



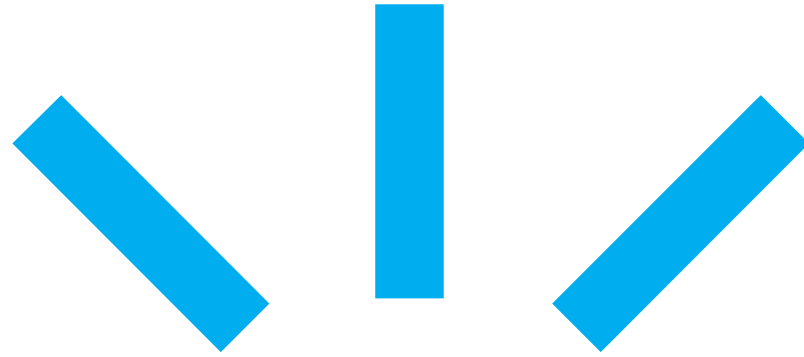
**KERTTU SAALASTI
INSTITUTE**

**UNIVERSITY
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FMT
FUTURE MANUFACTURING
TECHNOLOGIES

***Science
With
Arctic
Attitude***





Metallien 3D tulostuksen verkostot



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Euroopan unioni
Euroopan aluekehitysrahasto

Vipuvoimaa
EU:lta
2014–2020

Tuotanto 2021 – T21

Hankekoodi: A76580



POHJOIS-POHJANMAA

Council of Oulu Region





Kolarctic CBC

EU FINLAND NORWAY RUSSIA SWEDEN



From Idea to Printing of Metal Products I2P – Project

Project ID: KO4012



REGIONAL COUNCIL
OF LAPLAND





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EU – S3 verkosto ja rajat ylittävä yhteistyö



ADMA Energy



Advanced materials for batteries



Artificial Intelligence and Human Machine Interface (AI & HMI)



