HSE
Occupational Health & Safety
and Environmental Protection unit

Karlsruhe Institute of Technology

Cryogenic Pressure Relief Valve Sizing Tool

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Motivation and Goal

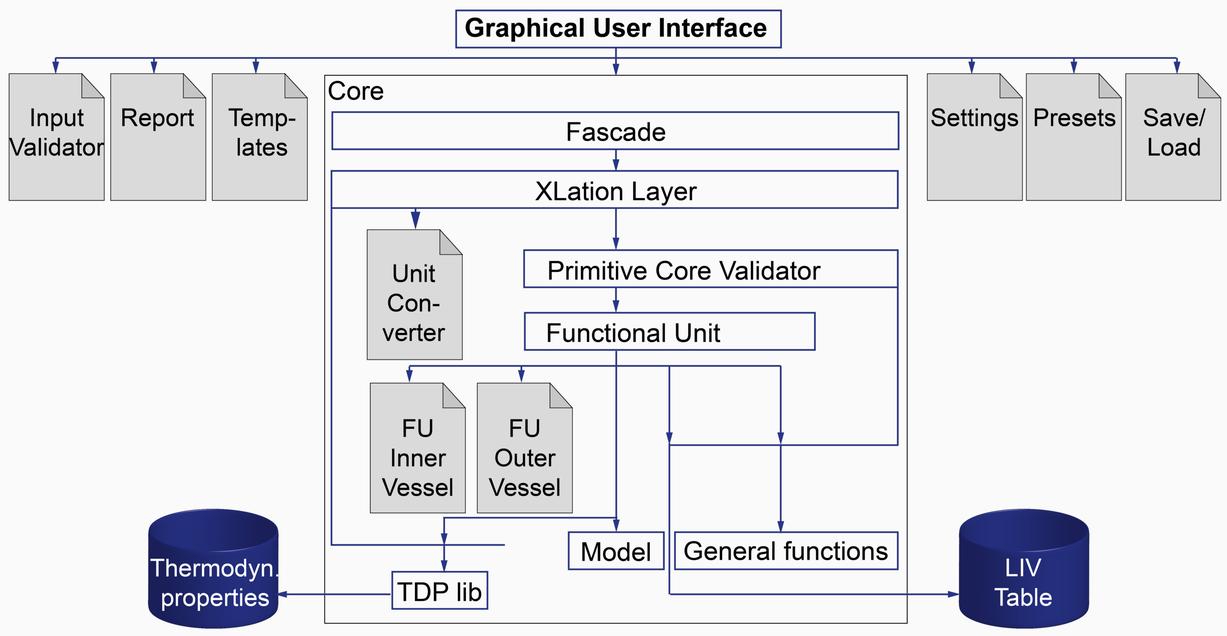
- Differences in cryogenic design practices
- Different understanding of risk

Kryolize

- Harmonization of the sizing approach:
  Dimensioning simpler, more efficient and less error prone.
- Development of a user-friendly software to provide a systematic sizing approach of cryogenic PRD.

