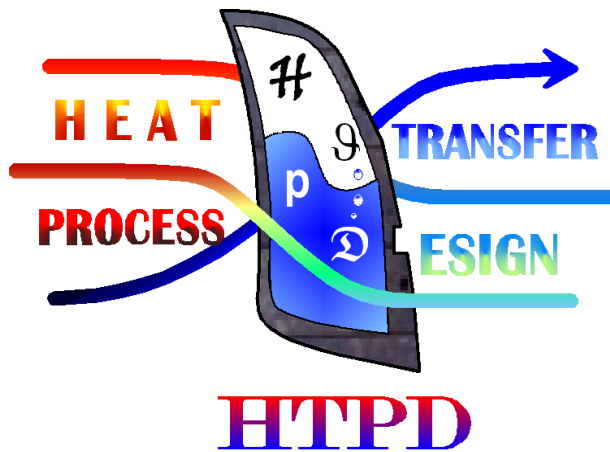


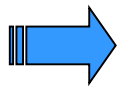
COMPANY PRESENTATION

Heat Transfer and Process Design (HTPD)



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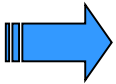


INTRODUCTION

HTPD is the engineering consulting company for the development and the realization of new innovative technologies in **automotive, process** and **plant engineering**.

The company supports in **planning, design, optimization and project management of entire engineering process chains**. In addition, we also carry out the automation tasks for you. From project planning to commissioning.

With modern engineering and project management tools support HTPD experts our customers in all phases of development, from **specification** to **prototyping, development** and **testing**. These benefits mean for you, a lower coordination costs, lower development- and product costs as well as shorter project implementation time.



INTRODUCTION

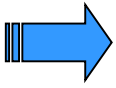
Year Founded: 2008 as part of a spin-off program at the University of Paderborn

The **core competences** are the planning, optimization, and research in the field of **heating, refrigeration, air conditioning, energy and process Engineering**:

1. **Conception, design and calculations** of heating and cooling systems
2. **Planning and dimensioning** of thermal systems, components
3. **Optimization** of thermal and thermodynamic processes
4. Process discovery and **process optimization and automation**
5. Interim **project management** and **technology consulting**
6. **Product design** and certification
7. Business Development
8. Industry automatization

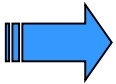
Cooperative Partner: University of Paderborn, Steinfurt FH Münster.





TEAM

1. - Dr.-Ing. Process Engineering, **Consultant/General manager** , (17 a)
2. - Dipl.-Ing. MBA Mechanical Engineering, **CAD/FEM expert**, (19 a)
3. - Dipl.-Ing. Electrical engineering, **Control engineering expert**, (26 a)
4. - Dipl.-Ing. Mechanical Engineering, **CAD, FMEA**, (26 a)
5. - MSc **Electrical Engineering**, Signal Processing, (5 a)
6. - MSc **Electrical Engineering**, Control Engineering, (5 a)
7. - Dipl.-Ing. **Process engineering, cooling technology**, (7 a)
8. - Dipl.-Ing. **Process Engineering**, (3 a)
9. - Dipl.-Ing. Process engineering, pump rotor technology expert, (10 a)
10. - Dipl.-Ing. Industrial engineer, **thermodynamics** and **CFD expert**, (12 a)
11. MSc Chemical and Energy engineering, **Product design** and **CFD expert**, (4 a)
12. - MSc Mechanical engineering, **CAD design**, (3 a)
13. - **3D CAD design** technician, (3 a)
14. **Technical writer**, Documentation and database, (15 a)
15. Sales, Online Marketing, **Social Media and technical writing**, (2 a)
16. **Sales, Marketing** (2 a)
17. IT-Administrator, **Cloud computing**, Data management (4 a)
18. Bookkeeping (10 a)

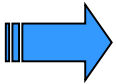


SERVICES

1. Interim Project Management
2. Functional Safety
3. Technology Consulting
4. Process Development
5. Product Development
6. Software and hardware design

Branches:

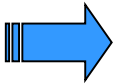
- Automobile
- Building technology
- General Appliance
- Plant construction
- Industry Automatization



PROJECT MANAGEMENT & CONSULTING

Interim Project Leader:

