



for Nippon Scotland Joint Ocean Innovation Program

Development of Autonomous Maintenance Technologies Applying Technologies of Industrial Robot Arm

Kawasaki Heavy Industries, Ltd.

AUV Department

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AGENDA

■ Project background

■ Progress of the development (3rd year results)

- Verification on the operation of a prototype water pressure balanced motor under water pressure
- Modification of water pressure resistance motor
- Development of New robot arm with revised motor
- Modification of the ITU
- Development of the dedicated driver for water pressure balanced motor

■ Future Prospects of the Project

Project Background

Objective of the Project

The development of **autonomous maintenance technologies** applying the technologies of industrial robot arm.

Key technologies applied to the development

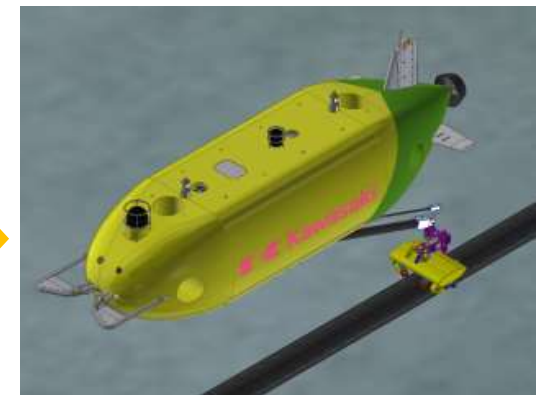
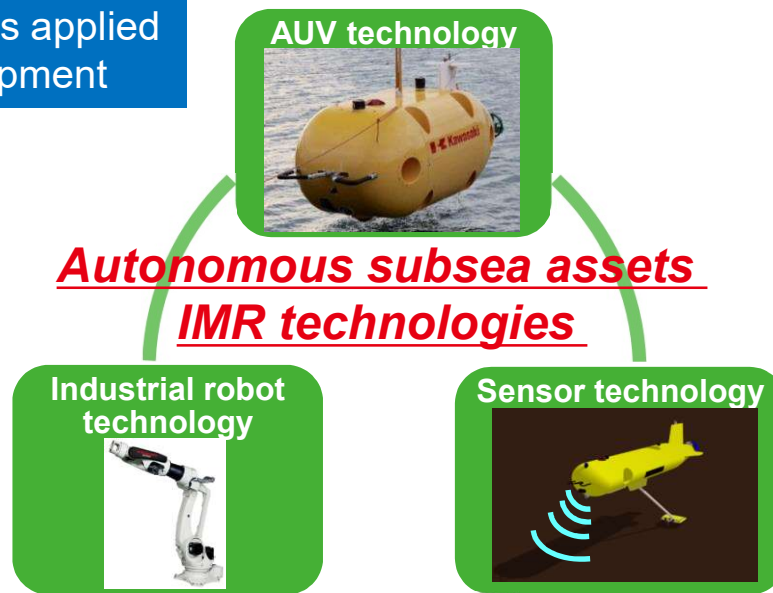
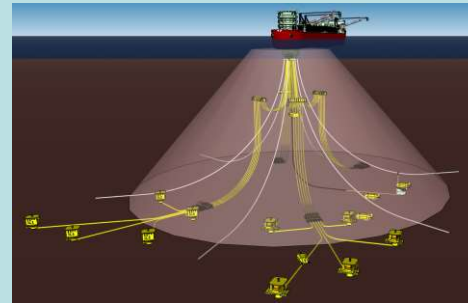


Image of subsea pipeline inspection with AUV

Project Background

Technology Application

- Subsea infrastructure inspection
- Inspection for decommissioning and continuous environmental research after decommissioning etc.



The development parties and their respective development role

	Japanese side	Scottish side
Key technologies	AUV & Robot arm	Sensor
Lead company	Kawasaki Heavy Industries Ltd.	Hydrason Solutions Limited
Partners	Kobe University	Heriot Watt University

Development Progress

- Verification on Pressure resistance of prototype pressure balanced motor -



KHI has conducted the operational test of the pressure balanced motor under high pressure which was developed in 2020.

Test details

- Pressure of 30MPa was applied.
- Under the pressure, the motor was repeatedly rotated in forward and reverse without load.



Test results

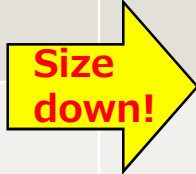
- The motor operated without any problem under the pressure.
- The mechanisms of seal and pressure equalization were well performed.

Development Progress

- Modification of water pressure resistance motor -



	Prototype	Revised
Diameter (max part)	Approx. Φ 250 mm	Approx. Φ 180 mm
Length (exclusive of output shaft)	Approx. 450 mm	Approx. 350 mm



Modified motor's rotation speed, torque and power consumption stay unchanged

KHI will carry out the performance test of the motor and the performance test integrated with robot controller on February 2021.

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