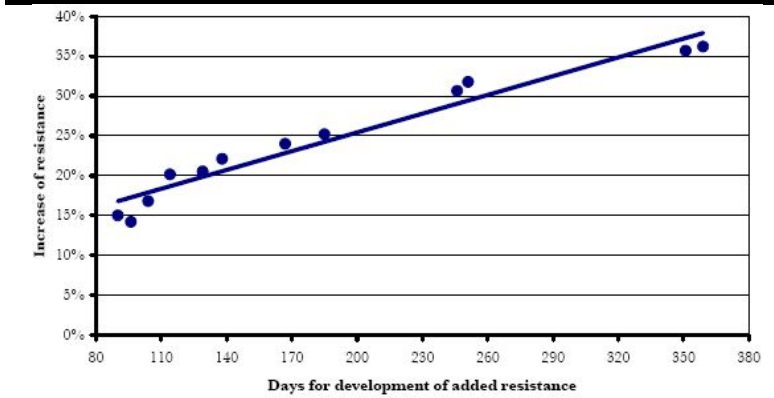
Marine Construction

- ICCP system installation (Impressed Current Cathodic Protection)
- Wood and Concrete Piling repair and installation
- Marine Construction of piers or wharfs
- Sheet wall repair and installation
- Underwater concrete pumping
- Water Jetting with High pressure systems

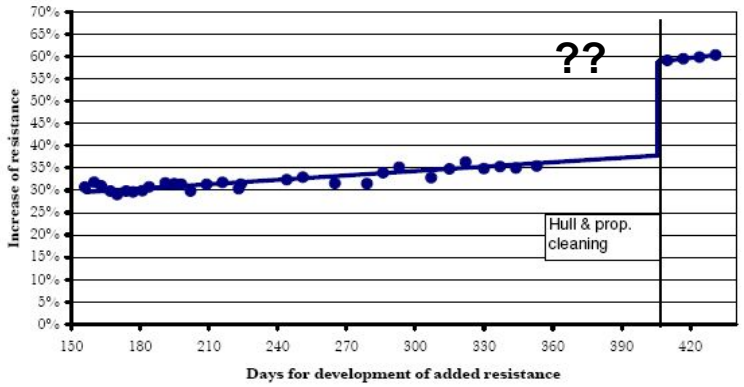
Our focus is to keep the vessels in service

Facts Regarding Hull Efficiency

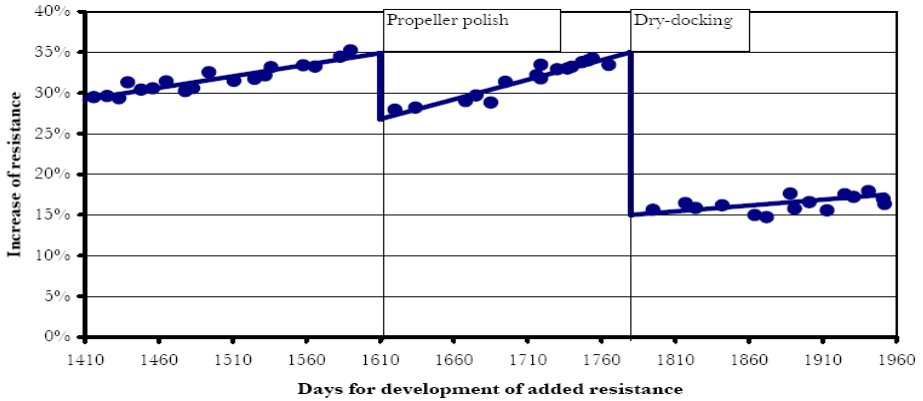
Typical added resistance development over time — Steep increase is due to fouling



Unknown Event — Propeller Coating peeling off after maintenance



Fluctuation in Added Resistance — Corresponding to maintenance carried out

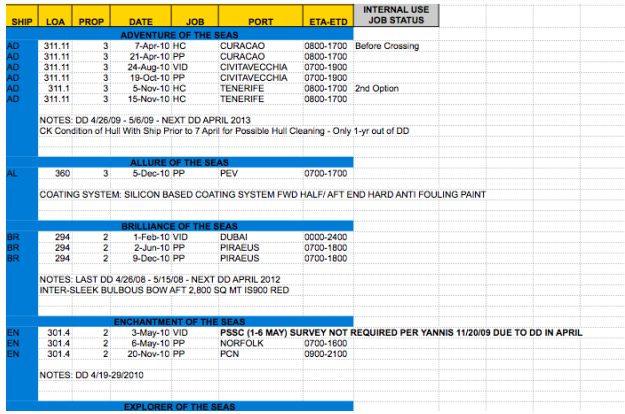


Proper fuel management protects the hull coating

Actual cruise vessel pictures in dry-dock. Hull coatings maintained even after 5 years of being under the SGS Fuel Management program.

- Planning is the Key
- Evaluate ship's itinerary, find the right ports of call for all Husbandry and inspection services.
- Schedule hull cleaning, propeller polishing and inspections in economical ports of call without delaying or changing a vessel's schedule.

