ON-DEMAND MANUFACTURING OF SPARE PARTS

WILHELMSEN'S APPROACH TO SOLVING SUPPLY CHAIN ISSUES FOR CUSTOMERS USING AM

One of the largest printable maritime & offshore spare parts catalogue in the world, with deep knowledge of certification and performance for on-demand production

A globally integrated delivery supply chain ecosystem that is financially and strategically attractive to manufacturing partners, OEMs and end users

Transacted through a secure digital warehouse and fabricator marketplace

Shaping the maritime industry

Maritime Services

New Energy

Strategic Holdings and Investments

Group competitive advantages:
- Solid reputation with strong financial position
- Sustainable operations with an unparalleled global network
- Industrial ownership and reliable partner

Group investment focus:
- Industrial platforms
- Sustainable products and services
- Global potential

7 AFFORDABLE AND CLEAN ENERGY
8 DECENT WORK AND ECONOMIC GROWTH
13 CLIMATE ACTION
14 LIFE BELOW WATER
16 PEACE, JUSTICE AND STRONG INSTITUTIONS
5 GENDER EQUALITY

Enabling sustainable global trade

Focusing on shipping, infrastructure, logistics and sustainable products and solutions

Creating profitable and sustainable operations through active ownership and strong governance

Leveraging our customer relationships, people and expertise, and the world's largest maritime network

Values: Teaming and collaboration • Learning and innovation • Customer centered • Empowerment • Stewardship

SINCE 2017, WILHELMSEN HAS BEEN EXPLORING AM TECHNOLOGY TO SOLVE SUPPLY CHAIN ISSUES FOR THE MARITIME INDUSTRY

Targeted supply chain issues ('Pain Points')

