NTNU

Knowledge for a better world

Self Presentation - RAMS Seminar:

Leonardo Giannini

Gioacch

f Seville

Valentino

Champion

Lila – the best dog of the world

University of Bologna

Bachelor's degree

ENERGY ENGINEERING – 3 years

Termodynamics and Dynamics of Fluids
Conventional energy production systems
Nuclear Power Plants

Master's degree

ENERGY ENGINEERING – 2 years

Solar Energy and Heat Pumps
Plasma Technologies
Pollutants Production and Managment
Sustainable and Unconventional Fuels

SH2IFT - Safe Hydrogen Fuel Handling and Use for Efficient Implementation

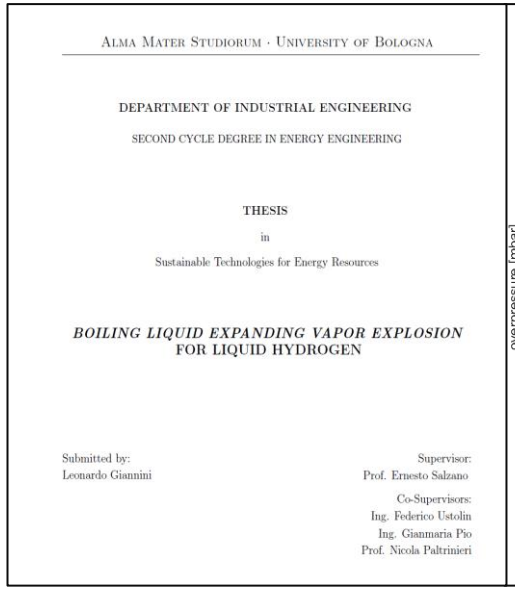
"The SH$_2$IFT project shall increase competence within safety of hydrogen technology, especially focussing on consequences of handling and use of large volumes and within closed and semi-closed environments and in maritime transport."

Liquid Hydrogen Tank

***B**oiling **L**iquid **E**xpanding **V**apor **E**xplosion*

SH2IFT - Safe Hydrogen Fuel Handling and Use for Efficient Implementation

Final Thesis:
Boiling Liquid Expanding Vapor Explosion For Liquid Hydrogen



ALMA MATER STUDIORUM · UNIVERSITY OF BOLOGNA

DEPARTMENT OF INDUSTRIAL ENGINEERING

SECOND CYCLE DEGREE IN ENERGY ENGINEERING

THESIS

in

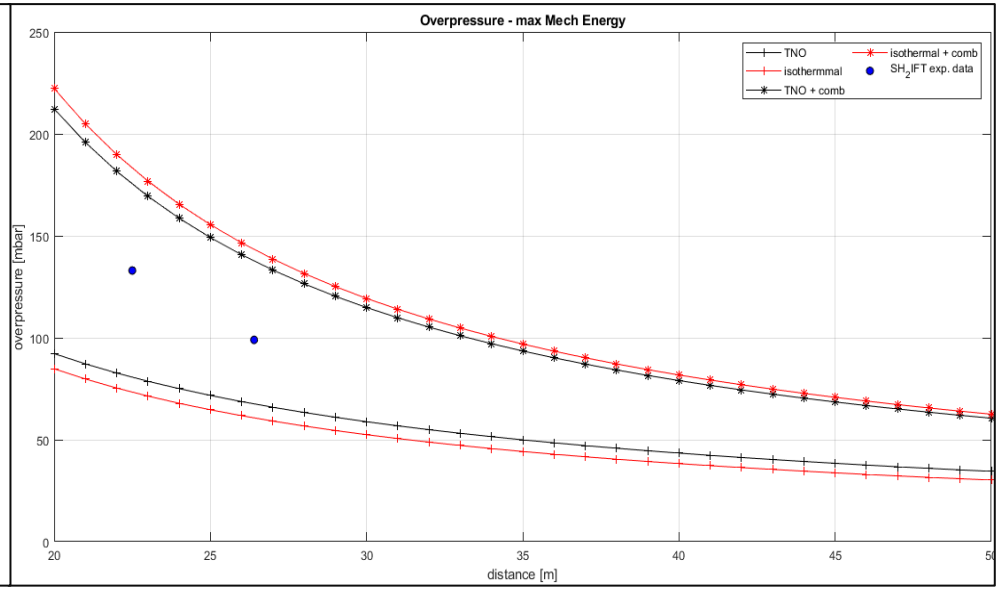
Sustainable Technologies for Energy Resources

BOILING LIQUID EXPANDING VAPOR EXPLOSION
FOR LIQUID HYDROGEN

Submitted by:
Leonardo Giannini

Supervisor:
Prof. Ernesto Salzano

Co-Supervisors:
Ing. Federico Ustolin
Ing. Gianmaria Pio
Prof. Nicola Paltrinieri



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On the Mechanical Energy Involved in the Catastrophic Rupture of Liquid Hydrogen Tanks

Federico Ustolin[a,*], Leonardo Giannini[a,b], Gianmaria Pio[b], Ernesto Salzano[b], Nicola Paltrinieri[a,b]