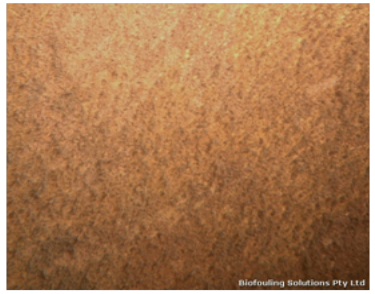
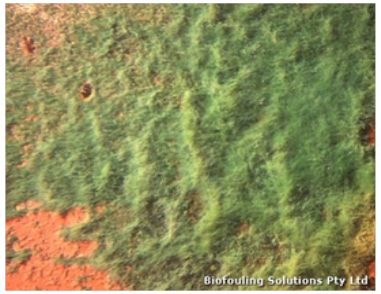
SHIP	LOA	PROP	DATE	JOB	PORT	ETA-ETD	INTERNAL USE JOB STATUS
ADVENTURE OF THE SEAS							
AD	311.11	3	7-Apr-10	HC	CURACAO	0800-1700	Before Crossing
AD	311.11	3	21-Apr-10	PP	CURACAO	0800-1700	
AD	311.11	3	24-Aug-10	VID	CIVITAVECCHIA	0700-1900	
AD	311.11	3	19-Oct-10	PP	CIVITAVECCHIA	0700-1900	
AD	311.1	3	5-Nov-10	HC	TENERIFE	0800-1700	2nd Option
AD	311.11	3	15-Nov-10	HC	TENERIFE	0800-1700	
NOTES: DD 4/26/09 - 5/6/09 - NEXT DD APRIL 2013							
CK Condition of Hull With Ship Prior to 7 April for Possible Hull Cleaning - Only 1-yr out of DD							
ALLURE OF THE SEAS							
AL	360	3	5-Dec-10	PP	PEV	0700-1700	
COATING SYSTEM: SILICON BASED COATING SYSTEM FWD HALF/ AFT END HARD ANTI FOULING PAINT							
BRILLIANCE OF THE SEAS							
BR	294	2	1-Feb-10	VID	DUBAI	0000-2400	
BR	294	2	2-Jun-10	PP	PIRAEUS	0700-1800	
BR	294	2	9-Dec-10	PP	PIRAEUS	0700-1800	
NOTES: LAST DD 4/26/08 - 5/15/08 - NEXT DD APRIL 2012							
INTER-SLEEK BULBOUS BOW AFT 2,800 SQ MT IS900 RED							
ENCHANTMENT OF THE SEAS							
EN	301.4	2	3-May-10	VID	PSSC (1-6 MAY) SURVEY NOT REQUIRED PER YANNIS 11/20/09 DUE TO DD IN APRIL		
EN	301.4	2	6-May-10	PP	NORFOLK	0700-1600	
EN	301.4	2	20-Nov-10	PP	PCN	0900-2100	
NOTES: DD 4/19-29/2010							
EXPLORER OF THE SEAS							

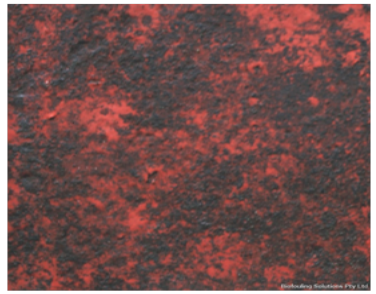


Less than 2% of the coating is replaced during the scheduled dry docking

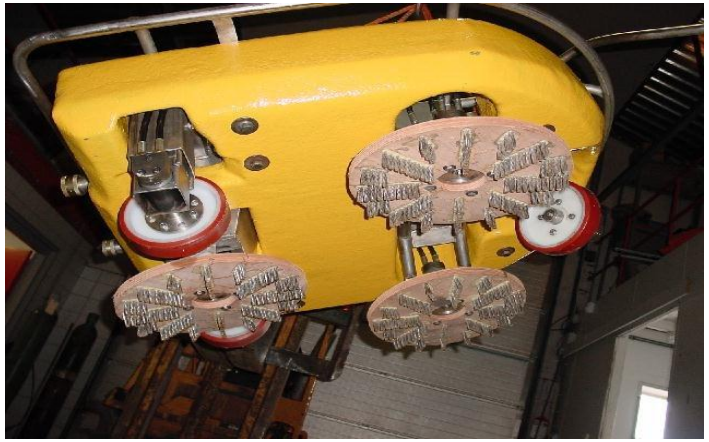
MINIMIZES OFF HIRE TIME
BRINGS PEACE OF MIND

Cleaning stages – Use of appropriate equipment

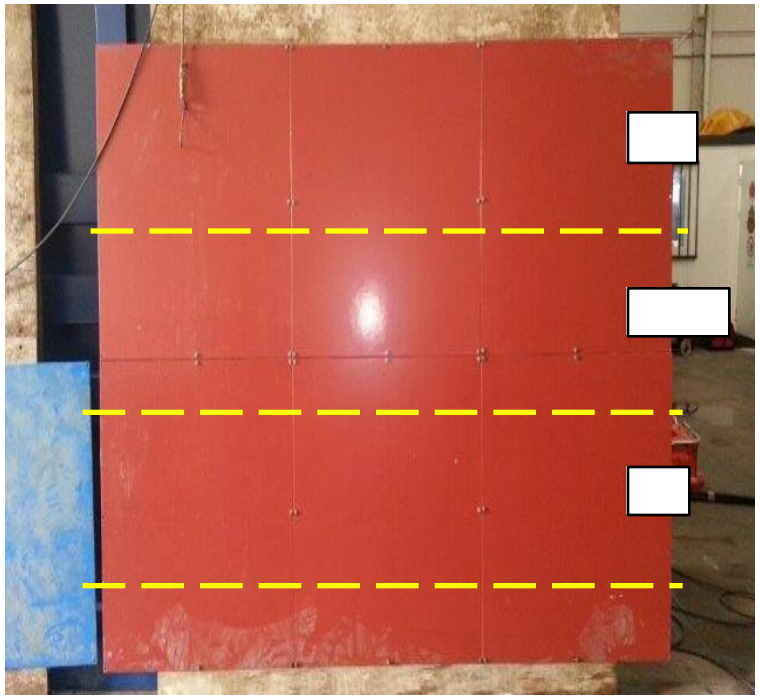



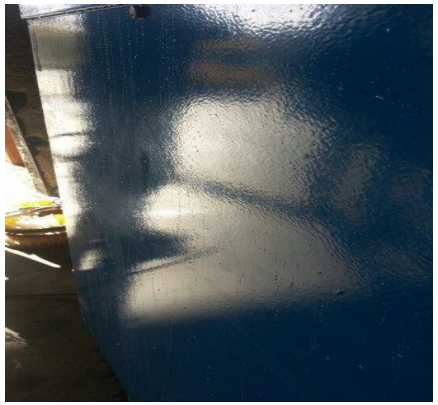


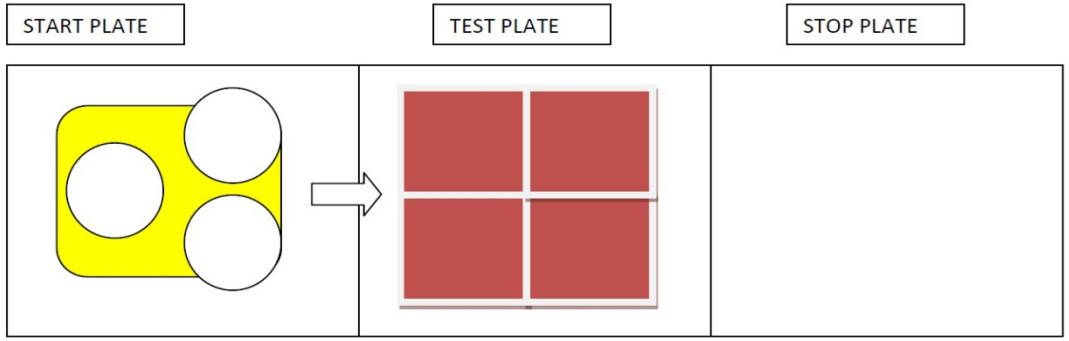
- Brushes used are an integral part of our advanced hull maintenance system.
- The nylon brushes are fitted to the machine to create the required water vortex friction needed to The nylon brushes are fitted to the machine to create the required water vortex friction needed to remove the slime on most coatings.