BERRY+

P-P mukana 10:ssa EU:n S3 kumppanuudessa



Bio-economy



Chemicals



Cultural and Creative Regional Ecosystems



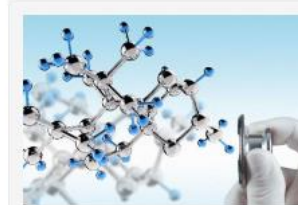
Cybersecurity



Medical Technology



Mining industry



New Nano-Enabled Products



Personalised Medicine



Digitalisation and Safety for Tourism



Efficient and Sustainable Manufacturing



High Performance Production through 3D-Printing



Hydrogen Valleys



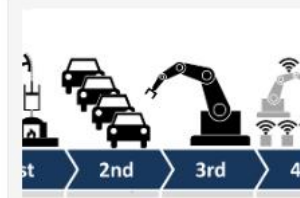
Photonics



Safe and sustainable mobility



Smart Regional Investments in Textile Innovation



SME integration to Industry 4.0

+

Agri-Food

- Traceability & Big data
- High tech farming - Energy
- Geothermal energy



Social Economy



Sport & Vitality



Water Smart Territories



Wireless ICT



3DP - High Performance Production through 3D-Printing

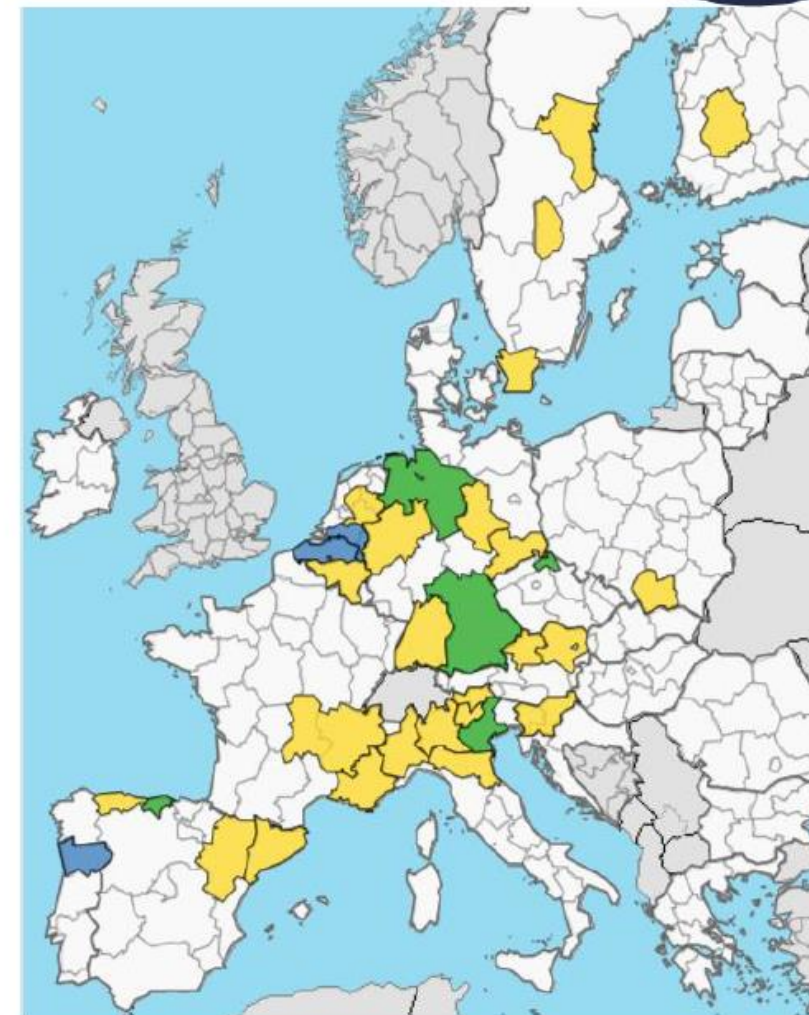
A structural multi-actors cooperation

Regions

- **3 Leading:** South-Netherlands, Flanders, Norte
- **29 Participating:** Aragon; Asturias; Autonomous Province of Bolzano/Bozen – South Tyrol; Autonomous Province of Trento / Trentino; ~~Auvergne-Rhône-Alpes~~; Baden-Württemberg; Cantabria; Catalonia; East Netherlands/Gelderland; **East and North Finland**; Emilia Romagna; Flanders; Gävleborg; Lombardia; Lower Austria; Lower Saxony; Malopolska; Norte; North Rhine-Westphalia; Orebro; South Netherlands; Piemonte; Saxony; Saxony-Anhalt; Slovenia; Tampere; Upper Austria; Värmland; Wallonia;
- **3+ Observers/interested:** Pays de La Loire (Observer), Navarra (Observer), Friuli Venezia Giulia (Observer), etc.

Main Target Groups

- 400+ organisations:
 - SMEs/End-users
 - Clusters representatives and Industry Associations
 - Facility Centres
 - Technology providers
 - Regional representatives/authorities



Implementation – The sequence

Industry Needs

- Target group: (Downstream) SMEs, Tech-suppliers and start-ups
- Looking for Expertise/Equipment, market/visibility
- 'Demonstration' and 'cross-regional'

3DP Pilot 'Treatment'

- Actors: Facility Centres, Tech-suppliers, etc.
- Benefiting from Co-development /deployment, visibility/market

Projects Implementation

- Funding support, Spill overs and feedback loops
- Towards Sustainable and Smart VCs

