



TLK-Thermo GmbH

Engineering Services and Software for Thermal Systems.

Computer Simulation | Measurement | Software | Consulting | Training



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Engineering Services and Software for Thermal Systems

TLK-Thermo GmbH offers engineering and software services for thermal systems with a focus on mobile applications, such as air conditioning, brake, fuel cell or thermal management systems. The services cover computer simulation, measurement, software, consulting and training. TLK-Thermo was founded in 2003 as a spin-off of the Institute of Thermodynamics, Technical University of Braunschweig. The founding team has been working together since 1996 in R&D with a focus on mobile air conditioning and refrigeration systems.

Simulation

TLK-Thermo GmbH is well experienced in computer simulation of thermal systems, focusing on mobile air conditioning and refrigeration systems as well as brake systems and thermal management systems in general.

TLK offers the following simulation services:

- System and component design.
- System and component optimization.
- Model validation with measurement data.
- Feasibility studies.

TLK works with the following tools:

- Modelica Library TIL for fluid systems such as air conditioning, refrigeration and heat pump systems as well as cooling systems.
- Modelica Library AirConditioning of Modelon.
- Several CFD software programs with complex hybrid mesh generation.
- C++ and Modelica libraries (TILFluids) for thermophysical data of materials and fluids, heat transfer and pressure drop correlations, numerical methods, optimization and visualization.
- Matlab and Simulink.
- TISC for platform independent co-simulation and tool coupling.

Measurement

TLK-Thermo GmbH offers measurement services with the following facilities, in co-operation with the Technical University of Braunschweig, Institute of Thermodynamics. Various natural and synthetic refrigerants can be used including R744, R134a and newly-developed mixtures.

Calorimetric test rig for air conditioning and heat pump systems and their components:

- Steady state and transient measurements with ambient conditions in the range from -20°C to 50°C and controlled humidity.
- Measurement of a/c, refrigeration and heat pump systems with up to 25 kW cooling capacity.
- Energy analysis using calorimetric evaporator balances, refrigerant balances, air balances and compressor torque.

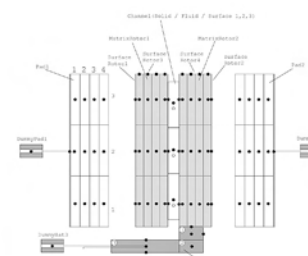
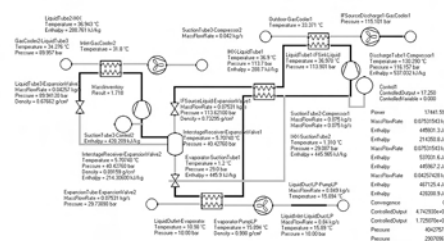
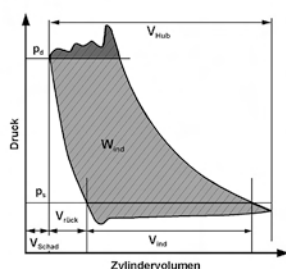
Test rig for R134a TXV and R744 valves for steady state and transient measurements.

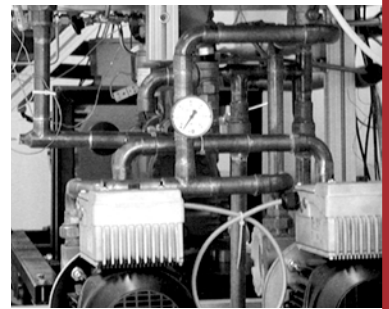
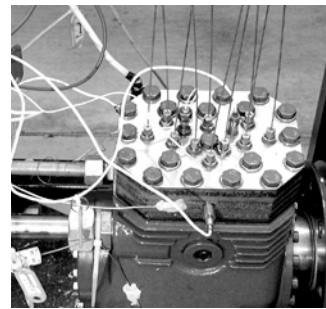
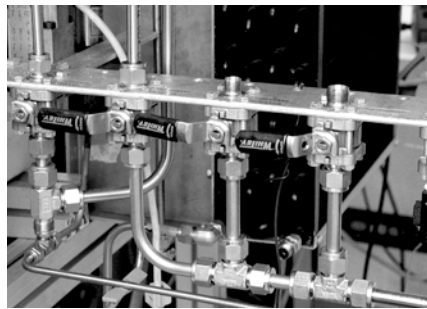
Test rig for R744 accumulators including a glass accumulator for steady state and transient measurements of refrigerant mass and outlet quality.

Test rig for R744 compressors with a large range of speed and refrigerant flow rates for measurement of efficiencies and indicator diagrams.

Thermal imaging with 14 bit temperature resolution and high accuracy calibration.

Air flow visualization with Particle Image Visualization (PIV) and 2-D Laser Doppler Anemometry.





Software

TLK-Thermo GmbH has a wide expertise in developing platform-independent software based on object-oriented methods using C++ for code implementation and Qt for graphical user interfaces.

Software products:

TISC®

Middleware for coupling software such as ASCET, Modelica/Dymola, Matlab/Simulink, Flowmaster, Kuli, Fluent, StarCD, LabVIEW, Trnsys and others.

StateViewer

Advanced graphical thermodynamic presentation and documentation of fluid data produced in simulation and measurement.

TIL

Advanced Modelica library for simulation of fluid systems such as heat pump, a/c, refrigeration or cooling systems.

TILMedia

Interface to import various fluid and solid property databases into different applications and languages such as Excel, Modelica, Matlab, Python, C++ etc.

User specific software:

TLK develops platform independent software on request. The focus is on simulation techniques for thermal systems including visualization and GUI. TLK uses C, C++, C#, Python, Fortran, Qt, Modelica, Matlab/Simulink and its own libraries.

Consulting

The team of TLK-Thermo GmbH offers consulting services regarding the design and analysis of thermal systems with focus on mobile thermal management e.g. air conditioning, hybrid vehicles or fuel cells. Due to the large R&D experience in alternative refrigeration technologies, TLK-Thermo GmbH is an excellent partner for assisting your R&D projects in this area.

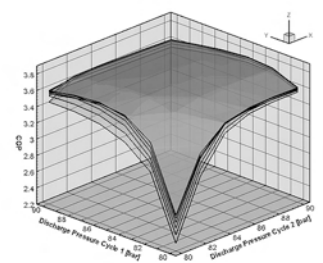
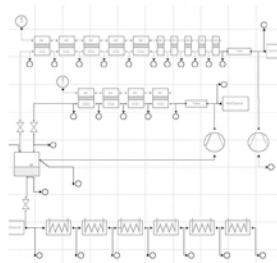
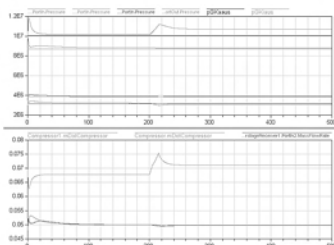
Furthermore, we are able to consult you regarding thermodynamics and heat transfer in general concerning our three working areas: simulation, measurement and software development.

Training

- Three days Modelica training for learning basic and advanced object oriented modeling of thermal systems using Dymola. Please have a look at our web page for the next date.
- Training on mobile air conditioning systems with Modelica libraries TIL and AirConditioning. Dates on request.

References

Audi AG, BMW AG, Behr GmbH & CO KG, BSH Bosch und Siemens Hausgeräte GmbH, Daimler AG, Graaff Transportsysteme GmbH, IAV GmbH, Konvekta AG, Liebherr Verkehrstechnik GmbH, Obrist Engineering GmbH, Robert Bosch GmbH, Shecco Technology, Thomas Magnete GmbH, Visteon Deutschland GmbH, Volkswagen AG



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