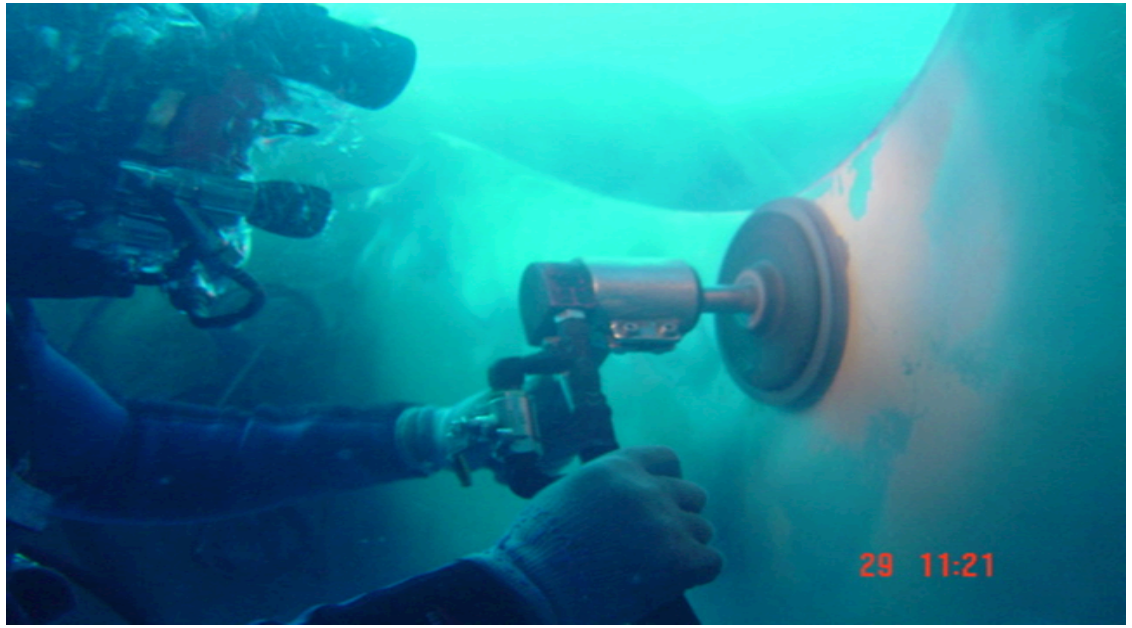
Our R&D department is currently testing together with International Paint, Hempel and Jotun in Spain, LA and Miami





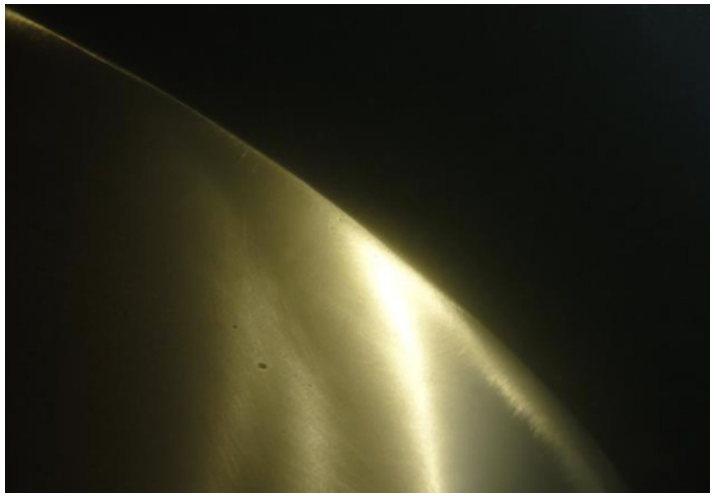


Propeller Polishing vs Propeller Cleaning

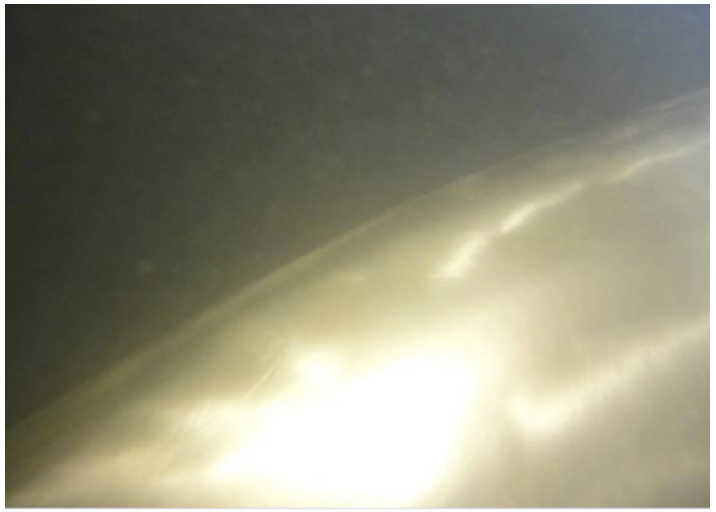


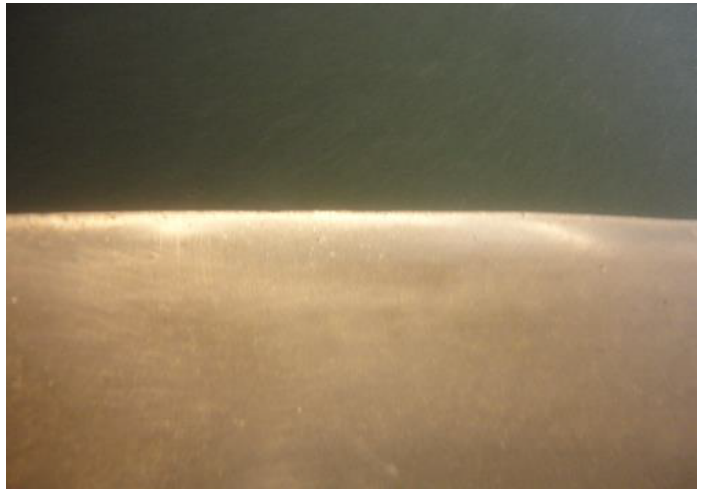
- Propeller Polishing performed in various ports of call simultaneously while cargo is performed.
- Micro polish system employed to exceed Rubert "A" criterion
- Full Swim out for identification and planning for other "in-water" defects to be repaired while vessel remains in service

