

**GEODRILL**



R&I to decrease costs and improve efficiencies

## Development of novel and cost-effective drilling technology for geothermal systems

Geo-Drill

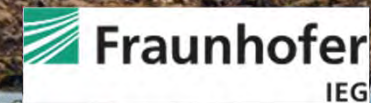
<https://www.geodrillproject.eu/>

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## Geo-Drill – at a glance

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### Overall Objective:

To develop 'holistic' drilling technologies helping to drastically reduce the cost of deep drilling (5km or more) and at high temperatures (250°C or more).

### Expected Impact:

The proposed solution will **reduce the CAPEX and/or OPEX** of energy generation from any of the mentioned renewable sources making it comparable to generation costs from competing fossil fuel sources

- Substrates and coatings
- Data harvesting and transfer system
- Corrosion/Erosion testing regime
- Improved BHA and Computer Modelling

## Geo-Drill – at a glance

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- A **prototype DTH hammer** will be manufactured and validated
- Substrate materials of 3D printed sensors & cables will be manufactured and tested. A **prototype drill monitoring system** based on 3D printed sensors combined with simulators will be manufactured and validated
- Advanced materials and coating will be developed and tested. **DTH hammer, drill pipe and drill stabilizer** will be manufactured and validated
- The Geo-Drill concept will be validated by a techno-economic assessment and an environmental assessment.

# Geo-Drill – Consortium



- 12 partners across Europe, with TWI as coordinator
- A mixture of skills and expertise including product developer to end users, universities and research org.



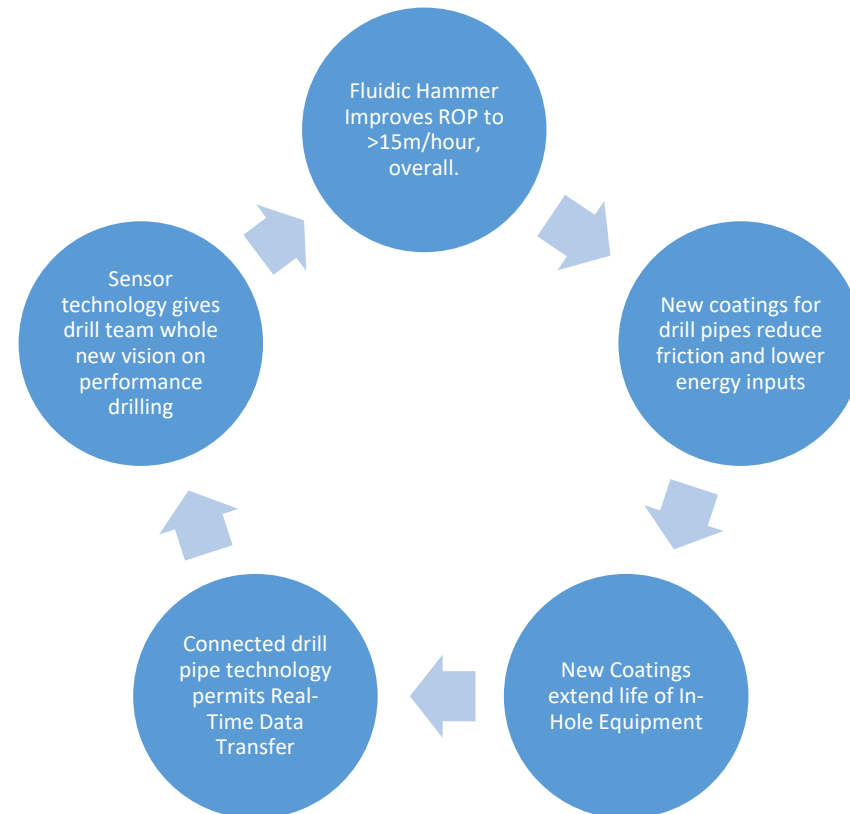
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## KPI's and targets



