# FRANCESCO BALDUZZI

# MECHANICAL ENGINEER



# PERSONAL DATA

 Via Giuseppe Bezzuoli 12, 50142, Firenze
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Date of birth:12.05.1985
Nationality: Italian

# EDUCATION

#### 1999-2004 **High School Diploma (100/100)** Liceo Scientifico Piero Gobetti, Bagno a Ripoli (Firenze)

2004 – 2007 Bachelor's degree, Mechanical Engineering (110/110 with honors) Università degli studi di Firenze, Firenze

2007-2009

Master of Science, Mechanical Engineering (110/110 with honors) Università degli studi di Firenze, Firenze

2010-2012 PhD, Industrial and Reliability Engineering Università degli studi di Firenze, Firenze

# LANGUAGE SKILLS

ITALIAN: Mother tongue ENGLISH: Fluent FRENCH: Good RUSSIAN: Basic

# **WORK EXPERIENCE**

## Department of Industrial Engineering, Università degli Studi di Firenze Firenze | Jan 2013 - present

## **Assistant Professor**

## **RESEARCH ACTIVITIES**

Techincal supervisor of all CFD activities for the REASE (Reciprocating Engines and Advanced Systems for Energy) group of the Dept. of Industrial Engineering:

- Design and optimization of internal combustion engines
- Steady and transient CFD simulation of reciprocating compressor for the prediction of the working cycle
- Conjugated Heat Transfer (CHT) simulations for the analysis of compressor's refrigerating systems
- CFD simulation of the scavenging process of 2-Stroke engines
- Unsteady CFD simulation of Low Pressure Direct Injection systems (LPDI) and High Pressure Direct Injection systems (HPDI)
- Advanced CFD simulation of the combustion process of internal combustion engines
- CFD analysis of turbocharger 's components
- Development and validation of 2D and 3D CFD models for the simulation of vertical axis wind turbines and horizontal axis wind turbines
- Development and validation of simplified CFD models for the simulation of wakes generated by vertical axis wind turbines and horizontal axis wind turbines
- Multi-phase and multi-physics simulation of the H2 generation process inside alkaline electrolyzers

## **TEACHING ACTIVITIES**

- Subject "Laboratory of Operating Machines", Master Course of Mechanical Engineering
- Subject "Internal Combustion Engine Development and Innovation", Master Course of Mechanical Engineering
- Subject "Energy Systems", Bachelor course of Management Engineering

# Fondazione ITS Energia e Ambiente Colle di Val d'Elsa (Siena) | Jan 2022 - present

## **Adjunct Assistant Professor**

Project "Industria@Energia - Tecnico Superiore per l'Industria 4.0: Progettazione digitale e sostenibilità energetica dei sistemi, dei prodotti e dei processi"

• Sistemi energetici per processi e prodotti ad alta efficienza

# ICAD (Internation Consortium for Advanced Design) Firenze | May 2018 - September 2024

## Researcher

CFD specialist for fluid machines and energy systems:

- Internal Combustion Engines
- Reciprocating compressors
- Micro-Wind turbines
- Cryogenic piston pumps
- Alkaline electrolyzers

# IT SKILLS

Excellent skills in using softwares such as: Microsoft Office | Ansys Fluent | Ansys CFX | Ansys Workbench | OpenFOAM | Converge CFD | TurboCFD | Altair Hyperworks | Ricardo WAVE | SolidWorks | Linux and MacOS operating systems

Programming codes: Matlab, C++, Python

# **PERSONAL SKILLSET**

#### **Organization skills**

Good experience in project or team management matured in years of partnerships with external companies (Baker Hughes, Ferrari, Piaggio, Betamotor, McPhy, Yanmar and many others), international universities (Politecnico di Milano, TU Berlin, Lancaster University, Delft University of Technology and many others) and to the supervision of interships of PhD and Master students.

Organisation of small groups for the support to the studies (turoring in maths and physics).

#### Adaptability / Flexibility

The experiences gained while working on different projects related to a large vaiety of topics make me an element ready for sudden changes, available, with a flexible mindset

#### **Communication skills**

Good ability to adapt to multicultural environments, acquired during my university and working experience, as well as through both having grown up in a multiethnic religious community and a passion for traveling all around the world.

# CITATIONS

#### ASN2018

Abilitazione Scientifica Nazionale, sector 09/C1 for Associate Professor, valid since 26/07/2018

# TEACHING ACTIVITY

## **Visiting Professor**

Peter the Great St. Petersburg Polytechnic University (SPbPU) St. Petersburg (Russia) | Nov 2019

• Lecturing in English on "Reciprocating machines"

# Higher education teaching professional

Securgreen Course Prato | Nov 2011 - Feb 2012

• High-education project supported by the Tuscany Region

# **Didactic support**

Department of Industrial Engineering, Università degli Studi di Firenze Firenze | Jan 2010 - present

- Didactic support to the teaching course of "Internal Combustion Engine" (MSc in Mechanical Engineering)
- Didactic support to the teaching course of "Operating machines" (MSc in Mechanical Engineering)
- Didactic support to the teaching course of "Internal Combustion Engine Development and Innovation" (MSc in Mechanical Engineering)
- Didactic support to the teaching courses of "Industrial Energy Management" and "Power Plants and Cogeneration"
- Supervisor of more than 30 MSc theses and scientific co-supervisor of 7 PhD theses

# SCIENTIFIC RECORD

- Author or co-author of more than 100 research articles published in international journals or presented at international and national conferences
- On December 11, 2024 the Scopus database reports 118 items, with more than 2500 citations, h-index 22

# **HONOURS AND AWARDS**

## Winner of research grant

Funded by Fondazione Cassa di Risparmio di Firenze for the subject "Energy, environment and sustainability" | 2016-2017

• Project title: Development of a novel approach for the siting of mini-micro wind turbines

# Winner of funded project

## Fondazione Cassa di Risparmio di Firenze | 2017

Project title: High-computing resources applied to novel approaches for the siting of mini-micro wind turbines