AutoMated Vessels and Supply Chain Optimisation for Sustainable Short SEa Shipping

D.3.2: Container Feeder Operation Simulation Results

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List of Abbreviations

abbreviation	description
AST	Advanced Shipping Technologies
CFD	Computational Fluid Dynamics
COLREGS	Convention on the International Regulations for Preventing Collisions at Sea
D3.2	Deliverable 3.2
DNV	Det Norske Veritas
DP	Dynamic Positioning
EC	European Commission
EGA	Effective Gravity Angle
FV	Feeder Vessel
IMO	International Maritime Organization
ISO	International Organization for Standardization
KPI	Key Performance Indicator
MARIN	Maritime Research Institute Netherlands
MoSCoW	Must have, Should have, Could have, Won't have (analysis method)
MSDV	Motion Sickness Dose Value
MSI	Motion Sickness Index
N.A.	not applicable
NATO	North Atlantic Treaty Organization
NTUA	National Technical University of Athens
OCIMF	Oil Companies International Marine Forum
PIANC	Permanent International Commission for Navigation Congresses
QTF	Quadratic Transfer Function
RAO	Response Amplitude Operator
RMS	Root Mean Squared
SGISC	Second Generation Intact Stability Criteria
SI	Success Indicator
STANAG	Standardization Agreement (NATO)
T3.2	Task 3.2
TEU	Twenty-foot Equivalent Unit
UML	Unified Modelling Language
WP	Work Package
XMF	eXtensible Modelling Framework

Executive Summary

This is the technical report for T3.2 “Feeder vessel simulation and autonomous operation investigation (M18-M24)”.

T3.2 was led by MARIN. The report D3.2 was prepared by MARIN, with various contributions from NTUA. In addition, technical discussions with NTUA, DANAOS, DNV and AST during project meetings are reflected in the contents of this report.

T3.2 will be used to demonstrate through simulations the innovative features of the developed feeder vessel concepts and assess the benefits of its potential autonomous operation within the context of the SSS part of the container supply chain through a final set of voyage/port entrance and mooring manoeuvre.

T3.2 will use the selected concept design from T3.1 and the autonomous mooring and remote-controlled port entrance functionality of the SSS feeder. For the latter it will lean on work performed already in the field of vessel autonomous navigation.

T3.2 will devise the conceptual set-up and interaction of the various planning levels and related systems needed to cope with the mid-term environment and voyage planning and the short-term track keeping, collision avoidance and close-in mooring planning.

The work will be conducted by using computer simulations and will use the voyage simulations framework used in T3.1 for both feeders to assess energy requirement vs schedule keeping. This task is the preparation and reference for the pilot demonstration in T7.3.

The results seem to justify the statement that the T3.2 objectives are achieved:

- Investigate, implement and test autonomous operation of the feeder vessel, using time-domain simulations, with a focus on mission execution.
- Demonstrate a complete roundtrip between a main port and a local port, using the implemented time-domain simulation models.
- Prepare the vehicle control and vessel autonomy for future use in the Pilot Demonstration 2 (T7.3), where the simulated container feeder vessel is replaced by a physical scale model of the ship.