MN3D

NETWORK FOR 3D-PRINTING
IN THE MARITIME INDUSTRY

Presentation of the network

MN3D

NETWORK FOR 3D-PRINTING
IN THE MARITIME INDUSTRY

Contents

Preface

NETWORK FOR 3D-PRINTING IN THE MARITIME INDUSTRY

The growing penetration of industrial manufacturing making use of IT-systems is playing an increasingly important role in today's economy. The interlinking of the physical and digital world is of vital importance. With regard to the maritime economy additive manufacturing processes gain momentum. With regard to this brochure these processes include those based on digital design data where a product or component is built up by successive layering of a material.

Various materials are already being used for additive manufacturing. Amongst these there are not only the well-known plasticbased materials but different special artificial resins, ceramics, cement, glass, a range of metals and metal alloys plus composite materials.The potential that lies within the use of this wide range of materials is immense. Not only simple components but complex spare parts can be produced in a decentralised and timely manner. These components have the potential to be of higher quality, functionality or design to those produced in a conventional process. A number of potential advantages such as less weight at same or higher stability can be reached. 3D-printing brings a freedom of design which has not existed up to now. For example, particularly complicated 3D geometries can be realised to facilitate extraordinary flow optimisation.

One of the strong focuses of the association Maritime Cluster Northern Germany (MCN e. V.) is digitalisation. Within this field of activities 3D printing in particular has been defined as one of the strategic topics. The MCN has initiated the cooperation of various maritime protagonists that strive to jointly work on research and development tasks within the field of 3D printing. The MCN network supports further incentives when it comes to 3D printing within the maritime industry.

The experts and companies heavily involved in the MCN 3D printing activities are mostly small and medium-sized companies working together on the development and marketing of innovative products, processes or technical services deriving from additive manufacturing processes. Furthermore, larger companies are also involved in these incentives participating by other means. Just like a number of development & research institutes plus universities these act as associated partners. These associated partners ensure that the focus of the work is always up to date and in line with the up to date standards and research results.

[1] Cf. Maritimes Cluster Norddeutschland e. V. 2017 Perspektiven des 3D-Drucks für die maritime Wirtschaft in Norddeutschland (Perspectives for 3D printing for the maritime economy in Northern Germany)
[2] https://www.zim.de/ZIM/Redaktion/DE/FAQ/Netzwerke/netzwerke.html

MN3D
NETWORK FOR 3D-PRINTING
IN THE MARITIME INDUSTRY

The described network of small, medium-sized and larger companies is seen as a project. The activities within this project will most likely consist of two phases:

Phase 1: Establishment of the network; development of a network concept and a technology roadmap.

Phase 2: This second phase of the network will include the implementation of the network concept, support of the network partners when it comes to the implementation of R&D projects etc. All of this has to be in line with the technology roadmap developed in phase 1 and the preparation of the market launch.

The network will also support further the launch of further innovative R&D projects during the project phases and beyond. These projects might also receive funding themselves. This applies to all kind of projects deriving from the group of companies cooperating within this network.

The project partners have appointed get-Next IT as their external, neutral network management agency. This agency will act as a service provider for the network and support it by finishing various tasks such as project scouting, linking the partners with potential external partners, marketing etc. In case of a successful application for funding (e.g. governmental or else) the agency will also appointed to coordinate all network activities such as internal workshops etc.

The strategic topics of the network will focus in innovations from the areas of process technology, strength & stability and surface properties of the additively manufactured products.

This brochure presents the participating companies and institutions actively taking part in the network. (Status July 2019).

Branch Manager Hamburg
Maritimes Cluster Norddeutschland e. V.
Branch Office Hamburg

Project partners

A. WINTER 3D-Konstruktions GmbH

Expert knowledge	Measurement (scan) of parts to be printed using a precise optical measurement procedure 1/10mm	
	3D construction and design	
	Slicing	
Contact	**Address**	Reepschlägerstraße 10c, 23556 Lübeck, Germany
	Contact person	Gerd Hagemeister
	Email	g.hagemeister@w3d.de
	Phone	+49 451 881970

FEM-Composites

Expert knowledge	Part optimisation & additive manufacturing	
	Optimisation with regard to stiffness, weight and dynamic behaviour	
	Optimisation of topology under consideration of complex secondary conditions	
	Optimisation of parameters	
	Mould optimisation	
	Optimisation for additive manufacturing	
	Results feed into CAD systems	
Contact	**Address**	Neuer Wall 63, 20354 Hamburg, Germany
	Contact person	M. Sc. Merlin Tamboula
	Email	merlin.tamboula@fem-composites.de
	Phone	+49 40 808093123