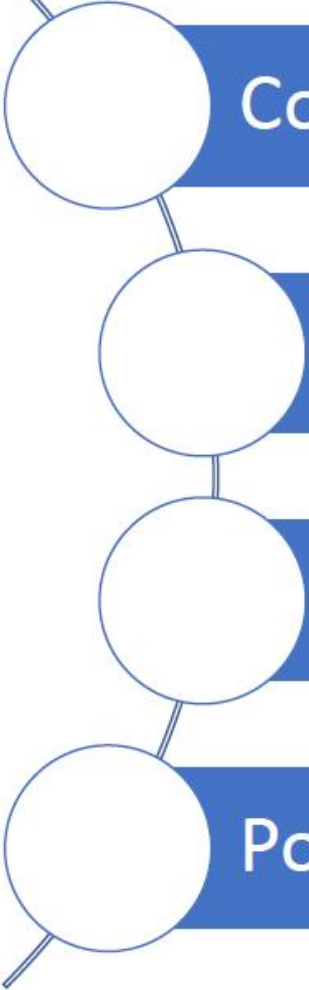
*Illustrative KPIs
05/2020-05/2021:*

- 1 Matchmaking [Tool](#) developed
- 3 [ATI](#) Product Watch reports drafted
- 100+ participants to all activities, 30 regions and 500+ actors connected

- Active co-development of 9 'AdMa Instrumental Solutions', 4 new ideas submitted, 10+ use cases designed, etc.
- 400k EU funding for demonstration activities made available, from which 360k secured for 3DP Pilot regions
- 6+ 3DP Pilot proposals HE IAs and RIAs in preparation
- Submission: 1 IRA SME, 1 CORNET, 1 TAF (selected), 1 Trinity

- 9 '3DP Pilot' SMEs-led projects, (grants: 375k €) in implementation (start: 2021)
- Generation of (bilateral) privately funded TRL7+ activities (PiPP)

Why a cross regional initiative?



Completeness/Efficiency

Best Solutions Available

Critical Mass

Positive Externalities and Spill over effects



The generation, development and deployment of industry-led, transregional demonstration platforms and projects that connect 3DP capabilities and actors

Overview of the Pilot's main action lines in 2021 (1)

Demo cases
Multi-materials components by hybrid 3D Printing manufacturing (Demo Case leader: Luca Tomesani, UNIBO, Emilia Romagna)
Innovative hybrid (subtractive/additive) manufacturing approach for repairing added value damaged objects (Demo Case leader: Paolo Gregori, Trentino Sviluppo, Trentino)
Multi-material 3D printing: Structural integrated electronics in 3D printed parts (Demo Case Leader: Hannes Fachberger, Profactor, Upper-Austria)
Medical Devices and Healthcare demo case: 3D-Printed customized components for orthosis, exoskeleton and exoprosthesis...and beyond? (Demo Case leader: Alberto Leardini, IOR, Emilia Romagna)
AM in the Built Environment (Demo Case Leaders: Maaïke Riemersma and Theo Salet, TUE, South-NL)
3D-Printed large parts and complex shapes (mono-material) through emerging 3DP technologies (Demo Case leaders: José Antonio Dieste, Aitiip, Aragon and Giulia Marchisio, CIM40, Piemonte)
Efficient collaborative robot through 3D printing optimization (Demo Case Leader: Oscar Alonso, Leitat, Catalonia)
Provide a toolset for maintenance for 3DP and a training course for employees to do the maintenance (Demo case Leader: Coen de Graaf, Brainport, South NL)
Additive-subtractive high precision & high finish production (high-end metals): towards revising the scope ('Smart AM for sustainable production')? (Demo case Leaders: Bianca Maria Colosimo, Polimi, Lombardy and Coen de Graaf, Brainport, South NL)
Transversal Actions
Transversal Action 1 - Elaborating cross-regional solutions for raising awareness (among SMEs) on AM-related opportunities (Leaders: Bianca Maria Colosimo, Polimi, Lombardy and Coen de Graaf, Brainport, South NL)
Transversal Action 2 - Building an international Benchmark for AM mechanical properties for various materials" (Leader: Thomas Kairet, Sirris, Flanders/Wallonia)

Vanguard Initiative 3DP Pilot Plenary Meeting - State of Play and Next Steps (6th of July, 09-10.30)

Jean-François Romainville, IDEA Consult, 3DP Pilot Network Manager



VANGUARD INITIATIVE
New growth through smart specialisation



Hyvää:

- Valmis toimiva laaja verkosto
- Vakiintuneet toimintatavat
- Yrityslähtöisyys
- Avoimuus

Huonoa:

- Ei sisällä rahoitusta (eli EAKR, BF, H27 rahoituksella)
- Toiminta joiltakin osin tehotonta

<https://3dppan.eu/>

THE 3DP PAN EU PLATFORM

Generating industry-led projects to test and validate 3DP solutions.

