

NOVIMAR and SciPPPer – Results of two Projects regarding the Automation of Inland Navigation

Dr. Alexander Lutz, Axel Lachmeyer ARPA seminar, Turku, 16th December 2021



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argonics GmbH

Vessel Train – Platooning in Inland and Short-sea Navigation





Areas of Interest

- Business concept of the vessel train
- Waterborne transport system
 - Composition & design of the vessel train
 - Navigating and manoeuvring the vessel train
 - Human factor
 - Waterway infrastructure and operations
 - Safety

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Rules and regulations



- ➤ Track and distance control
- ➤ Full-scale trial



Vessel Train: Basic Concept





Vessel Train: Basic Concept – Automatic Guidance





Vessel Train: Control Tasks – Lateral Control





Vessel Train: Control Tasks – Distance Control





Vessel Train: Control Tasks – Automatic Control





2-DOF Track Control of Leader and Follower Vessel



Based on argoTrackPilot by argonics



argoTrackPilot Performance Example







Cascaded Distance Control of Follower Vessel Speed Control Loop

speed setpoint





Cascaded Distance Control of Follower Vessel Speed Control Loop with RPM Feedforward





Cascaded Distance Control of Follower Vessel Distance Control Loop





Vessel Train: Communication





Test location: Haringvliet





Trials: 2 test runs on March 25th



From 10:50 to 12:38



Trials: 2 test runs on March 25th



From 13:55 to 14:38



Trials: Coupling at 8:53 GMT





Trials: Automatic Guidance





Trials: Automatic Guidance – Lateral Offset



Trials: Automatic Guidance – Lateral Offset











Trials: Assisted Guidance





Trials: Assisted Guidance – Lateral Offset





Trials: Assisted Guidance – Distance



Trials: Assisted Guidance – Distance



VESSELTRAIN

Trials: Assisted Guidance – Distance



VESSELTRAIN

Summary

- Coupling and uncoupling while sailing
- Automatic guidance
- Safety contours
- Assisted guidance
- Bridges
- 2 trips of 2 hours with almost no intervention
- Lateral offsets < 10m
- Maximum lateral offset 20m in tight turn
- Distance error between ships < 10m
- Distance error maximum 20m





Next up: SciPPPer

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