

1 AL

AUTONOMOUS TRANSPORT IN TRONDHEIMSFJORD Tuesday, May 8th 2018 -1-

Håvard Nordahl

Why and why not autonomous ships?



Why autonomous ships ?



Automate dirty, dangerous and dull



Defeat economy of scale



Lower emissions



Why not autonomous ships?



More complex ship systems



Unclear risk picture and higher safety requirements



Reliability



Shore control centre



More and automated shore infrastructure



Long time until international legislation is in place.



We need a sound business case!



Lower emissions



Improved operations







More complex ship systems









Shore Infrastructure

() SINTEF

Tailormade for the application – change the transport system

But with standardized ship systems



Ongoing autonomous ship projects

Yara Birkeland



- Yara fertilizer
- Kongsberg partner
- Replaces 40 000 truck trips a year



Yara Birkeland Operation



- Features
 - Batteries Fully electrical
 - 100-150 TEU
- Staged implementation
 - Manned after 1 year
 - Remote after 2 year
 - Autonomous after 3 year



Milli-Ampere – urban waterway

D NTNU Kunnskap for en bedre verden

> DITNU AMOS Centre for Autonomous Marine Operations and Systems



Linking center of Trondheim to seaside and rail station



Currently manned passenger ferry in Kristiansund Alternative to bridge



ASTAT – Autonmous ship transport at Trondheimsfjorden



Autonomous Ship Transport at Trondheimsfjorden (ASTAT)

- Short voyages
- Inland, sheltered
- 12-50 TEU
- Batteries
- Constrained autonomy



Case 1: Bulk transport inside fjord (Lumber)



- Alternative to truck
- Remove storage
- Reduce lifting
- Tailor made



Case 2: Seafood for airline export





Case 2: Seafood for airline export (or rail)



- Stowage in airline containers at packing site
- Fully automated transport from packing to airplane



Case 3: Feeder from main coastal fairway



- Avoids 5 hours sailing for liner ships
- Flexible
- May be able to use highway ferry quais
- Integrated with land autonomous transport

• Can call on all quais, also non-ISPS

() SINTEF

No international legislation – no problem!



Standardisation projects



OpenBridge



Associated partners



Co-funded by







Open Simulation Platform (OSP)



- Maritime model standard
- Open source simulation platform
- Main Partners: Rolls-Royce, NTNU, SINTEF and DNV-GL
- JIP: OSC, VARD, Kongsberg, Hyundai



Conclusions



- Autonomous ships should be tailor made for the specific transport system
 - But ship systems should be standardised
- When you start looking there are several possible business cases
- Autonomous ships is an important strategic area in Norway and SINTEF Ocean.





Technology for a better society