DeepStar activities and expectations for Japanese companies

The Nippon Foundation - DeepStar MoU Signing Ceremony – 2021

The Nippon Foundation International Seminar – 2021





DeepStar® Global Offshore Technology Development Consortium 30 Years of Industry Excellence

DeepStar 2021 Model

DeepStar Recruiting Members for DeepStar 2021

DeepStar is the industry's longest running and most successful offshore technology development consortium and it has generated significant value by providing technology transfer to its members and the industry. There is an increased need in the industry for an operatordriven, collaborative technology development program.

DeepStar[®] Core + Satellite Model

Core Program

DeepStar CORE Program focuses on all members' common collaborative technology needs; discusses industry technology issues and develops ideas for larger, elective satellite projects.

Satellite Projects

Focuses on elective Satellite Projects in which the technology advancement is aided by collaborative among interested parties.

2021 Core Members

Cherron

Potential Participants

Aker BP

Apache

Aramco

Potential

Pote





DeepStar® Technical Subcommittees:

- Drilling, Completion and Intervention
 - Dissolvable Drilling Materials
 - Drilling Operations, Monitoring ESPs
 - Surface Controlled Subsurface Safety Vales

Flow Assurance

- Asphaltene Deposition Remediation
- Enhanced Flowback Technology
- Gas Hydrates Plug Remediation
- Hydrate Agglomeration in High Salinity
- Hydrate Formation During Cold Restart

Subsea Systems Engineering

- Subsea Large Particle Detector
- Dewatering method for deepwater
- Subsea Electrical Fail-Safe Valves
- Subsea WiFi Systems

• Floating Systems & Met-Ocean

- Acid Gas Removal and Reinjection
- Accurate and Reliable Surface Measurement
- Fiber-Rope for Top & Mudline Mooring
- Flow Induced Vibration
- Improving Mooring Integrity
- Integrity Management
- Real-time Surface Current Measurements
- Autonomous Operations
 - · Management of safety devices in NUF
 - Automation FPSO Process and Machinery
- Green House Gas Emissions / Carbon Abatement
 - Related techs including renewables

Potential Technical Subcommittees

- Geoscience
- Reservoir

DeepStar Membership Fee

- Core Member (\$100,000 annual)
- Associate Member (\$15,000 annual)

Visit www.thedeepstar.com Contact DeepStar Director Shak Shamshy shakir@chevron.com or DeepStar Program Manager Joe Gomes joe@theooc.us

Tullow Oil

Present DeepStar Members



DeepStar Associate Members & Contractors

Aker Solutions	ALTISS Technologies	AMOG Consulting
Baker Hughes A GE Company	Colorado School of Mines	Daido Steel Co.
Det Norske Veritas	FSubsea	Genesis / TechnipFMC
Halliburton	JGC Holding Corporation	JETRO
Mitsubishi Heavy Industries	Nagano Keiki	Nissan Chemical Corporation
Ocean Power	OTM Consulting	Reaction 35 LLC
Rice University	SAIPEM	SBM Offshore
Schlumberger	Shimadzu Corp	Spire Engineering
SOFEC	Stress Engineering	Strohm
Subsea 7	Tridiagonal Solutions	Veros Systems
Yokogawa Electric	University of Tulsa	

DeepStar[®] 2021 Board & Management Structure



DeepStar Program Framework



Core Program

- Funded with membership fees from core members, associated members, admin fees from Satellite program and Partnership program
- Focused on small projects and multiphase projects on common industry needs
- Set to develop ideas for Satellite program
- Core members can participate in Satellite projects with only 10% project admin fee
- Proposal due date: May 31, 2021



Satellite Program

- Satellite projects are funded with separate cash calls from the project participants (mainly operator companies)
- A Satellite project must be led by at least one DeepStar Core operator company
- Non-DeepStar members/operators can participate in any Satellite project with 35% project admin fee
- Two participants can start a Satellite project
- Proposal due date: anytime

DeepStar Program Framework (cont.)



Partnership Program Nippon Foundation (NF) DeepStar Partnership (connected to Core Program)

- Projects are funded with financial support from the Nippon Foundation (80%) & Japanese vendors (20%); and guided with technical support from DeepStar core operators
- Proposals are evaluated, reviewed, and selected by DeepStar; and approved by NF
- Projects are managed by DeepStar (guided by DeepStar champions & chairs)
- DeepStar Core members can access to NF DeepStar partnership projects without additional cost reports/deliverables are shared with all DeepStar Core members
- Project contractors/vendors are Japanese companies or other companies collaborated with Japanese companies
- Proposal submission time window for the next program: mid-Jan to Jan 31, 2022 (selected projects will start in June 2022)

DeepStar 2020/2021 Program Projects

(DeepStar Core Satellite projects)



Drilling, Completions & Intervention

- Topside Monitoring of Subsea Pump Systems
- Through Tubing Surface Controlled Subsurface Safety Valves (continues satellite project)

Fixed & Floating Offshore Production

- Database of Mooring Integrity Issue and Lesson Learned
- Management of Safety Devices in a NUF Environment
- Floating Production Normally Unattended Installation (NUI)



Flow Assurance

- Hydrate Formation and Transportability in Co2 Rich Systems
- Hairy-Nanoparticles to Prevent Asphaltene Deposition in the Near-Well Region
- Optimal facility operability envelope in erosion / corrosion environment

Subsea Systems Engineering

- Remote zero carbon power for electric subsea operations
- AUV Interface Standards Phase 3
- Application for Thermoplastic Composite Pipe in Deepwater
- Subsea Large Particle Detector
- AUV Collision De-Risking via Simulation
- 20Ksi systems validation project

NF DeepStar Partnership Projects (2020 – 2022)