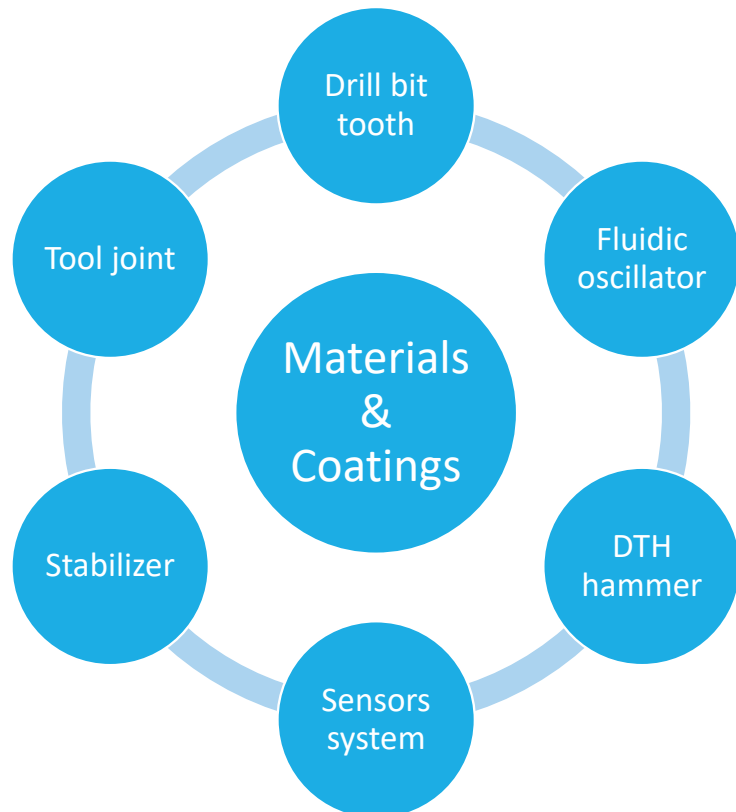
The target for GeoDrill is to develop an holistic drill system, that lowers the cost of deep high temperature/high pressure geothermal wells. To achieve this we need to improve on the following parameters:

- Increase Rate of Penetration - ROP
- Predicting – Knowing what is happening at the bit/formation interface in real time
- Improved Lifecycles – make tools and completion materials last longer
- Optimization – If the bit is not making hole, then the operation is losing money.
- Capability – High Temperatures of 250°C and Pressures in excess of 70MPa, need to be catered for.
- Practicality – The system has to integrate with current operations.



# overview WP Material development

## Development of materials and coatings



GO-enhanced tungsten carbide material development for tooling and hammer coating for drill bit tooth, fluidic oscillator, and stabilizer