Gebr. Friedrich Industrie- und Elektrotechnik GmbH

Expert knowledge	Mechanical engineering	
	Metal engineering	
	Electrical engineering	
	Ship repair & maintenance	
	Welding specialists	
Contact	**Address**	Borsigstraße 11, 24159 Kiel, Germany
	Contact person	Nico Schwaiger
	Email	n.schwaiger@gfelektro.de
	Phone	+49 431 20978-0

Gebr. Potthast Kunststoffspritzguss GmbH & Co. KG

Expert knowledge	We are a manufacturer of injection molded plastic parts, made of nearly all types of technical plastics and produced with high-quality tools „made in Germany“ from our in-house tool engineering department. Especially for the production of small and medium series, often processing high-tech materials like PPSU and PEEK, we are working for our customers who are mainly co-ming from industries like marine and nautical engineering, controls and hydraulics, medical engineering, traffic control systems and general engineering. No matter if new projects, revision of existing tools or simply manufacturing parts from your tools with or without additional values – when working together with Gebr. Potthast you will have a partner from Schleswig-Holstein who is able to fulfill your corresponding demands with a lot of experience and competence.	
Contact	**Address**	Teichkoppel 38, 24229 Dänischenhagen, Germany
	Contact person	Olaf Wissenbach
	Email	o.wissenbach@gebrpotthast.de
	Phone	+49 4349 915810-31

GEFERTEC GmbH

Expert knowledge	GEFERTEC is conceptualising, constructing and steadily developing innovative systems for the computer-controlled three-dimensional additive manufacturing combining electric arc and wire. For this, the 3DMP®-procedure has been specially developed to produce high voluminous and geometrically complex component structures by use of many different raw materials, whereby near-net components can be reached in a time- and cost-efficient manner. Notably, the know-how of GEFERTEC refers also to the reliably controlling of the three-dimensional metal printing and to the qualification of the printed materials, where emphasis is put on the quality assurance of the manufactured components.	
Contact	**Address**	Schwarze-Pumpe-Weg 16, 12681 Berlin, Germany
	Contact person	Dr.-Ing. Sebastian Neubert
	Email	sebastian.neubert@gefertec.de
	Phone	+49 30 912074-782

JBS System GmbH

Expert knowledge	Development, construction & service	
	Electric and pneumatic controlled JBS flexible guide bush unit	
	Guide collets	
	Over-grip systems for sliding head lathes	
Contact	**Address**	Kieler Str. 118, 24119 Kronshagen, Germany
	Contact person	Maik Jess
	Email	m.jess@jbs-system.com
	Phone	+49 431 5377-426

Rolf Lenk Werkzeug- u. Maschinenbau GmbH

Expert knowledge	Industrial additive manufacturing center	
	AM technologies: SLM and 3DMP metal printing	
	AM metals: Stainless steel, titanium, aluminum, tooling steel, hastelloy, inconel, amagnetic steel	
	Prototyping and series AM	
	Mechanical & CNC post-processing: Turning, cutting, milling, drilling, polishing, eroding	
	Reverse engineering	
	Production & assembly of components	
	Our motto: „From the idea to the finished product“	
Contact	**Address**	Kornkamp 26, 22926 Ahrensburg, Germany
	Contact person	Alexis Noguer & Gregor Sodeikat
	Email	an@rolf-lenk.de / info@rolf-lenk.de
	Phone	+49 4102 69588-0

S.M.I.L.E.-FEM GmbH

Expert knowledge	Finite element simulations	
	Strength and fatigue simulations	
	Topology and functional optimisation	
	Reverse engineering	
	Design for 3D printed parts	
	Prototyping on in-house filament printer	
Contact	**Address**	Winkel 2, 24226 Heikendorf, Germany
	Contact person	Dr. Marco Göttsche
	Email	marco.goettsche@smile-fem.de
	Phone	+49 431 2108020

Treo - Labor für Umweltsimulation GmbH

Expert knowledge

As an accredited test laboratory Treo offers a range of test options from a single source. New products and technologies are tested in accordance with industry-specific standards and individual customer specifications (e.g. specifications within the areas of environmental simulation, EMC, electrical safety and material testing). Treo carries out all tests required for type approval for electronic devices in shipbuilding and has been accredited for this by DAkkS and certified by DNV GL. The fascinating area of industrial 3D printing is now being introduced to the shipbuilding industry too. When using this type of new technology it is important to proof that the developed products meet industrial standards and requirements e.g. with regard to their function and durability. Based on thorough experience in other industries Treo offers highly-skilled support in the before mentioned fields.