Subsea Systems Engineering

Subsea Omni Directional Optical Wi-Fi System Demonstration of Layout Free & flexible Directional UOWC system

Autonomous Operations

- Reducing operational and capital risks through unified FPSO process & turbomachinery automation solution development
- Standardization of Inspection to Enable Digital Twin

Fixed Floating Offshore Production

- Acid Gas Removal (AGR) and Reinjection Project
- Flow-Induced Vibration Predicting Method Study for Subsea Flowlines/Risers



Flow Assurance

- NanoActive EFT (Enhanced Flowback Technology) for Offshore Application -Nissan Chemical Corporation
- Prevention and Remediation of Asphaltene Deposition and Hydrate Formation at Field Conditions -Assessment and Modeling

Drilling, Completions & Intervention ESP with Magnetic Drive System (MDS) for Deep WaterSurface Controlled Subsurface

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- Establishment of cost-effective monitoring method for HPHT reservoir and downhole by using P-T sensorequipped flowable ball
- Smart Dissolvable Plugged Nozzle Assemblies (DPNAs) to be Installed on Limited Entry Liners with Tracer -Release Capability for Extended Reach Deviated Wells

DeepStar 2021/2022 Program Projects

(DeepStar Core & Satellite projects)



Fixed Floating Offshore Production & Metocean

Brines

- Database of Mooring Integrity Iss PHASE 2
- Testing of Serpentina FPSO HMPE Mooring Ropes
- Qualification of Fiber Ropes to Replace Top Chain for Offshore Mooring
- Surface Current Imager Nowcast System (SCINS)



Flow Assurance

- Effect of JT cooling on hydrate formation and deposition mechanisms
- Large scale, multiphase flow wax deposition for crude oil systems -**UPDATED**

Autonomous Operations

- Management of Safety Devices in the NUF Environment Stage 2 Overpressure **Protection (PS**
- Management of Safety Devices in the NU - Stage 2 - Fire and C



Subsea Systems Engineering

- Applying Free Space Optics subsea wireless communication
- Barrier fluid-less subsea condensate pump
- Applications for Thermoplastic Composite Pipe in Deepwater
- Analysis of Reliability and Availability of Subsea Chemical Storage and **Distribution System**
- Gas/liquid separation at high pressure
- Pipeline Plug Phase II: Localization using Acoustics



Technology Service Providers:

Japanese technology companies and international technology companies



Nippon Foundation & DeepStar Partnership

Advisory Committee

DeepStar Core Members/Operators



(Chevron, Equinor, ExxonMobil, JX Nippon, Oxy/Anadarko, Petrobras, Shell, and TotalEnergies)

Projects in 2021

Second Call Phase 2 projects

- Prevention and Remediation of Asphaltene Deposition and Hydrate Formation at Field Conditions Assessment and Modeling (20122) – Yokogawa Electric Corp
- 2. Data Standardization Tool Development for Floating Facilities (20144) Mitsubishi Heavy Industries
- 3. Flow-Induced Vibration Study for Intelligent Production Integrity Operating Window (Ip-IOW) module (20143) Mitsubishi Heavy Industries
- 4. Reducing operational and capital risks through unified FPSO process & turbomachinery automation solution development (20142) Yokogawa Electric Corporation
- 5. Establishment of cost-effective monitoring method for HPHT reservoir and downhole by using P-T sensor equipped flowable ball (20152) Nagano Keiki Co
- 6. Smart Dissolvable Plugged Nozzle Assemblies (DPNAs) to be installed on Limited Entry Liners with Tracer Release Capability for Extended Reach Deviated Wells (20153) Daido Steel Co

First Call Phase 2 projects

- 1. ESP with Magnetic Drive System (MDS) for Deep Water (20151) Mitsubishi Heavy Industries
- 2. Acid Gas Removal (AGR) and Re-injection Project (20141) JGC Corp
- 3. Subsea Omni Directional Optical Wi-Fi System Demonstration of Layout Free & flexible Directional UOWC system (20133) Shimadzu Corp
- 4. nanoActive EFT (Enhanced Flowback Technology) for Offshore Application (20121) Nissan Chemical Corp

Nippon Foundation DeepStar Partnership Next Program (2022 - 2026)

Themes to be added

- 1. Geothermal generation by using high temperature in preserver (renewable energy)
- 2. Wind power/Ocean current power generation to supply offshore oil & gas production facilities (renewable)
- 3. Cost reduction technology for flammable gas removal and re injection at production facilities (global warming)
- 4. Establishment of oil spill drift forecast simulation method by using local ocean current monitoring by aerial drone (marine environment)
- 5. Hydrogen related technologies
- 6. Safety related techs including NUF (normally unattended facilities) and robotics
- 7. Water treatment related technologies

DeepStar expectations for Japanese companies

- 1. Communicate with the Nippon Foundation and DeepStar to understand general needs for proposals requested funding from the NF DeepStar Partnership Program.
- 2. Engage with DeepStar core members/operators to understand DeepStar operators' business and technical needs.
- 3. Find overlapped areas between the needs of DeepStar operators and the technical capabilities of Japanese companies.
- 4. Develop ideas for proposals in such overlapped areas a Japanese company can also work with another international tech company to jointly deliver a project.
- 5. Convince at least one technical representative from a DeepStar core member/operator to champion the idea to develop it into an official proposal.
- 6. Submit the one-pagers/proposals to the Nippon Foundation between mid-Jan and Jan 31, 2022.
- 7. Plan to attend the DeepStar Technology Symposium on May 6, 2022 (if possible).
- 8. Get ready to start the projects by June 2022 (if the proposals are approved).

DeepStar Contacts



General contacts

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