Multi-stage propeller polishing

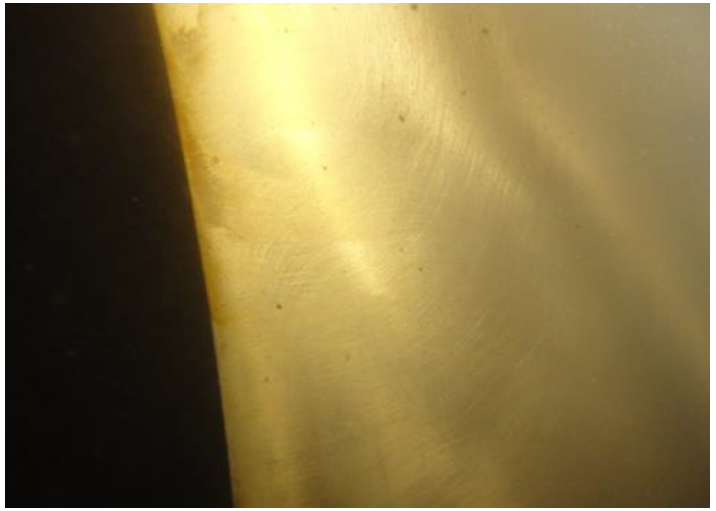


Actual in-service propeller
on vessel in SGS Hull and Propeller maintenance program





Same propellers after six months of operation -
Light tarnish only



Independent performance testing carried out by Wartsila

A CPP Ni-AL Bronze propeller blade and required surface roughness measurement equipment borrowed from Wartsila Propulsion.

Measurements were taken before, during & after in-water polishing was done.

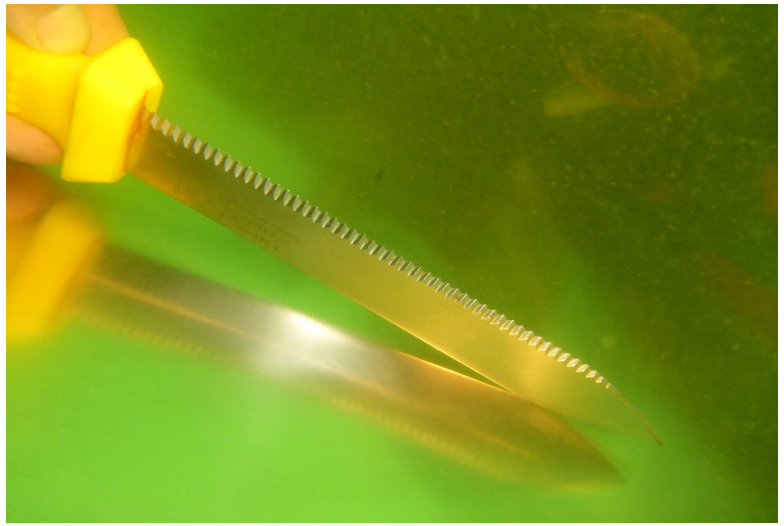
Different Propellers of different degrees of initial roughness were tested. All with excellent results. 0.1 Ra (µm) at some locations!

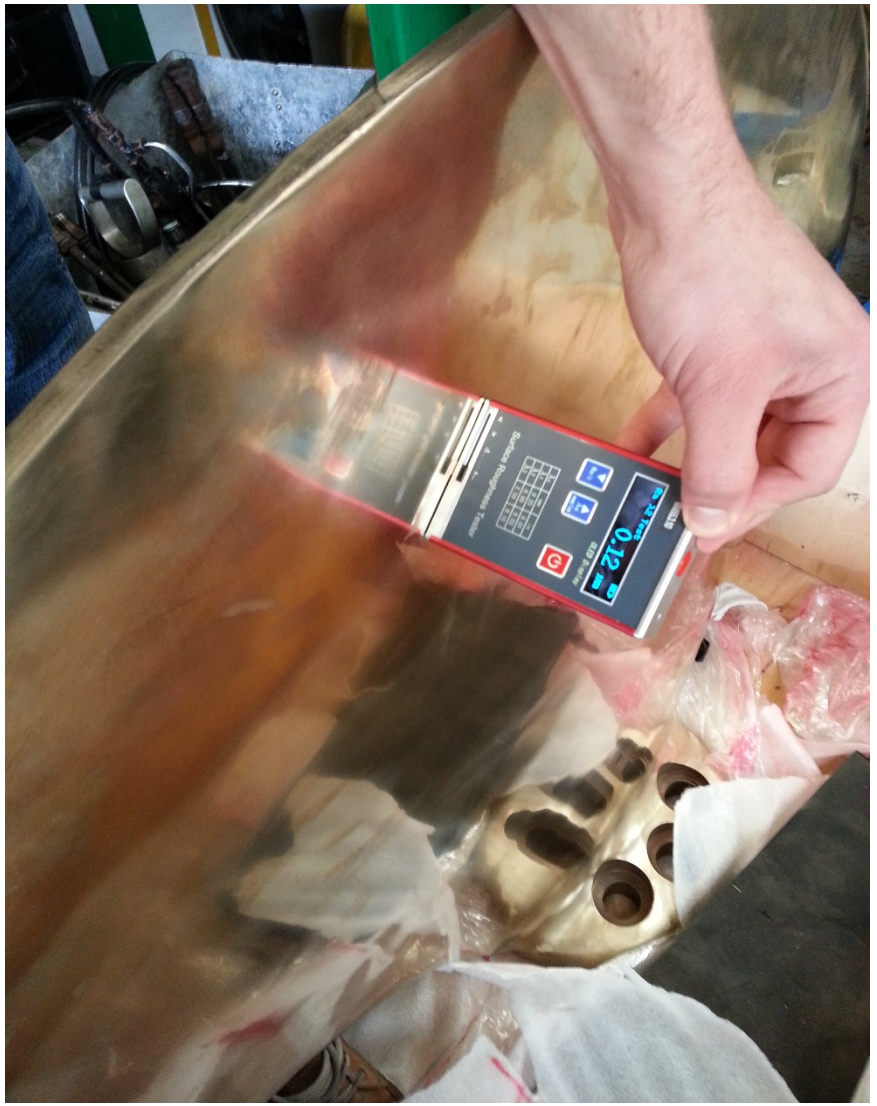
Actual underwater visuals

Subsea Global Solutions achieved a FAR BETTER result than required by Rubert "A+" with the SGS Multi-stage polishing process

Once a propeller is conditioned using the SGS Multi-stage polishing process, the condition of the propeller service can be easily maintained

In-Water propeller polishing achieves a far better result than propeller polishing performed in the dry dock or in a work shop condition.