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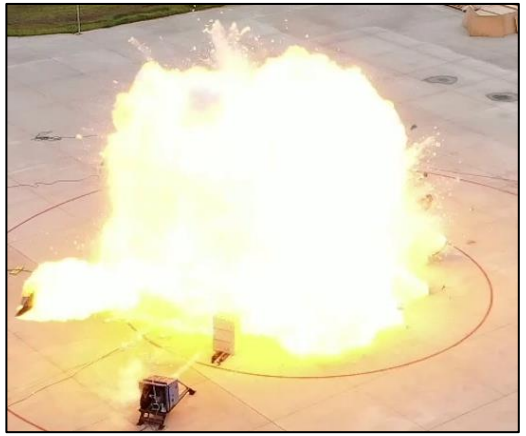
[b]Dipartimento di Ingegneria Civile, Chimica, Ambientale e dei Materiali, Università degli studi di Bologna, Via Terracini 28, 40131 Bologna, Italy

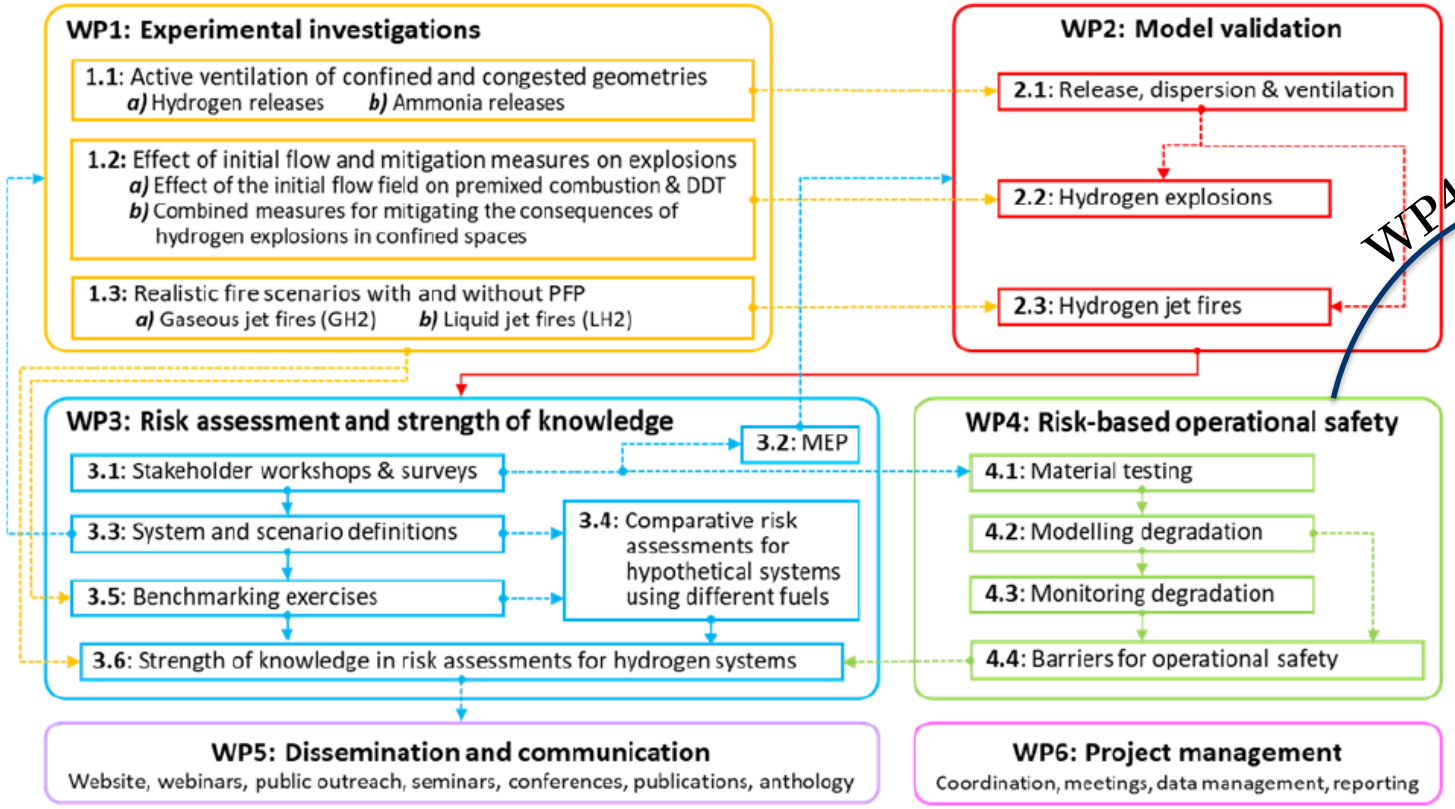


Peer Reviewed Conference Paper

SH2IFT II

NTNU

"SH2IFT-2 will explore a risk-based approach for operational safety. Materials testing will be conducted to study material compatibility and degradation characteristics. Modelling and measurement of degradation processes will constitute a basis for lifetime prediction. Barriers for operational safety will be designed for risk-based guidelines for inspection planning.