Contact

Address	Tempowerkring 19, 21079 Hamburg, Germany
Contact person	Dr.-Ing. Hanno Frömming
Email	hanno.froemming@treo.de
Phone	+49 40 7097376-22

Weihe GmbH

Expert knowledge

System solutions for complex customer-specific requirements

Project management, engineering, global purchasing, trading of technical products and manufacturing (metalworking)

Profile: welding company, sheet metal processing, pipe construction with complex 3D geometry

System supplier for silencers, pipes, insulation, special plant construction and technical products among others like coolers, soot filters, standard parts

Certifications in various fields, i. a. pressure equipment, military, marine and railway technology

Contact

Address	Teichkoppel 63, 24161 Altenholz, Germany
Contact person	Sebastian Friedrich
Email	s.friedrich@weihe-gmbh.de
Phone	+49 431 32913-21

Associated partners

DNV GL SE

Expert knowledge	DNV GL is one of the biggest classification and certification societies worldwide. DNV GL is active in more than 100 countries and offers approval and certification services both for additive manufacturing processes and the printed components itself. The company has certification programmes and directives tailormade for additive manufacturing.	
Contact	**Address**	Brooktorkai 18, 20457 Hamburg, Germany
	Contact person	Norbert Worm
	Email	norbert.worm@dnvgl.com
	Phone	+49 40 36149-7225

MCN e. V. Branch Office Hamburg

Expert knowledge	Project management and consulting	
	Project scouting	
	Networking	
	Market overview	
Contact	**Address**	Wexstraße 7, 20355 Hamburg, Germany
	Contact person	Lina Harms
	Email	hh@maritimes-cluster.de
	Phone	+49 40 227019-492

MCN e. V. Branch Office Schleswig-Holstein

Expert knowledge	Project management and consulting	
	Project scouting	
	Networking	
	Market overview	
Contact	**Address**	c/o WTSH Wirtschaftsförderung und Technologietransfer Schleswig-Holstein GmbH, Lorentzendamm 24, 24103 Kiel, Germany
	Contact person	Matthias Wiese
	Email	matthias.wiese@maritimes-cluster.de
	Phone	+49 431 66666-868

Mecklenburger Metallguss GmbH

Expert knowledge	Large-scale 3D printing in the plastics sector	
	Design of high-quality, shape optimised free-form surfaces	
	Model construction	
Contact	**Address**	Teterower Straße 1, 17192 Waren, Germany
	Contact person	Dr.-Ing. Lars Greitsch
	Email	sales@mmg-propeller.de
	Phone	+49 3991 736-225

REINTJES GmbH

Expert knowledge	Integration of requirements and and ideas for applications into the project	
	Integration of ideas for function optimisation of special parts for maritime engine technology	
	Evaluation of project ideas and project results	
Contact	**Address**	Eugen-Reintjes-Straße 7, 31785 Hameln, Germany
	Contact person	Dr.-Ing. Thomas Kruse
	Email	thomas.kruse@reintjes-gears.de
	Phone	+49 5151 104-487

SLM Solutions Group AG

Expert knowledge	Selective laser melting pioneer and full-service metal additive manufacturing equipment partner	
	Robust selective laser melting machines, materials and services for consultative process development enabling metal additive manufacturing success	
	Partner reducing the additive manufacturing learning curve for long-term success with SLM® technology	
Contact	**Address**	Estlandring 4, 23560 Lübeck, Germany
	Contact person	Giulio Canegallo
	Email	info@slm-solutions.com
	Phone	+49 451 4060-3000

thyssenkrupp Marine Systems GmbH

Contact	**Address**	Werftstraße 112-114, 24143 Kiel, Germany
	Email	marinesystems@thyssenkrupp.com
	Phone	+49 431 7000

Research institutes & universities

Fraunhofer-Einrichtung für Additive Produktionstechnologien (IAPT)

Expert knowledge	IAPT develops new processes, components and systems for additive manufacturing, and owns a comprehensive range of suitable equipment. In addition, IAPT certifies new materials, provides training sessions for developing designers, manufacturing technicians and managers, and is available to any industrial or service company in the maritime sector as a research and development partner.	
Contact	**Address**	Am Schleusengraben 14, 21029 Hamburg, Germany
	Contact person	Olaf Steinmeier
	Email	olaf.steinmeier@iapt.fraunhofer.de
	Phone	+49 40 484010-622

Hochschule für Angewandte Wissenschaften Hamburg

Expert knowledge	The Institute of Materials and Welding Technology uses different methods of fusion build-up welding as well as the selective laser meting process for the additive production of metallic components. We develop robot based additive manufacturing applications using laserpowder / -wire (LMD) as well as arc based powder or wire welding processes (DMD or WAAM). We offer training on metallic additive manufacturing, with a focus on design, production, health and waste treatment.	
Contact	**Address**	Berliner Tor 13, 20099 Hamburg, Germany
	Contact person	Prof. Dr.-Ing. Shahram Sheikhi
	Email	shahram.sheikhi@haw-hamburg.de
	Phone	+49 40 42875-8955