Welcome to the 3DP PAN EU matchmaking platform, where supply and demand of 3D Printing services is brought together.

Find the right partners to take the next step in your 3D Printing projects by heading over to our Search tool!

COVID-19

When stocks run out and you have difficulties buying parts or components from your regular suppliers, 3D printing may bring you the solution.

Check out our COVID-19 initiative below.





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Rajat ylittävä yhteistyö, tuki- ja tutkimusverkostot

- Rajat ylittävä yhteistyö
 - Interreg ohjelmat – Pohjoisessa Interreg Aurora
 - CBC – ohjelmat
- Tutkimusverkostot
 - The European Factories of the Future Research Association (EFFRA) <https://www.effra.eu/>
 - The European Institute of Innovation & Technology (EIT) - EIT Manufacturing - <https://eit.europa.eu/our-communities/eit-manufacturing>

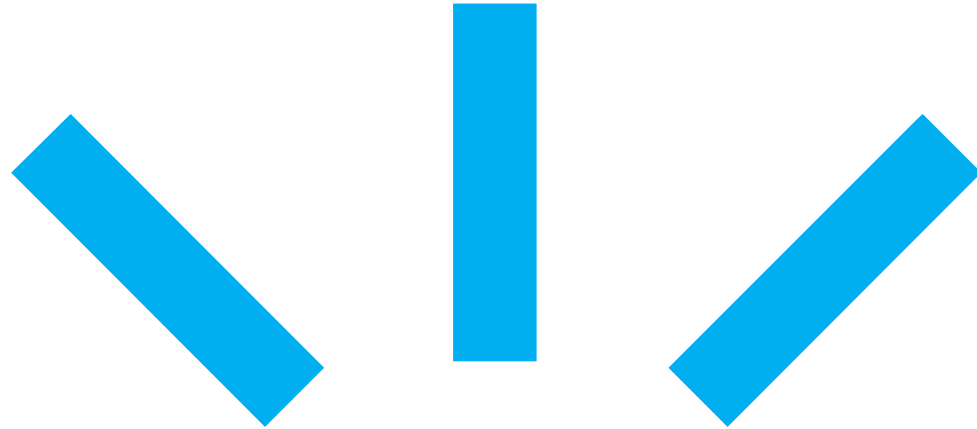


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Muut verkostot



FMT - Kansainvälinen yhteistyö

Iceland

- University of Iceland - Faculty of Industrial Engineering, Mechanical Engineering and Computer Science, Reykjavik, Iceland

The British Isles

- De Monfront University - School of Engineering and Sustainable Development, Leicester, United Kingdom
- The University of the Highlands and Islands - Lews castle college, Isle of Lewis, Scotland, United Kingdom

USA

- Tennessee Tech University - Manufacturing and Engineering Technology, Tennessee, USA

Costa Rica

- Tecnológico de Costa Rica - Medical Devices Engineering, Costa Rica

Scandinavia

- Luleå Technical University - Department of Engineering Sciences and Mathematics, Luleå, Sweden
- UiT - The Arctic University of Norway - Intelligent Manufacturing and Logistics, Institute of Industrial technology, Department of Industrial Engineering, Narvik, Tromsø, Norway
- Lund Technical University - Production and Materials Engineering, Lund, Sweden
- SWERIM, Heating and Metalworking, Luleå, Sweden.

