Dion M. Jakobs

PhD Chemical Engineering Candidate at ETH Zürich
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Education

ETH Zürich Zürich, Switzerland PhD in Chemical Engineering with Prof. Dr. Gonzalo Guillén Gosálbez Sustainable Process Systems Engineering Lab	September 2023 – Current
<i>RWTH</i> Aachen University Aachen, Germany Masters of Science in Chemical Engineering Grade: 1.4, Dean's List	October 2021 – March 2023
Imperial College London London, United Kingdom Visiting Researcher: Master's Thesis with BASF	October 2022– March 2023
<i>RWTH</i> Aachen, Germany Bachelor of Science in Mechanical Engineering Grade: 2.0 – 9 th Percentile, Dean's List	October 2017 – September 2021
<i>Carnegie Mellon University</i> Pittsburgh, PA, USA Sponsored Exchange Year: Department of Chemical Engineering	August 2019 – May 2020

Publications

GPA: 4.0 - Dean's List

Publication (Multilevel surrogate modelling of an amine scrubbing process for CO₂ capture) (RWTH/Carnegie Mellon University)

- Research and design thesis for the implementation of different levels of abstraction for surrogate modelling in chemical process simulations
- Extensive work with Aspen Plus simulations and surrogate modeling methods such as artificial neural networks and kriging.
- Published in AICHE Journal as equal contribution first author in cooperation with Prof. Larry Biegler. DOI: <u>https://doi.org/10.1002/aic.17705</u>

Projects

EURECHA Competition/ Publication (CO2 Utilization under Intermittent Electricity Supply: Sorption Enhanced DME Synthesis with an Integrated RSOC Process) (RWTH)

- Winner of the European Committee for the Use of Computers in Chemical Engineering Education Student Competition
- Comprehensive novel dynamic chemical process design for Synthesis Gas & Dimethyl Ether production using Captured CO₂ and Renewable Energy Sources.
 - Developed complete process models in Aspen plus & Matlab.
 - Plant design optimization completed using a Genetic Algorithm. Demand side management/ scheduling optimization completed using GAMS
 - Techno-economic and ecological assessment of the process compared to state of the art processes
 - Invitation to the ESCAPE-32 conference to present the competition results
- Being prepared for publication.
 - Competition Report: <u>https://www.wp-cape.eu/wp-</u> content/uploads/2022/07/RWTH Eurecha Report with License.pdf

Masters Thesis (Optimization of a high temperature Proton Exchange Membrane fuel cell for industrial cogeneration) (RWTH/Imperial College London)

• Developed, parameterized, and optimized a novel mechanistic model of a high temperature proton exchange membrane fuel cell for cogeneration purposes.

- Created an MINLP optimization problem for process specific unit operation sizing and the fulfillment industrial heating and electricity requirements via decarbonized technologies.
- Joint research project between Academia (RWTH & Imperial College) and BASF

Bachelor Thesis (Development of a Semantic Database for Chemical Processes) (RWTH)

- Development of knowledge graphs and ontologies for chemical process engineering knowledge from mined publications
- Implemented a knowledge graph in a Virtuoso database using developed Python scripts and the OntoCAPE ontology.

Undergraduate Student Research (Carnegie Mellon University / Grossmann Group)

- Created extension to Hydrogen network optimization problem by implementing reliability of essential units to the optimization model
- Gained experience in process engineering optimization, modeling, and professional research

Design of Dimethyl Ether Plant (Carnegie Mellon University)

- Created complete design proposal based on product quality requirements i.e. product purity, product quantity
- Research of the process, material and energy balances in Excel and Aspen Plus, and economic evaluation

Work Experience/Internships

Research Assistant, Research Center Jülich IEK-10

- Working for a Ph.D. candidate on his research on Koopman Linearization
- Developing neural networks to act as Koopman predictors of switching non-linear dynamic systems in Pytorch
- Implement a model predictive controller (MPC) to control switching non-linear dynamic systems with gurobipy.

• Working for a Ph.D. candidate on his research on Dynamic Ramping constraints

- Formulating and solving sparse regression optimization problems in Pyomo/Python
- Modelling and solving a demand side optimization of a dynamic Chlorine Alkali Electrochemical Cell

Intern, FAI FTC Pontevico, Italy

• Forging, casting, welding and repair workshop internship

Intern, Evonik Operation GMBH Hanau, Germany

- Chemical engineering specific internship working in a product development laboratory.
- Self-sufficiently worked to develop, produce, and analyze new product prototypes.

Intern, Seco Tools Düsseldorf, Germany

- CNC Machining including milling, turning, drilling, filing etc.
- Developed organizational system to introduce 5S methodology on the production floor

Intern, KRAFFT Walzen Düren, Germany

Welding Internship

Further Experience & Activities

- Olympic & Half Ironman triathlons, Salsa & Bachata dance performance team, Football/Soccer, Camping & Hiking
- Member of the Mechanical Engineering Student Council at RWTH Aachen
- AICHE Member
- Organizer, chair, and participant in many Model United Nations conferences
- Saxophone player, Cooking

Skills

Laboratory: Industry Lab Experience (Evonik), Technical Measuring Laboratory (*Messtechnisches Labor*) Software/Applications: Matlab, Python, Aspen Plus, GAMS, Pyomo, Pytorch, Dymola, Java, Autodesk Inventor, Siemens NX10, MS Office, Latex

Languages: English – Native Speaker, German – Fluent

June 2022-November 2022

November 2021-April 2022

July 2021- August 2021

April 2021 - June 2021

August 2018 - September 2018

July 2018 - August 2018