Long-lead time

Examples

IG Fan Impeller
Made to order w/ lead time 6-8 weeks

Water Cooling Pipe Connector
135 days lead time

Poor part performance

Examples

Fan Impeller
Frequent failure due to corrosion issues

Rubber Impeller
Frequent failure due to part deteriorating

Obsolete / Legacy parts

Examples

Gear wheel
Part not available in market

Side Thruster Propeller Blade
Low-volume part

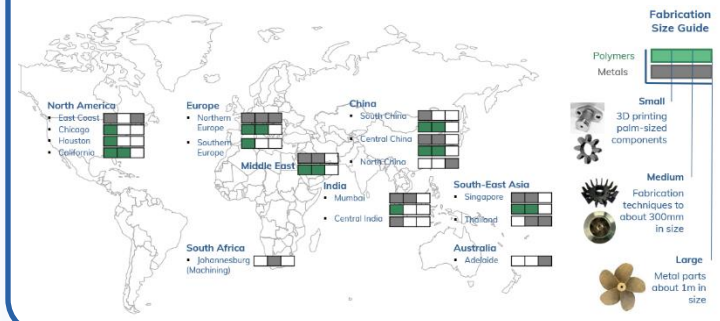
Customers

End Users

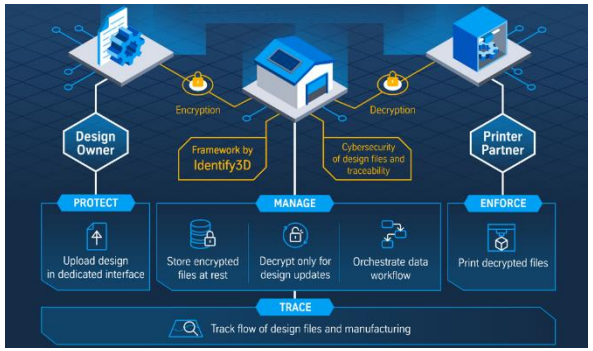
OEMs

WE HAVE DEVELOPED A BUSINESS MODEL WHICH ALLOWS US TO DELIVER SPARE PARTS ON DEMAND, SOLVING KEY PAIN POINTS

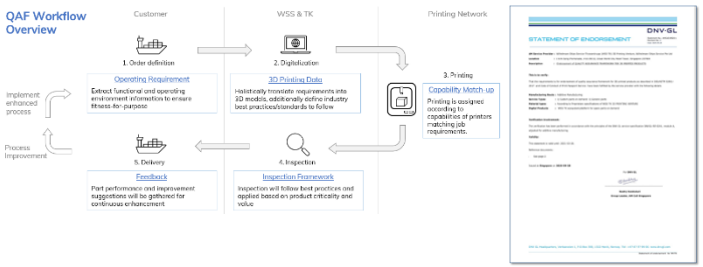
Global Manufacturing Network



Digital Platform



International Standards for AM parts

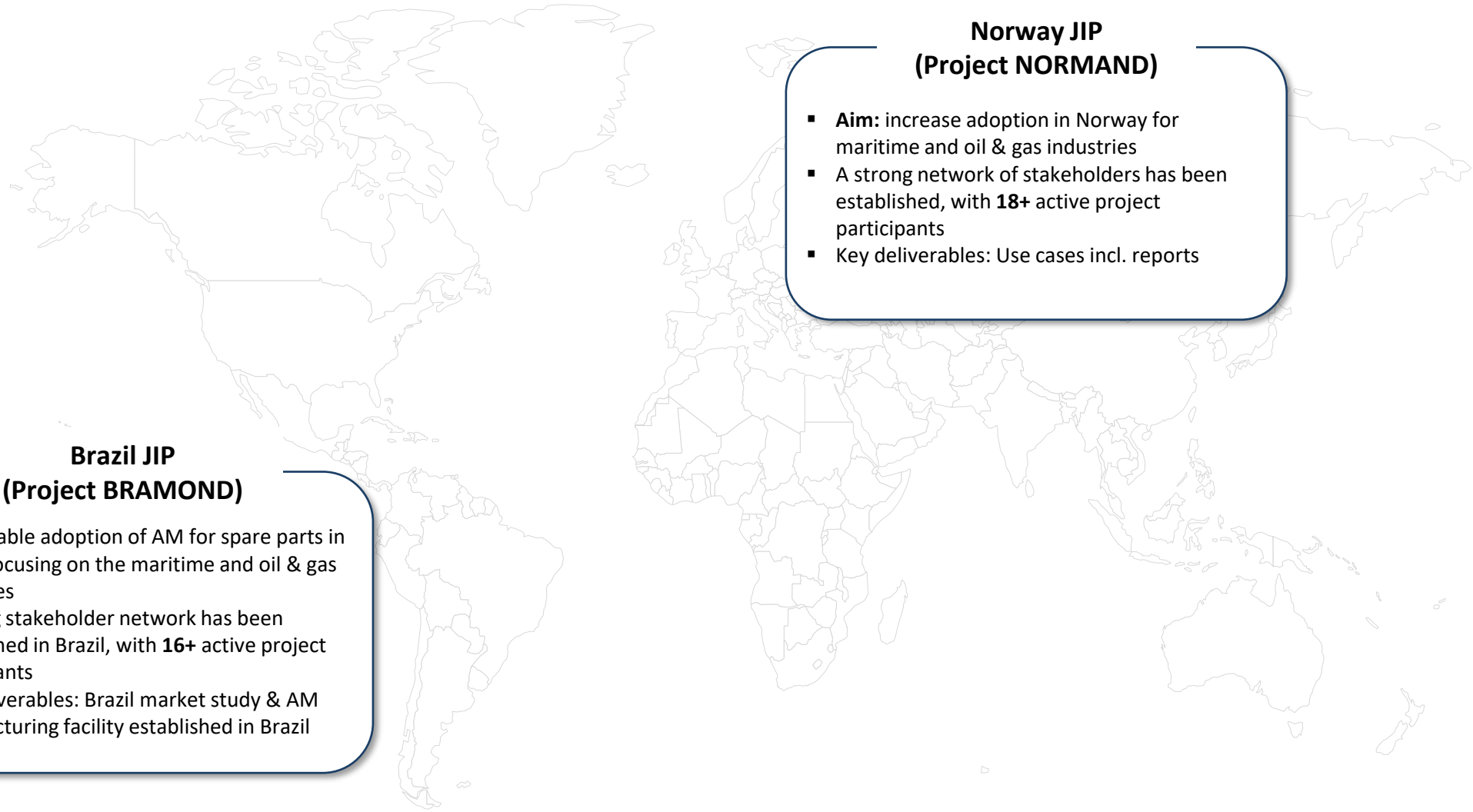


Engineering partnership with thyssenkrupp (TK)