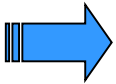
- Project Definition & its objective
- Creation of requirement / specifications
- Schedule & resource planning
- Supplier Management
- Costing & control
- Moderation of Kick-Off & review meetings
- Project Coordination
- Functional analyses
- Functional safety, FMEA-Moderation for VDA and AIAG
- Commissioning
- Business Development



PROJECT MANAGEMENT & CONSULTING

Technology Consulting:

- Consulting on project management and investment planning
- State of the art product and process development
- Ideas for innovative product and process development
- Elaboration of technical specifications
- Cost saving analysis for product and process development (modular system)
- Description of overall process steps for the realization of series production
- Consulting on manufacturing and packaging strategies
- Consulting for certification processes CE, CSA, UL, IECEx, ATEX
- Pressure equipment line ATEX, FM, explosion protection
- Standards and Regulations EU, ASME, CSA, UL, ISO
- Market and competitor analysis
- Consulting in measurement technology (software & hardware and sensors)
- Prototyping
- Construction of testbed and pilot plants
- Advice and preparation of readiness for funding purposes



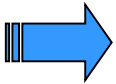
RESEARCH & DESIGN

Process discovery and process optimization:

- Feasibility study and development of process concepts, RI flow sheets
- Creating mass and energy balances
- Creating Process Simulation
- Design and implementation of pilot and testing plant
- Planning, execution and evaluation of experiments
- Model development of processes and plant

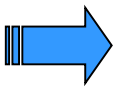
Product development, design, structural analysis and flow simulation:

- Product design and modeling
- Calculation of Single-phase flow, two-phase flow
- Seal design
- Thermal systems/components
- Thermodynamic systems/components
- Ex-devices



CONTROL ENGINEERING

- Development of automation concepts and feasibility study
- E.P.C (Engineering, Procurement and Construction)
- Software creation and configuration of PLC-supported automation systems?
- drive technology and visualization.
- Use of standard software templates such as PackML, S88, etc.
- Start-up, installation and commissioning
- PLC programming, visualization and commissioning
- Plant modernization and system conversion
- Upgrades and Migrations
- Operation and Maintenance (MRO)
- Application and Remote Support
- Embedded systems
- Preventive Maintenance
- Remote Monitoring and Analytics
- Risk analysis, verification and validation of the machine and plants.
- Support for the implementation of industry 4.0
- Functional safety of machines and plants



SOFTWARETOOL

Construction

- CATIA V5
- PTC Creo
- Pro/Engineer Wild Fire 5
- Autodesk Inventor
- MegaCAD
- AutoCAD/Mechanical
- Microsoft Visio
- NX-Unigraphics
- ViCADO

Mathematical modeling

- Matlab
- Maple
- Origin Pro
- Visual Basic
- VBA-Excel

Automation

- Labview
- Simulink
- CoDeSys
- C++
- SPS
- Comos

Simulation & Visualisation

- Abaqus
- Star-CD
- Star-CCM+
- OpenFOAM
- Ansys – Fluent
- Siemens NX-Flow

Functional safety

- APIS, IQ-RM PRO

Documentation & Database

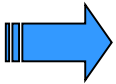
- DOORS
- LaTeX
- MS Office
- Lotus Notes
- SAP
- InDesign
- GIMP

Project-, Product Management

- MS Project
- PTC Windchill PDMLink
- PTC Windchill ProjectLink
- Comos

Prototyping:

- 3D-printing, Object Eden260VS



RESEARCH & DESIGN

Control engineering

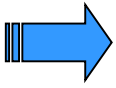
- Engineering and design software for PLC Studio 5000
- Seamless access and high performance communication RSLinks
- PCWORX für PLC-Programmierung
- EthernetIP
- RSnetworx
- PackML

Simulation & Visualization

- Rockwell software for HMI FactoryTalk View Studio
- FactoryTalk Energy Metric
- MES solutions for the discrete and flexible manufacturing EFLEX
- Ansys- Fluent
- OpenFOAM
- Simens NX-Flow

Functional safty

- SISTEMA calculation tool to calculate the Performance Level from the **safety**-related parts of a machine's control system to (EN) ISO 13849-1



REFERENCES