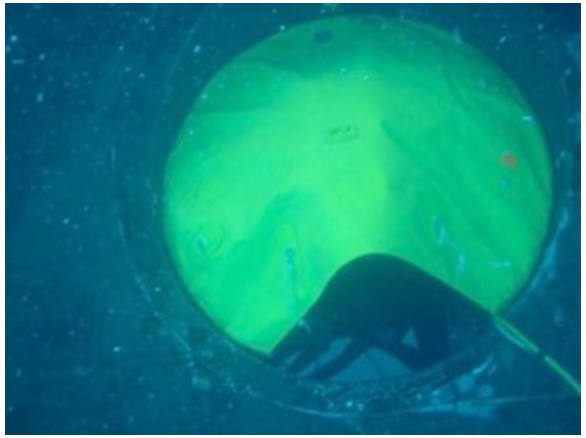




Engineered Solutions - Flexible Hyperbaric Tunnel Thruster Repairs

- Fast, Safe and reliable. Work done in accordance to OEM specifications in dry, environmentally controlled environment.
- Flexible systems for easy transport on standard commercial cargo aircraft

Weld screw dogs with “A” class wet welding process

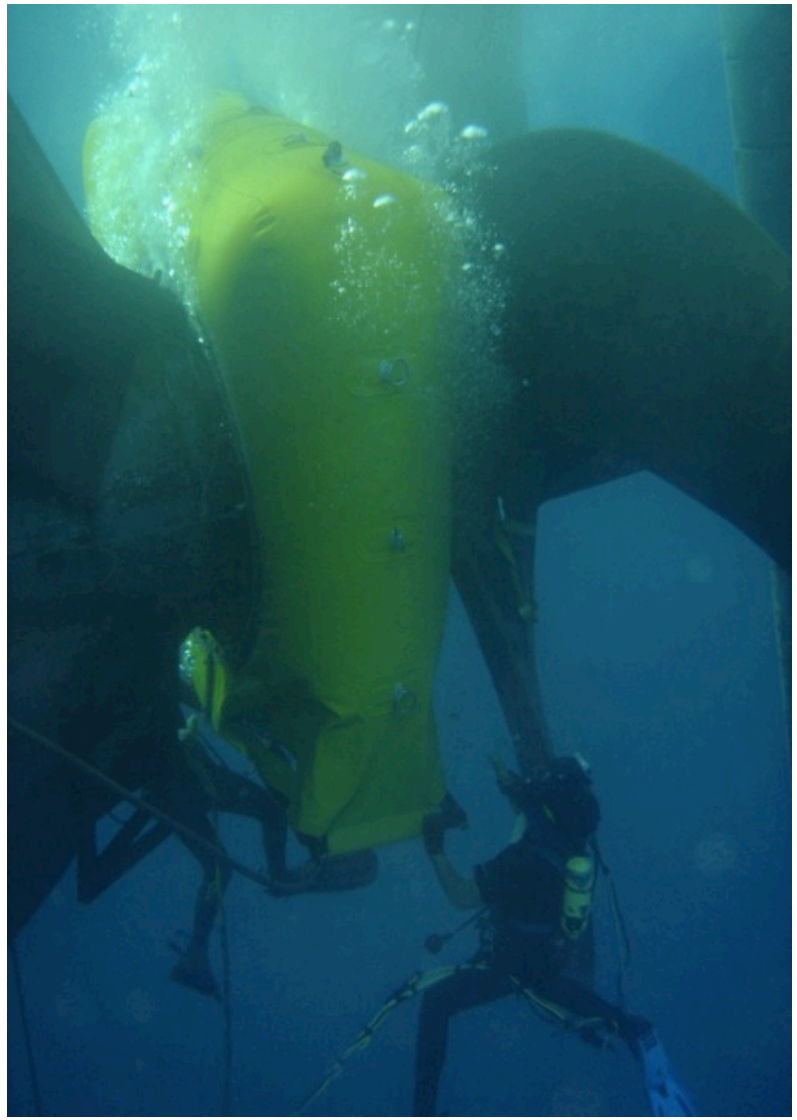


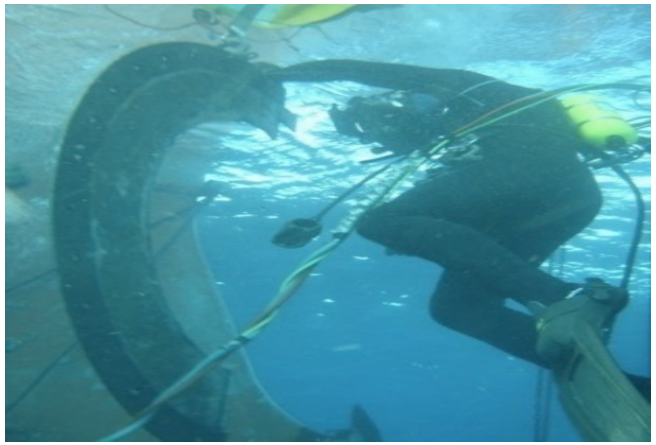
Install flex doors and de-water space to create dry working space