My PhD:

Risk-Based Inspection and Maintenance for Safe Handling and Use of Hydrogen

Main Supervisor: Professor Nicola Paltrinieri

Co-Supervisor: Associate Professor Federico Ustolin

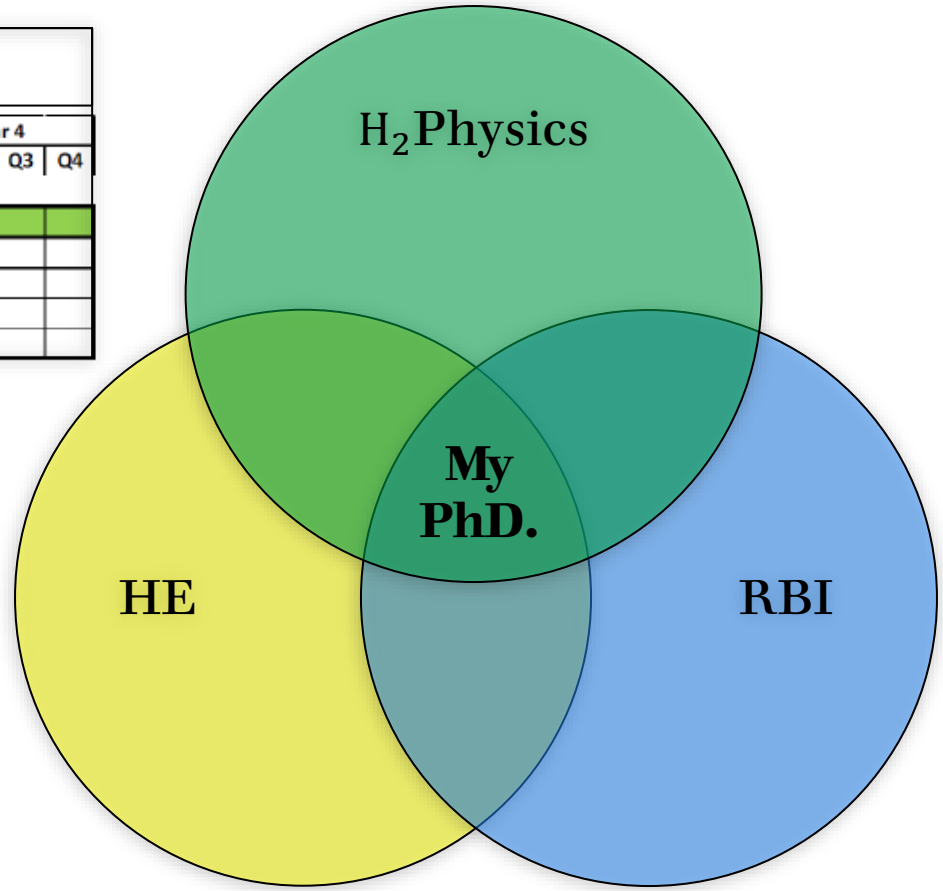
Co-Supervisor: Senior Researcher Antonio Alvaro (SINTEF)

WP4: Risk-based operational safety

		Year 1				Year 2				Year 3				Year 4			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
WP4	Risk -based operational safety																
T4.1	Material testing							D4.1									
T4.2	Modelling degradation mechanisms													D4.2			
T4.3	Monitoring degradation mechanisms														↓		
T4.4	Barriers for operational safety														D4.3		

My PhD:

- Hydrogen Physics: Chemical and Physical Properties
- Materials: Metal-hydrogen interaction, Hydrogen compatibility with steels, Hydrogen Embrittlement (HE)
- Safety: Risk-Based Inspections (RBI)



My current research:

Conference Papers for OMAE 2023 and MESIC 2023

Materials for Hydrogen Storage and Transport: Implications for Risk-Based Inspection

Inspection Planning in the Marine Sector, a Case-Study of a Hydrogen-Fueled Fishing Boat

mesic
Manufacturing Engineering Society International Conference

10th edition
28 · 30 june 2023
Escuela Técnica Superior de INGENIERÍA DE SEVILLA

MANUFACTURING ENGINEERING SOCIETY

UNIVERSIDAD D SEVILLA 1505

Escuela Técnica Superior de INGENIERÍA DE SEVILLA

My future research:

Risk-Based Inspection and Maintenance for Safe Handling and Use of Hydrogen

WP4: Risk-based operational safety

		Year 1				Year 2				Year 3				Year 4			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
WP4	Risk -based operational safety																
T4.1	Material testing							D4.1									
T4.2	Modelling degradation mechanisms													D4.2			
T4.3	Monitoring degradation mechanisms														↓		
T4.4	Barriers for operational safety														D4.3		

SH2IFT II

- Is it possible to effectively assess the HE effects?
- What is the role of the operating conditions?
- What are the implications on RBI?
- Is it possible to implement mitigation procedures?

For more information see :

www.ntnu.edu

Thank you for the attention!

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NTNU ENERGY
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