OUR ECOSYSTEM APPROACH IS CORE TO OUR BUSINESS MODEL, AND WE WORK IN CLOSE PARTNERSHIPS WITH OEMS AND END USERS

Note: several companies not shown due to NDA

WILHELMSEN HAS INITIATED SEVERAL JOINT INDUSTRY PROJECTS TO INCREASE ADOPTION OF AM FOR SPARE PARTS



Norway JIP
(Project NORMAND)

- **Aim:** increase adoption in Norway for maritime and oil & gas industries
- A strong network of stakeholders has been established, with **18+** active project participants
- Key deliverables: Use cases incl. reports

Brazil JIP
(Project BRAMOND)

- **Aim**: enable adoption of AM for spare parts in Brazil, focusing on the maritime and oil & gas industries
- A strong stakeholder network has been established in Brazil, with **16+** active project participants
- Key deliverables: Brazil market study & AM manufacturing facility established in Brazil

THE PROJECTS ARE CONTRIBUTING TO INCREASED AWARENESS ABOUT THE BENEFITS OF AM…

Project NORMAND kick-off, Stavanger

Project DAVAMS kick-off, Oslo

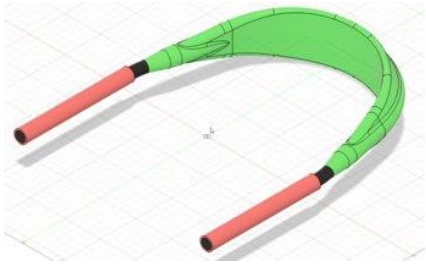
Project BRAMOND kick-off, Rio de Janeiro

Project DAVAMS kick-off, Oslo

… AND ARE INCREASING KNOWLEDGE AND ADOPTION BY PRODUCING REAL-LIFE USE CASES

Pipe support (Vår Energi)

- Application: FPSO pipe
- AM technology: Composite FDM
- Material: Carbon fibre nylon
- Size: 340*80*400 mm

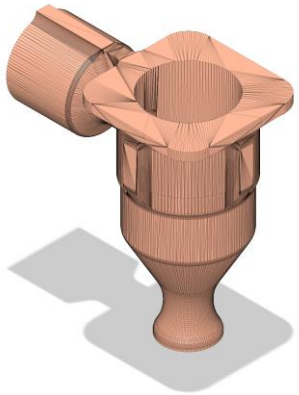


Flange for Electric Motor (Servogear)

- Application: Propulsion system
- AM technology: L-PBF
- Material: AlSi
- Size: Approx 268*266*113 mm

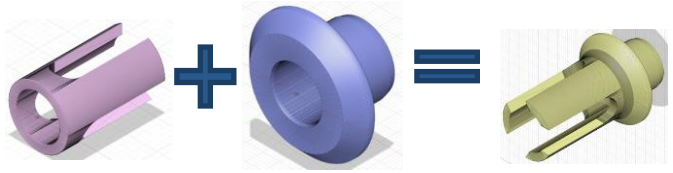
Tool for differential pressure (Servogear)

- Application: Propulsion system
- AM technology: L-PBF
- Material: AlSi
- Size: 28*50*52 mm



Spring base (Kawasaki)

- Application: Diesel engines
- AM technology: L-PBF
- Material: Ti64
- Size: 65*35 mm



FINAL REFLECTIONS

- How did we get started with AM?
- What are the success factors?
- What is the focus going forward?

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