Perform required repair in a dry environment

Swing up thruster repair

Engineered Solutions– Aft Stern Seals and Main Propeller Shafts

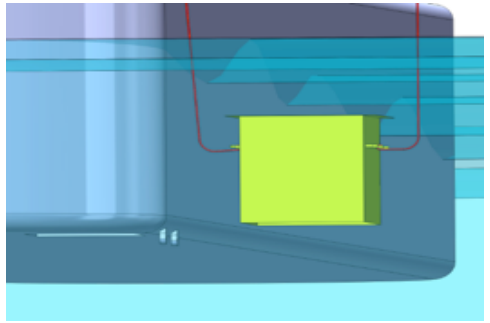




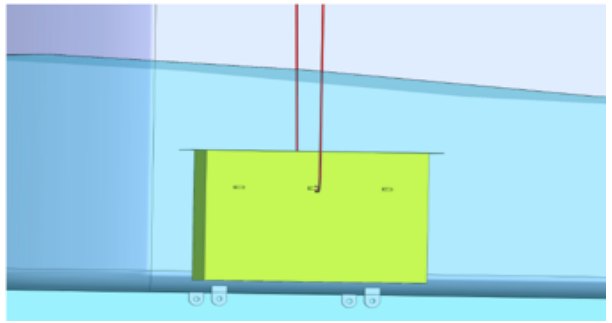
- Bonding new seal rings, removal or installation of spacer rings, and even complete replacements.
- Diver/technicians trained and certified by Major OEM's for seal bonding.
- Class Approved repair process- just like being done in Dry dock!
- Fast Response- Entire system, including electrical powered diving support equipment, shipped anywhere required by air cargo with only a few hours notice.

Hundreds performed to date with no incident of recorded failure

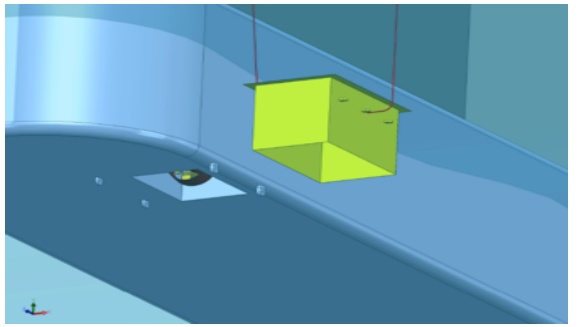
Engineered Solutions– Portable Hard sided Hyperbaric Cofferdam Systems



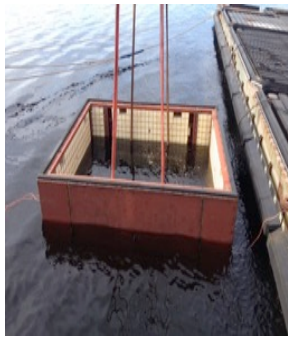
Lightweight, engineered Compact Hyperbaric Cofferdam

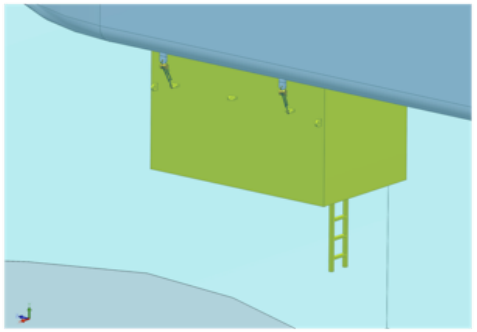


Hyperbaric Cofferdam is positioned into place around thruster and secured to semi pontoon by small welded pad eyes

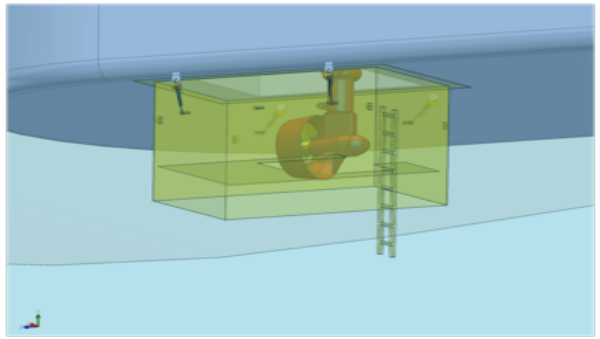


Hyperbaric Cofferdam designed to be floated from thruster to thruster once in the water

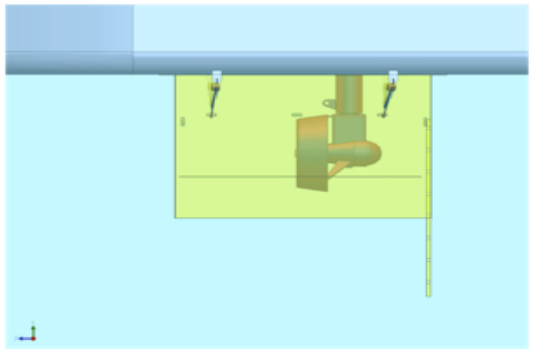




Bolt-on Adaption plates for different hull forms and curvatures with same basic box



Once floated into position secured with Chain blocks to welded pad eyes



Repair commences in controlled dry environment

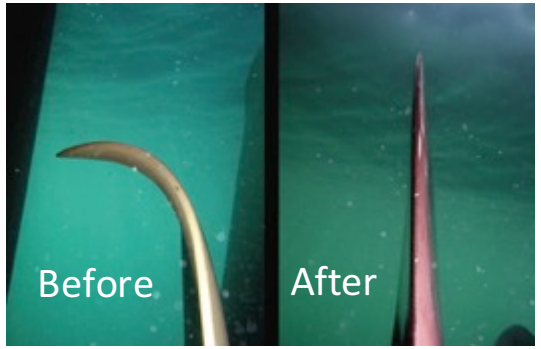
Engineered Solutions – Propeller Repair

Underwater Propeller Repair Services Include:

- Straightening large bends
- Removal of damaged blade sections
- Crack repair and propagation control
- Restoration of hydrodynamic edge contours
- Static balancing (calculations on-site)
- Hydrodynamic balancing (calculations on-site)
- Replacement of C.P. blades and blade seals

Design Modification Solutions

- Pitch and camber alterations
- Diameter and blade area reduction
- Correction of propeller induced engine overload
- Contour modification to eliminate cavitation
- Edge modification, including anti-singing edge correction



Class Approved permanent repairs

Large bends can be straightened underwater in hours; dockside or at anchor.