Russia

- NArFU - Northern (Arctic) Federal University, Arkhangelsk, Russia

India

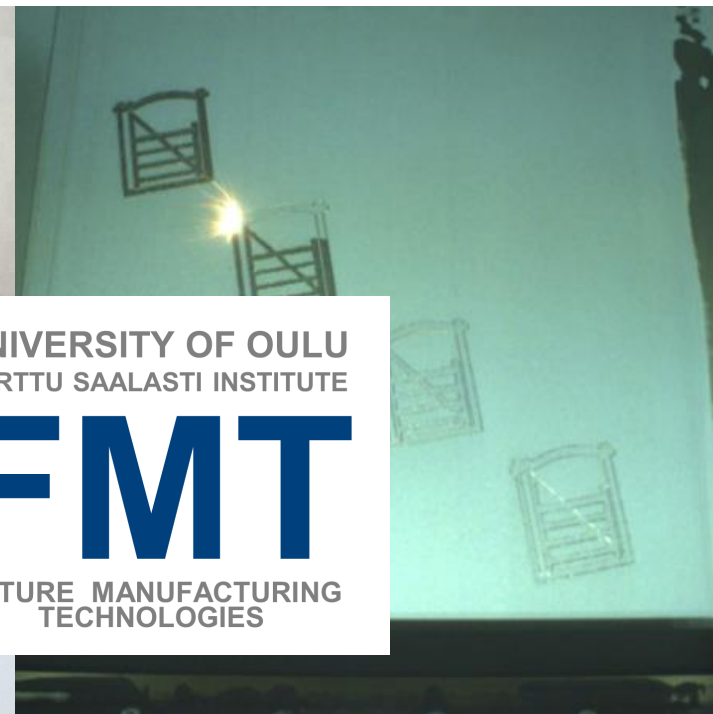
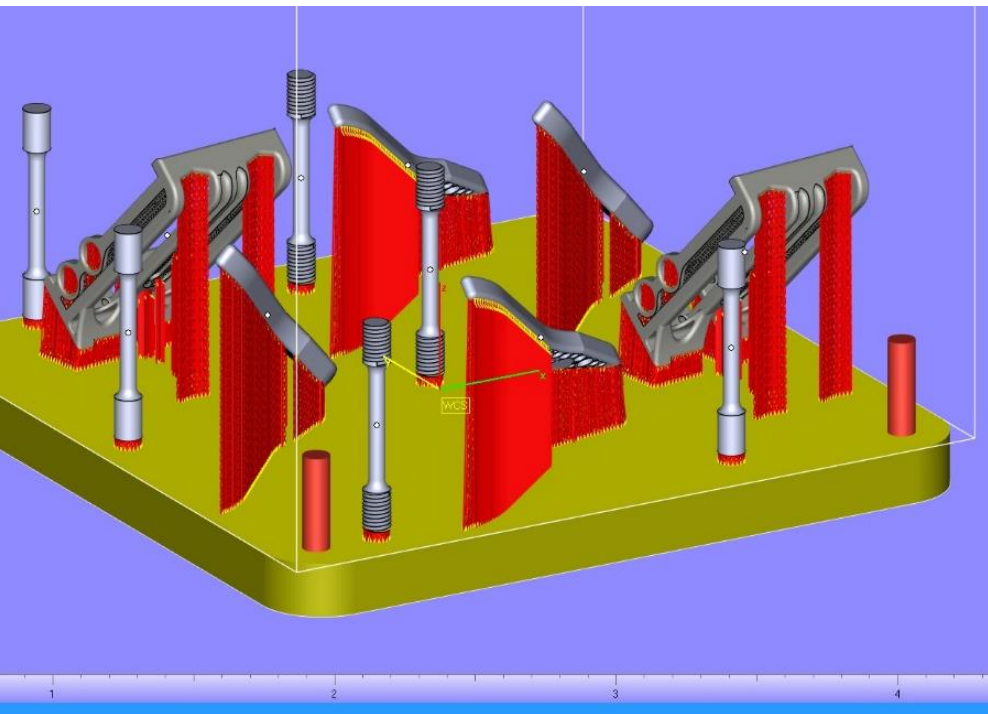
- Jadavpur University, Physics Department, Jadavpur, India