Helmholtz-Zentrum Geesthacht - Zentrum für Material- und Küstenforschung GmbH

Expert knowledge	Laser material deposition with powder or cable and laser welding	
	Characterisation of laser-additive manufactured and laser-welded structures	
	Chemical & metallographic analysis, gas analysis, various mechanical tests	
	Non-destructive testing	
	Scientific understanding with regard to the process/micro-structure/property relationship	
	Particularly light construction materials such as aluminium, magnesium, titanium and titanium aluminide, and also steel	
	Synergies with other departments at the „Institut für Werkstoffforschung am Helmholtz-Zentrum Geesthacht“	
	Leadership of the working group ProAdditive (tailored materials and processes for generative manufacturing) - an association of various partners from research and industry, with expert knowledge in additive manufacturing, with representation of the different additive processes and characterisation options.	
Contact	**Address**	Max-Planck-Straße 1, 21502 Geesthacht, Germany
	Contact person	Dr.-Ing. Josephin Enz (SFI)
	Email	josephin.enz@hzg.de
	Phone	+49 4152 87-2507

Hochschule Flensburg

Expert knowledge	Construction of big size FDM 3D-Printer (0,9m x1,4m), printing of prototypes and models (e.g. comets for Max-Planck-Institute)	
	Development and implementation of platform as construction device implying CAD, simulation, visualisation and rapid-prototyping inclusive 3D - prints	
Contact	**Address**	Hochschule Flensburg, Fachbereich 1 (Maschinenbau, Verfahrenstechnik und Maritime Technologien), Kanzleistraße 91 -93, 24943 Flensburg, Germany
	Contact person	Prof. Dr.-Ing. Axel Krapoth
	Email	krapoth@hs-flensburg.de
	Phone	+49 461 805-1667

University of Rostock - Faculty of Engineering and Ship Technology

Expert knowledge	Development of procedures and systems for additive manufacturing (ink-jet based 3D printing processes, electron-beam melting, stereolithography, fused deposition modelling)	
	Development of processes and materials (metals, technical ceramics, plastics)	
	Experimental characterisation of base materials and process results	
Contact	**Address**	Justus-von-Liebig-Weg 6, 18059 Rostock, Germany
	Contact person	Dr.-Ing. Philipp Drescher
	Email	philipp.drescher@uni-rostock.de
	Phone	+49 381 498-9118

Insights from project participants

“Apart from research additive manufacturing is becoming increasingly important for industry too. For example, in the maritime sector, the use of additive manufacturing technology makes it possible to improve ship structures with regard to weight and performance, to facilitate new repair processes and speed up part-replacement. Helmholtz-Zentrum Geesthacht would like to help the maritime industry with this important development.”

Dr.-Ing. Josephin Enz
Helmholtz-Zentrum Geesthacht
Research institute

“Digitalisation and automation are already a reality in many industries. This development will not stop at the maritime industry and it will go faster than we all suspect.”

Katrin Birr
Gebr. Friedrich Industrie- und Elektrotechnik GmbH
Project partner

“Taking part in the project clearly aims to bundle skills in this new area which is of major importance for the maritime sector in particular. In this sector this leads to the task of making products in individual units or in low-volume runs. In addition this can also give rise to complex moulds due to the hydrodynamic requirements. The special opportunity for 3D printing lies in the speed of implementation. Even when the manufacturing process does not offer production time benefits per se there might be time savings due to more direct paths between the design and start of the production - a particularly important feature in model and mould construction.”

Dr.-Ing. Lars Greitsch
Mecklenburger Metallguss GmbH
Associated partner

MN3D
NETWORK FOR 3D-PRINTING
IN THE MARITIME INDUSTRY

Network management agency

DSN Connecting Knowledge

Contact	**Address**	Andreas-Gayk-Straße 7-11, 24103 Kiel, Germany
	Contact person	Ralf Duckert
	Email	ralf.duckert@dsn-online.de
	Phone	+49 431 996966-99

Become part of the “Maritime Network for 3D-Printing” (MN3D) and move forward in facing the technical challenges of using additive manufacturing processes. If you are interested in participating in the network or in further information please contact us.

Responsible as defined by the Press Act
Maritimes Cluster Norddeutschland e. V.
Branch Office Hamburg · Lina Harms · Wexstraße 7 · 20355 Hamburg · Germany
Phone +49 40 227019-492 · Email hh@maritimes-cluster.de

Design by www.geschmackslabor.de