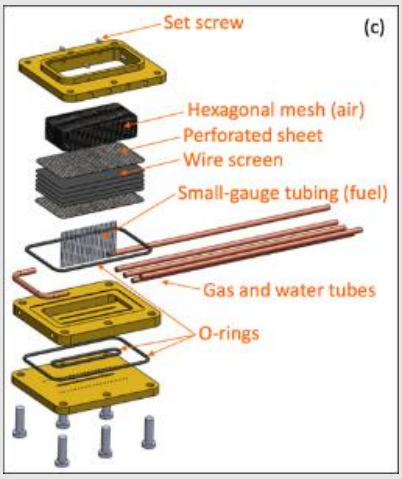
Lehrstuhl für Technische Thermodynamik
Friedrich-Alexander-Universität Erlangen-Nürnberg
Prof. Dr.-Ing. Stefan Will

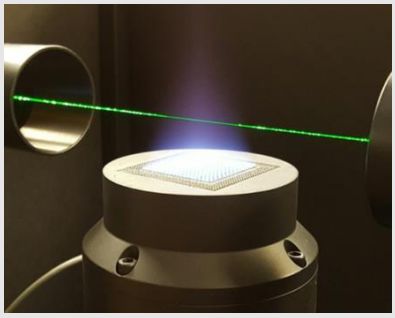
Bachelor thesis
Project thesis
Master thesis

Development, additive manufacturing and characterization of a Hencken-type lab burner

Supervisor: Sebastian Faderl
Starting time: January 2026
Topics: Additive Manufacturing, Combustion



CAD design of a linear Hencken-type burner [1]



Hencken burner during Rayleigh scattering thermometry [2]

The multi-element diffusion burner (MEDB), also called a Hencken-type burner is a classical and well characterized, canonical, near adiabatic, laboratory burner. The original Hencken burner was made by “Research Technologies” and is no longer available as the company dissolved. Many labs around the world built their own burner with similar geometries. The aim of this work is the construction of a MEDB for use as a calibration burner for combustion experiments.
Therefore, it is necessary to design a Hencken burner that is similar to the ones most commonly used. As this type of burner consists of multiple capillaries and a fine honeycomb structure, additive manufacturing is seen as an especially useful tool to create these geometries. The burner itself should be fuel flexible, it needs to handle fuels such as ammonia, hydrogen and methane. The investigation, design and manufacturing of the burner should be carried out. The 3D printing of the burner will be in collaboration with the Lehrstuhl für photonische Technologien.
After the manufacturing, the burner has to be tested and characterized, measuring its species and temperature. This will be done by using optical diagnostics such as emission spectroscopy or laser diagnostics.
Applicants should bring interest in engineering and design, as well as combustion processes. Knowledge of CAD programs (especially CREO) is useful but not needed. A high degree of initiative and independence is demanded.

[1] M. F. Campbell, G. A. Bohlin, P. E. Schrader et. al; Design and characterization of a linear Hencken-type burner. *Rev. Sci. Instrum.* 1 November 2016; 87 (11): 115114.
[2] Sutton, G., Fateev, A., Rodríguez-Conejo, M.A. *et al.* Validation of Emission Spectroscopy Gas Temperature Measurements Using a Standard Flame Traceable to the International Temperature Scale of 1990 (ITS-90). *Int J Thermophys* **40**, 99 (2019).

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