Central Europe

- "BOKU" University of Natural Resources and Life Sciences, Vienna, Austria
- "IPM" Institute of Physics of Materials - Czech Academy of Sciences, Brno Czech Republic
- TU Bergakademie Freiberg - Institut für Werkstofftechnik, Freiberg, Germany
- RWTH Aachen University - Department of Ferrous Metallurgy, Aachen, Germany
- "DTU" Technical University of Denmark - Department of Mechanical Engineering, Lyngby, Denmark
- University of Technology of Troyes – Department of Physics, Mechanical engineering, Material sciences and engineering and Nanotechnologies, Troyes, France

Middle East / Africa

- Egypt Japan University Of Science and Technology, Alexandria, Egypt
- University of Tehran, Hot Deformation and Thermomechanical Processing Laboratory of High Performance Engineering Materials, Tehran, Iran
- Islamic Azad University, Department of Materials Engineering, Shiraz, Iran.



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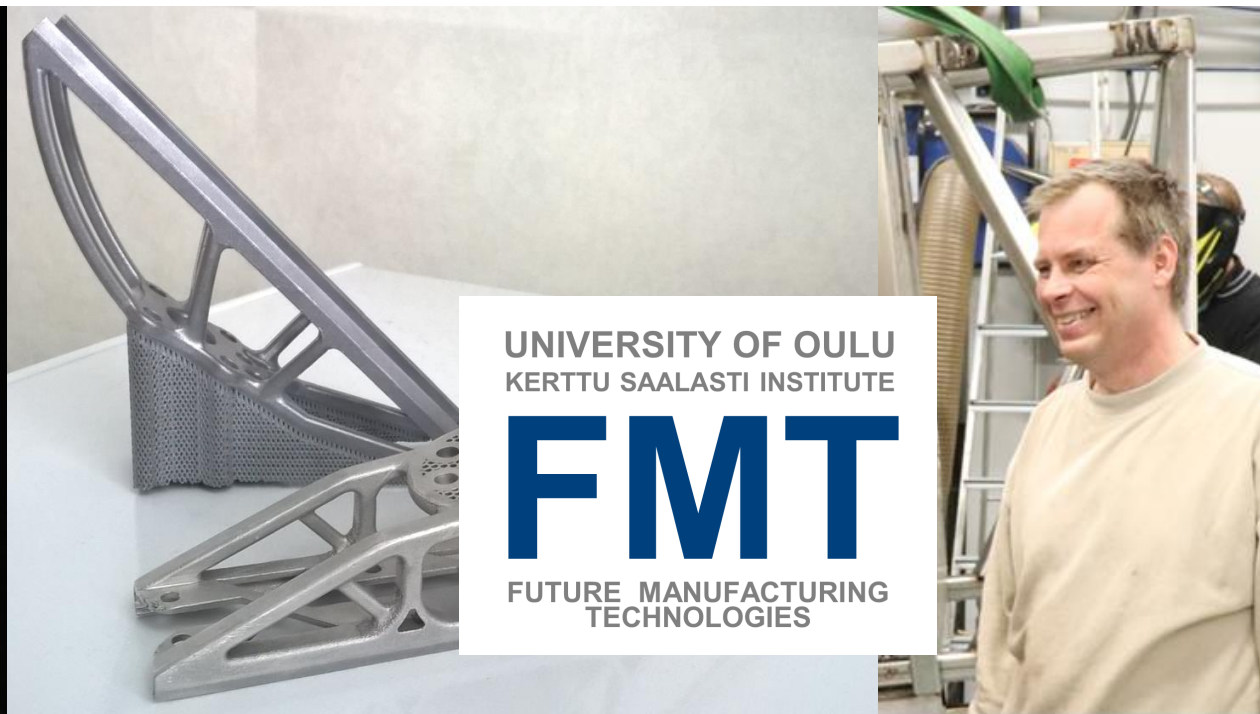
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3D tulostus ja väsymistestaus