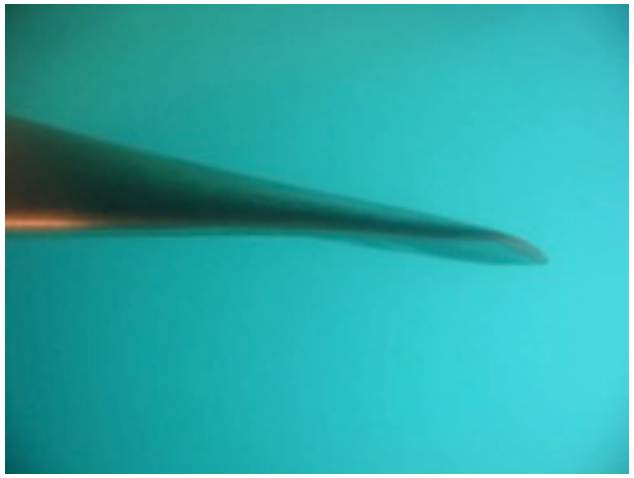
Fast Response- Straightening systems include cold straightening systems for smaller bends, designed to be small enough and light enough to be flown on commercial aircraft as luggage.

The full size systems for handling major deflections are designed and packaged for swift worldwide mobilization by air cargo.

Engineered Solutions – Propeller Repair

Before

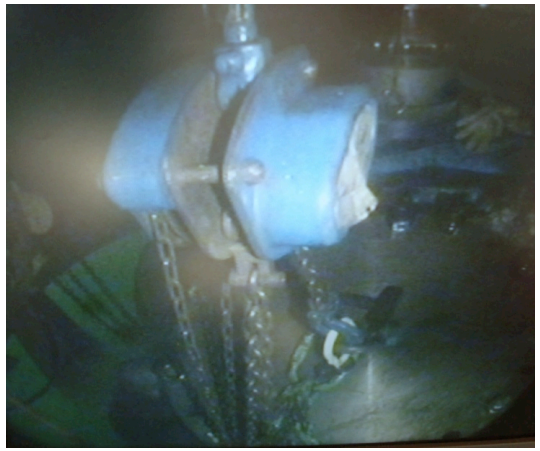
Cruise ship crippled by log damage. Vibrations & speed loss, caused by bends nearly 1 meter deep, threatened to cancel itinerary.



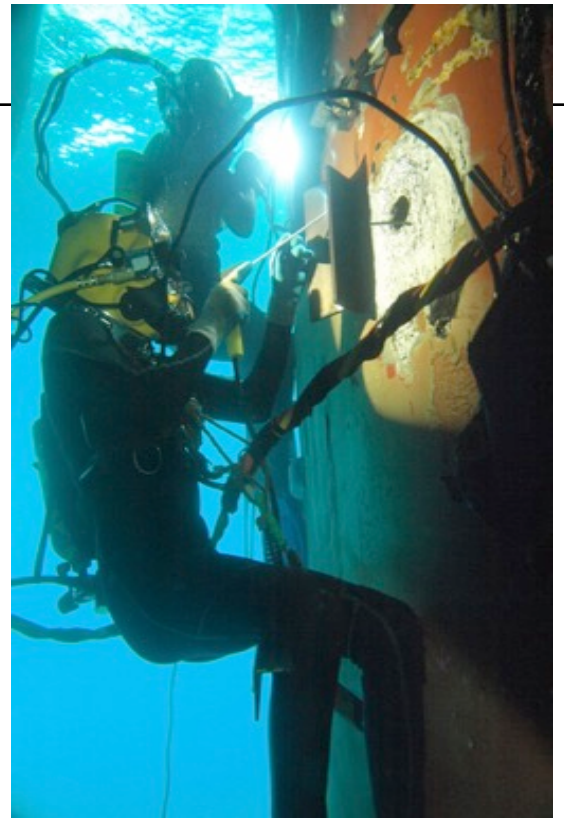
After

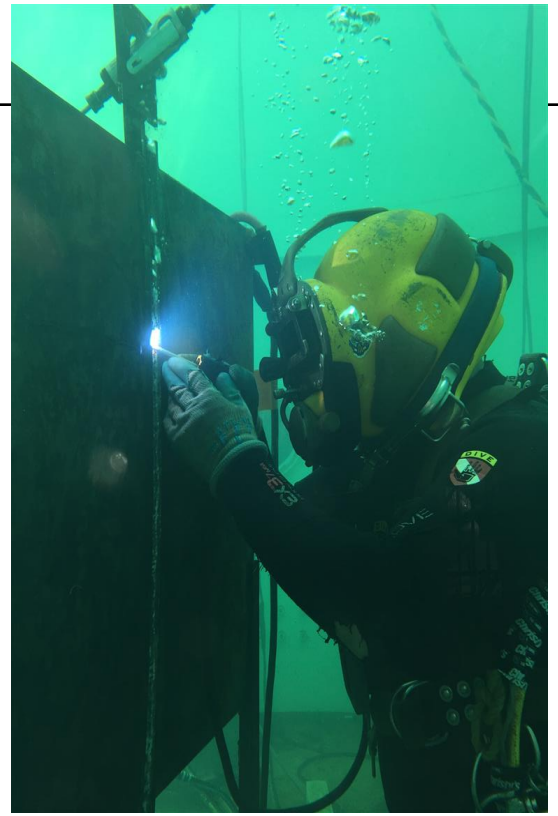
In brief "tide window" Propeller Technicians repaired majority of damage. Vessel speed restored, vibrations eliminated & itinerary maintained.

Engineered Solutions – Retractable Azimuthing thruster repairs



- OEM approved Thruster repair done in the retraction column without the need any cofferdam- GABON WEST AFRICA
- Complete lower unit extracted for topside repair performed by OEM Service team
- Performed pier side in Africa with no shipyard support!

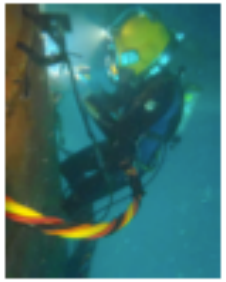




Permanent underwater wet welding repairs approved by DNV GL

02.09.2016 Adams, Simon

DNV GL and Subsea Global Solutions LLC. are proud to announce that they have completed an extensive joint research and development program, that will allow permanent repairs to be carried out by underwater wet welding on certain areas of vessels. Subsea Global Solutions' global network of coded welder divers will be available to perform these permanent repairs on a case by case basis utilizing this procedure in suitable locations throughout the world in accordance with the approvals given by DNV GL.



Underwater wet welding

Over the last two and a half years, Subsea Global Solutions welded in excess of 80 groove weld test plates underwater at depth in their training facilities in Miami, Florida, Long Beach, California and Terneuzen, the Netherlands. The non-destructive and mechanical testing of the plates was performed at the DNV GL lab in Hamburg, Germany. All data collected was shared between SGS and DNV GL during this procedure development program.

