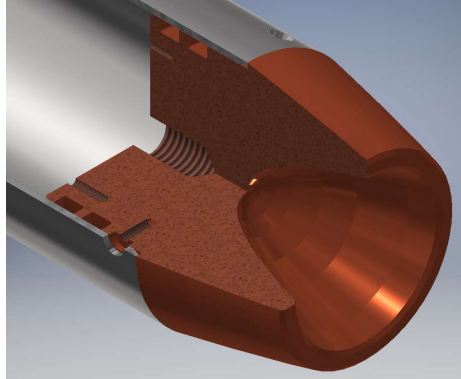# RWTH Technology

## High efficiency head for fast melting probes



### Challenge

For the autonomous exploration of glaciers, polar ice shields or icy moons thermal drills are a good choice. Thermal drills /melting probes need a minimum handling by human operators and the logistic overhead is significantly lower in comparison to mechanical drills. To minimize the mission length and risks a high penetration speed (several meters per hour) is crucial. In order to maximize the speed, the available energy must be used efficiently.

The efficiency of melting probes is defined by the amount of energy used related to the volume of ice that is molten in direction of movement. In common melting probes a high amount of energy is not contributing to the forward movement, due to thermal flow into the surrounding ice and convection in the liquid water. This finally results in widening of the molten channel without contributing to the velocity.

### Solution

The innovative geometry of our melting head is designed for optimal melting in direction of movement. The partly inverted parabolic shape offers a larger contact area to the ice than flat melting heads. At the same time, it homogenizes the projected thermal flux to the front. This way, less energy is lost to the surrounding and the head stays in contact with the ice preventing water convection.

### Advantages

- Highly efficient
- Less mass than parabolic shape
- No central heat accumulation

### Status

- Patent application pending in DE, EP, US, RUS, IND, CHN.
- Ongoing research and Prototype

RWTH Aachen University is looking for partners for patent exploitation and for research partners for joint development and contract research.