- FMT:n käytössä L-PBF metallitulostus, verkostojen myötä lähes kaikki metallitulostusmenetelmät
- Kaikkia tutkimuksessa tarvittavia, usein erittäin kalliita, laitteita ei ole eikä kannata hankkia Oy:lle – saadaan käyttöön verkoston kautta
- Lisäkapasiteetti väsytykseen – Long cycle ja Ultra long cycle väsytyksiin
- Kaikkia hyödyttävää tutkimusyhteistyötä - Raha ei yleensä liiku organisaatioiden välillä!
- Paras osaaminen ja kokemus maailmalta alueen käyttöön



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Nopeat lämpökäsittelyt

- Nivalan induktiolaboratorio on maailmanlaatuisesti ainutlaatuinen!
- NorFast-HT projektin jälkeen lyhyiden lämpökäsittelyjen verkostoa vedetään InTeMP projektista
- Lund/Magcomp korkeiden taajuuksien tekniikka ensimmäisenä esiteolliseen käyttöön
- **www.norfast-ht.eu**

Oulun yliopisto - FMT
Lundin yliopisto
Luulajan teknillinen yo
Swerim - Mefos

MagComp

RECION

Miilux® oy

SSAB



SWEBOR

Olofsfors



TEKNIKUM

outokumpu



TL Solution



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I2P – Arktinen metallien 3D tulostus

- C3TS projektissa muodostettiin pohjoismainen arktinen metallien 3D tulostuksen yhteisö
- I2P projektissa laajennettiin yhteisö käsittämään myös Argangelin alue Venäjällä
- Osaamisen siirto, kokemusten vaihtaminen
- Yritysyhteistyö, yritysten auttaminen ja webinaarit
- <https://i2metprint.com/>

- Luulajan teknillinen yliopisto
- Oulun yliopisto - FMT
- UiT - The Arctic University of Norway
- NArFU - Northern (Arctic) Federal University
- Alueen yritykset



I2P
IDEA TO PRINT

ARCTIC PLATFORM

▶ PRINT YOUR IDEAS IN METAL

PROJECT «FROM IDEA TO PRINTING OF METAL PRODUCTS»
ARCTIC PLATFORM FOR METAL ADDITIVE MANUFACTURING

PROJECT INFORMATION, REPORTS, EVENTS, NETWORK MEMBERS
AND SAMPLES OF METAL 3D-PRINTING **CAN BE FOUND ON OUR SITE**

Kolarctic CBC
EU FINLAND NORWAY RUSSIA SWEDEN



Kotimainen verkosto

- Yhteistyö yritysten kanssa
 - Vuosittain n. 50 yrityksen kanssa
 - Katso FMT päivien yritysesittelyt!
- Yhteistyö tutkimuslaitosten kanssa
 - Metallien 3D tulostus
 - Fimecc – FAME (Finnish Additive Manufacturing Ecosystem)
<https://fame3d.fi/>
 - Suomen Pikavalmistusyhdistys -
Finnish Rapid Prototyping Association FIRPA ry
 - CASR – laajentunut valtakunnalliseksi terästudkimusympäristöksi
 - Tietenkin OAMK + muut ammattikorkeakoulut ja JEDU + muut ammattiopistot



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Yhteenveto



Voimaa Verkostoista – Yhteistyöllä Tuloksiin

- EU ja kansainväliset verkostot
 - 3DP - High Performance Production through 3D-Printing
 - <https://3dppan.eu/>
 - Rajat ylittävä yhteistyö
 - EU:n rahoittamat tutkimusverkostot
- Omat verkostot
 - Kotimaiset verkostot
 - Yritykset, FAME, FIPRA, Yliopistot, AMK:t jne...
 - FMT:n kv. verkosto käsittää reilut 20 yliopistoa, tähän lisäksi ulkomaiset yritykset joiden kanssa tehdään yhteistyötä



Thank you for your kind attention!



Contact Information:
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kari.mantylarvi@oulu.fi



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