At the End of April 2014, test plates were welded in the training tank in Miami Florida, with a DNV GL welding engineer in attendance. The non-destructive and destructive testing was again performed at the DNV GL lab in Hamburg. Welding of the plates as well as non-destructive and destructive testing was performed in accordance with AWS D3.6M:2010 Class A. The results of the non-destructive and destructive testing were very positive with all welded test plates exhibiting metallurgical properties equivalent to permanent weld repairs performed "top-side" dry.

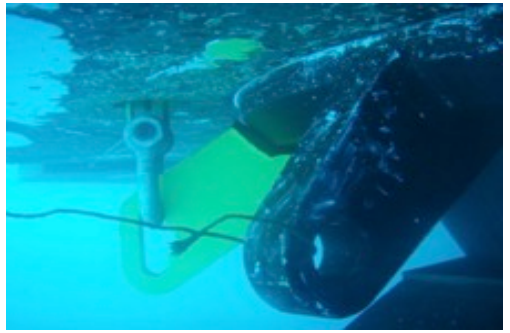
DNV GL is pleased to announce that during the SMM in Hamburg, Subsea Global Solutions representatives Rick Shilling (Executive Vice President),

Structural, Marine, and Weld / Underwater Welding Engineers / Experts on Staff and Retainer

Installation specific Repair Procedures developed submitted to class and Original Equipment Manufacturers for review and APPROVED before repairs are started.

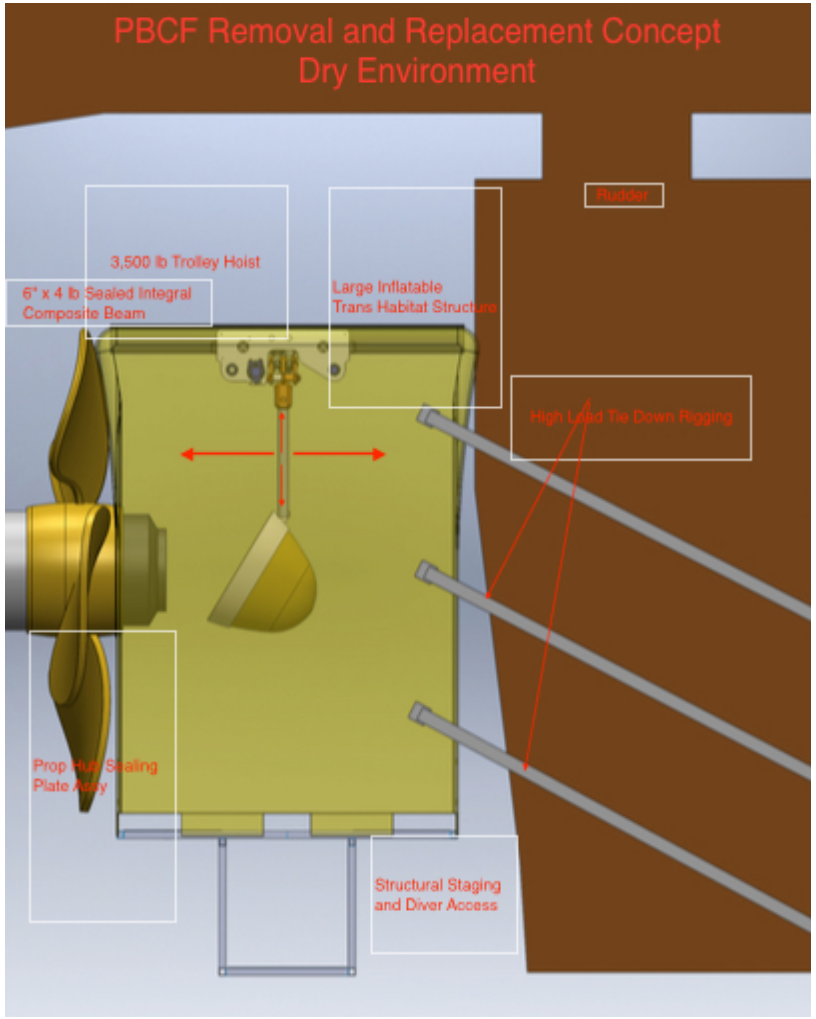
Engineered Solutions
Class Approved Wet Welding

Engineered Solutions – Strand Jacks Demountable Azimuthing Thrusters

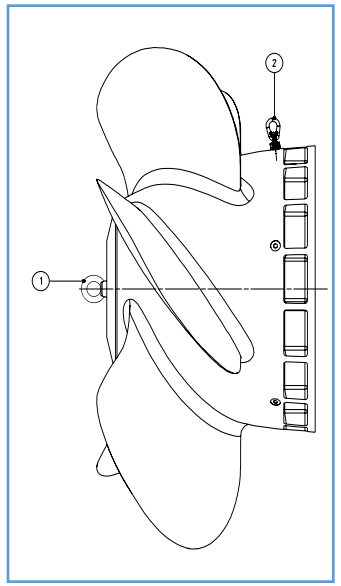


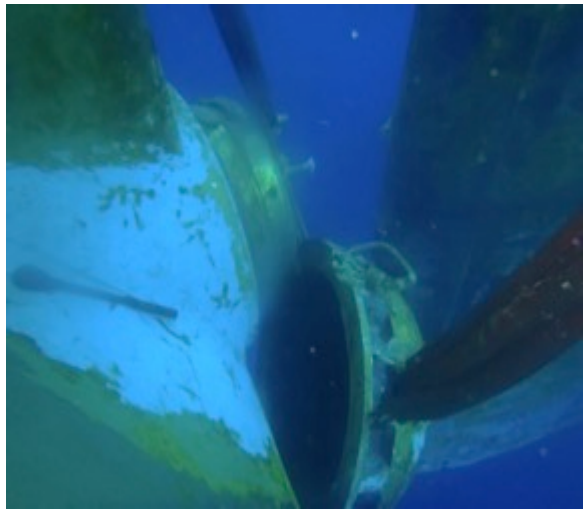
Subsea Global Solutions performs removal and installation of all azimuthing thrusters on board the rigs **with conventional thruster exchange procedures.**

Engineered Solutions– Finned Propeller Cap Installation



- Safely remove existing propeller boss cap and rig to surface
- Safely rig the finned propeller cap unit underwater and prepare it for installation
- Properly align and install the new unit on to the Propeller
- Dewater the finned cap and fill inside with OEM provided grease.
- Use underwater epoxy to fair in Fitting bolt holes. Complete work.





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