Proposal ID **729290** *Acronym* **3DTTool**

1 - General information

Topic	SMEInst-02-2016-2017
Call Identifier	H2020-SMEInst-2016-2017
Type of Action	SME-1
Deadline Id	H2020-SMEINST-1-2016-2017

Acronym: 3DTTool

Proposal title*: Next Generation of Cutting Tools Using Additive Manufacturing Technology I, Phase 1

Note that for technical reasons, the following characters are not accepted in the Proposal Title and will be removed: < > " &

Duration in months: *5*

Fixed keyword 1: *Nano-materials (production and properties)* Add

Free keywords: *Thread cutting tools, 3D printing, additive manufacturing, maritime, offshore, machine taps, custom tools, custom design, KET.*

Abstract

Our goal is to develop the next generation of thread cutting tools by using additive manufacturing technology (3D printing). Thread cutting tools are used to make screw threads – the main building blocks of modern day machinery. However, these tools have developed very little since they were invented over 100 years ago besides alternating materials used or adding new coatings for the tools to make them stronger.
The total Tool Cutting industry worldwide is estimated to be about €17.2 b with average annual growth of about 4% . The bulk of the industry operations are within specific segments: offshore, maritime, automotive and mining – and most of these clients require highly customised tools due to the nature of their business. As such, the Tool Cutting industry spans broadly and innovations that spur new products and ways of working will have far-reaching and important consequences.
Printing thread cutting tools in 3D will bring about a high level of innovation to this mature and stagnating industry and will bring about clear and much needed benefits compared to the existing solutions:
1. Improved performance: reduced wear-rate to increase cut rates by 30%-50%
2. Disruptive solution to cooling and lubrication issues: current tools are severely lacking in this aspect
3. Short production lead-time: the new tools reduce production time from 4-14 weeks to 1 week
4. Lightweight product for easy handling: 3D printing enables 60% lighter tools
5. Price competitive offering: expected savings of 10%-30% compared to conventional tools
6. Environmentally friendly product: no waste by-product
7. High-level of client driven customisation: designing in 3D offers full flexibility and adaptation
Thürmer 3D Tools project is situated at TRL6 as a technology demonstrated in an industrially relevant environment. We therefore propose a Feasibility Study to verify the technical, commercial and financial viability of the 3DTTool concept with a view to continue to a Phase 2 application.

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Publishable summary

Thürmer aims to develop high-performance and durable thread cutting tools with the latest additive manufacturing (also mentioned as 3D-printing). The technical break-through is the innovative 3D-printed cooling and lubricating features and light-weight structures. The new tools will have prolonged tool-life, increased cutting speed, and low cutting fluid consumption. The three improvements result in significant life-cycle benefits to the end-users in terms of less machine down-time, boosted productivity, and worker's health. The light-weight structure is especially favorable for reducing the work load of field workers in offshore oil and wind energy. On top of these improvements, AM offers the flexibility that enables highly customized tools with short lead-time.

This feasibility study assesses the technical, economic, and operational viability of incorporating AM to thread cutting tools. It envisages a product development in which a disruptive technology advances a traditional industry. The study presents the value proposition of the new tools by quantifying the cost and benefit from the end-users' view point. The technical assessment, including an intellectual property and competitor analysis, operational assessment, and supply chain, suggest the critical issues for design and production of the new tools. It also gives an in-depths investigation of the current status of metal AM technology with focus on material properties, design tools, and existing AM products. The study outlines the financial prospect, product launch strategy, and future business model.

AM is one of the core enabling technology that will upgrade the manufacturing industry towards high-performance, functionality, and environmentally friendly production. The machine tool industry is the sector that has broad impact on other sectors, such as consumer products, general machines, and transportation. We expect the success of the project to disseminate the knowledge and experience of AM adoption to a spectrum of industries, thus maintaining the competitiveness of the European manufacturing industry.