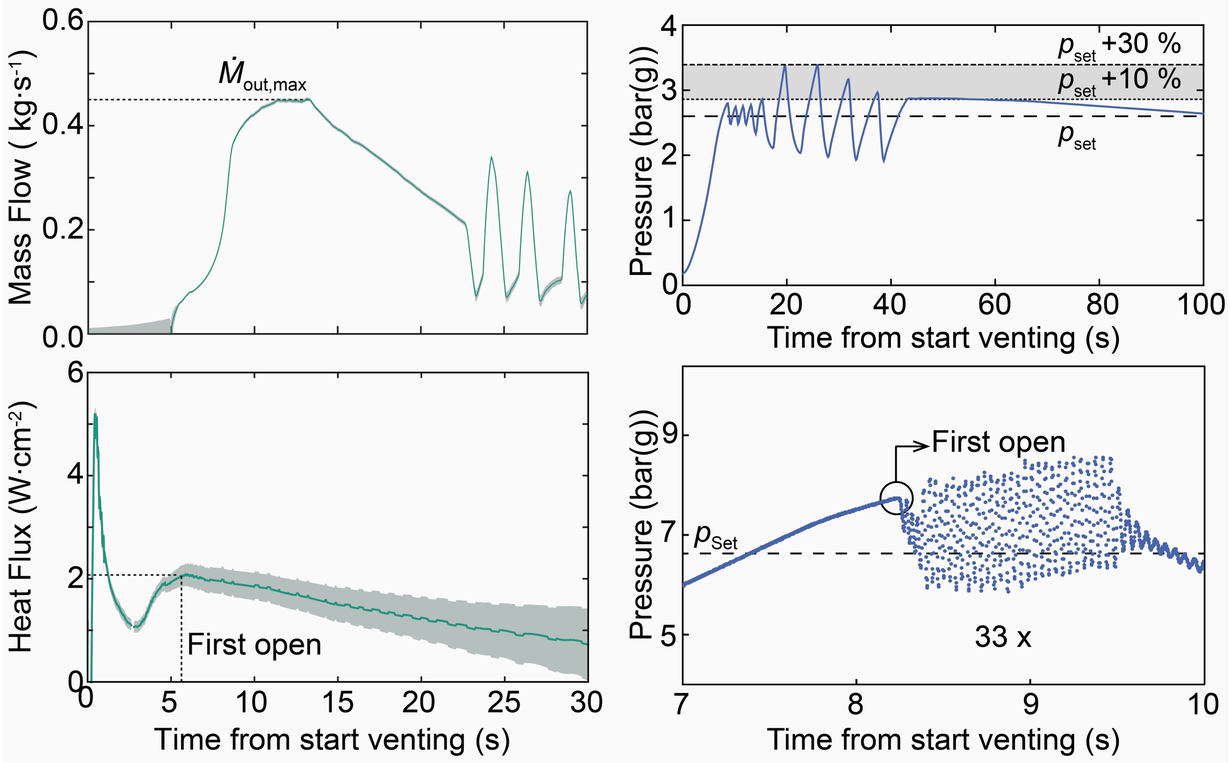
Approach: Kryolize software

- Based on state of the art knowledge and today's best practice from industry and research
- Reference to EN, ISO, API Standards
- Sizing approach harmonized with PED
- Python architecture allows discrimination between input related and functional logic components
- Two evaluation parts:
  1) Front-end: executable file
  2) Back-end: Independently stored in library
- Financed by CERN'S HSE Unit and Knowledge Transfer Group



R&D Experiments

- State of the art sizing experimentally tested in the framework of R&D collaboration between CERN and KIT



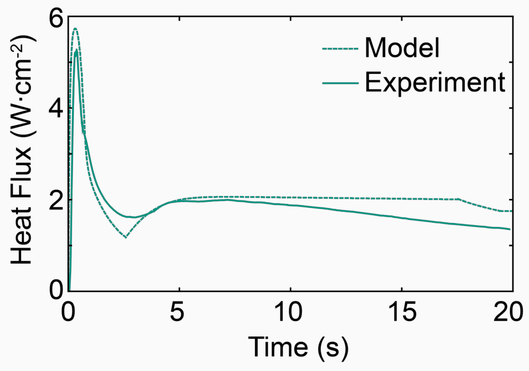
Publication Ref.	Heat flux (W/cm²)	Add. info
Lehmann, Zahn	3.8	@ Maximum peak
Weber, Henriques et al.	2.1	@ PRD first opening

May lead to:
1) Unstable operation
2) Impermissible overpressure

Future improvements

The Kryolize Professional software is currently running with v2.1.
Already foreseeing further improvement (work under development) :

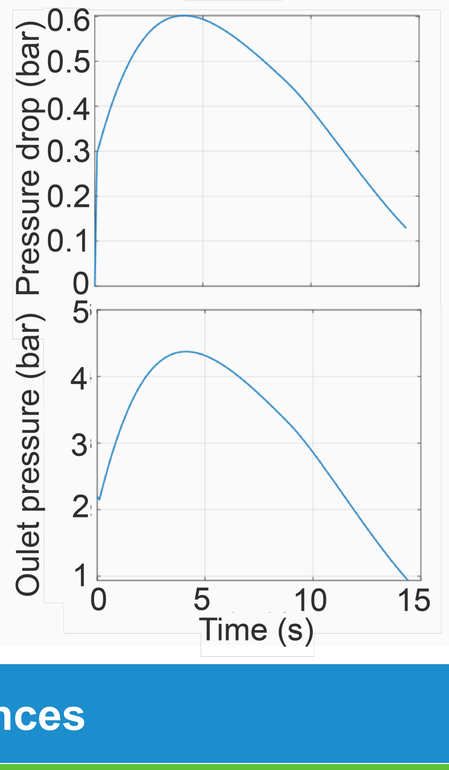
1) Dynamic modeling for estimation of the heat load



- Already good agreement with measurement data
- Further investigation needed

2) Sizing model for transfer lines

Optimize $\frac{\dot{m}_{line}}{\dot{m}_{PRD}}$; $\downarrow \Delta P_{line}$



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