HIP bonding process for drill bit tooth

diffusion bonding process for tool joint and drill stabilizer

synthesis of sensor materials

Electroless (EL) plating for synthesis of PTFE based composite coating

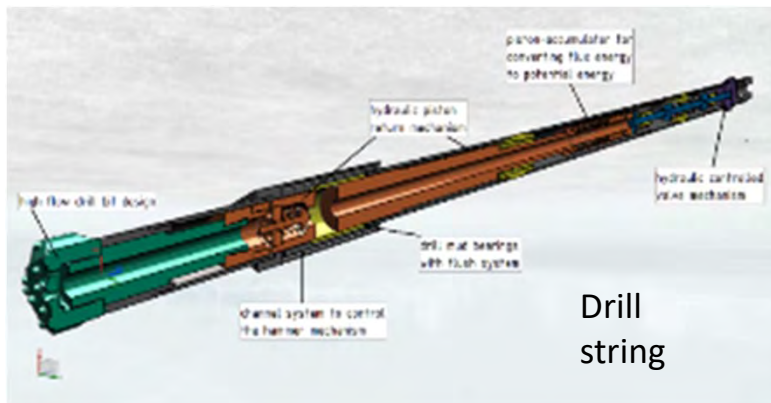
HEA and cermet coating



# Development of Novel Mud Hammer



## Possible DTH fluid hammer assembly (Wassara type)

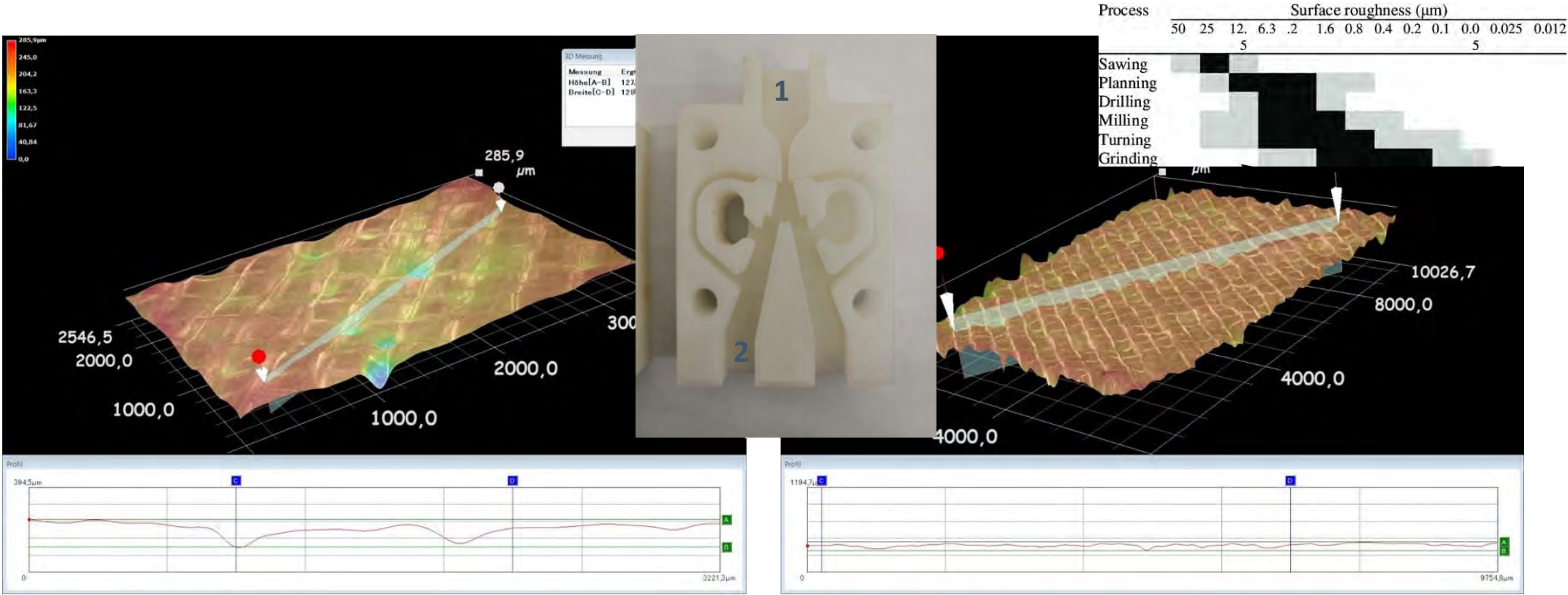


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Wear within hydraulic DTH hammers

# Surface erosion Measurements of wear parts



- $Rz, max \sim 128 \mu m$  at inlet port (1)
- Measured length 1.3 mm
- $Rz, max \sim 124 \mu m$  at outlet port (2)
- Measured length 6.6 mm
- $Rz, max \sim 0.6 \dots 6.3 \mu m$  for fluid bearings and plane surfaces after turning, e.g. piston



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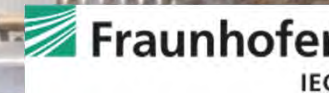
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