Thermodynamics at GUNT

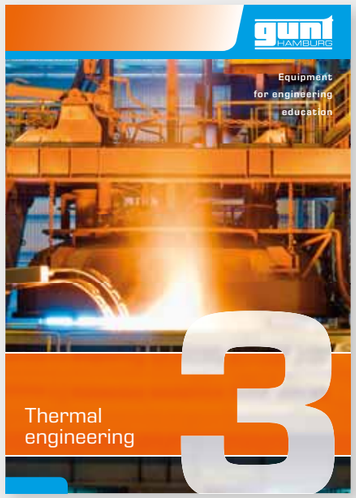
Thermal engineering comprises the discipline of thermodynamics and the specialisation of energy technology.

Thermodynamics as a general study of energy is a fundamental science of technology. It is a fundamental subject in almost all technical courses of study and training.

Thermodynamics is particularly important for energy engineering, e.g. in the planning, construction and operation of power plants. It also plays a key role in the design of fluid machinery such as turbines, compressors, internal combustion engines or drive mechanisms.

In order to cover the extensive topic of thermodynamics comprehensively, GUNT has distinguished the subject areas from each other and compiled them in two catalogues:

The main catalogue is catalogue 3 **Thermal engineering**. One important field of thermodynamics is **refrigeration and air conditioning technology.** GUNT has dedicated catalogue 3a to this topic.



Courses of study,
all engineering sciences, e.g.

- mechanical engineering
- environmental engineering
- applied natural sciences
- industrial engineering
- civil engineering and architecture
- energy engineering
- process engineering

Training in the field of

- refrigeration technology
- mechatronics
- air conditioning technology

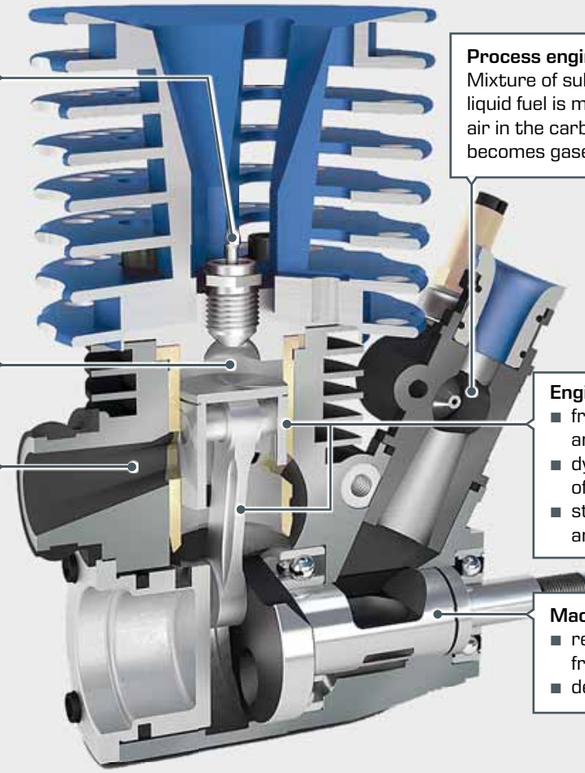
Courses of study

- mechanical engineering
- supply engineering
- civil engineering
- environmental engineering
- refrigeration technology
- building services engineering
- facility management
- climate engineering

Why “Thermal engineering”?

Thermal engineering involves more than pure thermodynamics. In thermal engineering, it is necessary to take account of connections and interrelationships with other disciplines/teaching fields. The example of an internal combustion engine below shows which knowledge from other disciplines is necessary for understanding and design.

Thermodynamics: 1st and 2nd principle, phase change, heat transfer, energetic balancing



Electrical engineering
Ignition: by electrical energy

Chemistry
Conversion of matter: in the combustion chamber, the chemically bound energy of the fuel is released by conversion of matter, fuel becomes exhaust gas

Fluid mechanics
Flow of compressible fluids: fuel and air are added, exhaust gases are discharged

Process engineering
Mixture of substances: liquid fuel is mixed with air in the carburettor and becomes gaseous

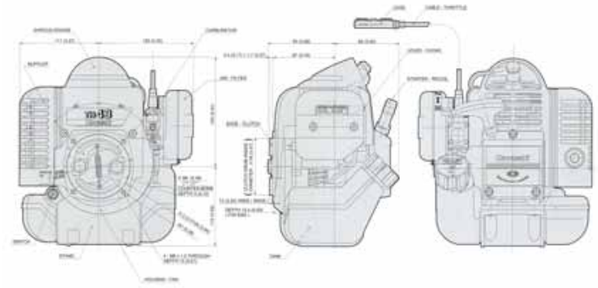
Engineering mechanics

- friction: between piston and cylinder wall
- dynamics: due to motion of the piston rod
- strength of piston rod and crankshaft

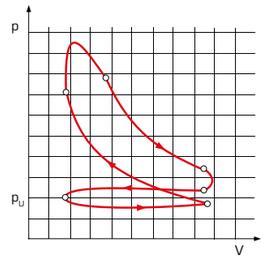
Machine dynamics

- reduce vibrations due to free inertia forces
- design of bearings

Engineering design
Functional and energy-efficient design



Computing and information technologies
For cyclic processes for internal combustion engines, e.g. the Seiliger process



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Structure of the catalogue

Catalogue 3 is divided into five chapters. Firstly, the basics of thermodynamics are discussed as an introduction to the topic. The next section deals with application and practice.

When compiling the **Thermodynamics** product range, GUNT took guidance from the standard curricula and textbooks in use at German universities.

Fundamentals and introduction

Chapter 1 | Fundamentals of thermodynamics

- Thermodynamic state variables
- Principles of heat transfer
- Phase transition

Application and practice

Chapter 2 | Heat exchangers

- heat transfer
- recuperators
- direct-contact heat exchangers
- fluidised bed heat exchanger

Chapter 3 | Thermal fluid energy machines

- steam power plants
- gas turbines
- piston compressors
- internal combustion engines

Chapter 4 | Principles of refrigeration

- principles of cold production
- compression refrigeration system
- refrigeration applications

Chapter 5 | Thermodynamic applications in supply engineering: HVAC

- hot water generation
- air conditioning technology and ventilation
- GUNT-RHLine Renewable Heat

Equipment series in the thermodynamics product range

Chapter 1 | Fundamentals of thermodynamics

GUNT-Thermoline: Fundamentals of heat transfer

Chapter 2 | Heat exchangers

Series WL 110 Heat exchanger with supply unit

Chapter 4 | Fundamentals of refrigeration

Chapter 5 | Thermodynamic applications in supply engineering: HVAC

ET 915 HSI training system refrigeration and air conditioning technology

Chapter 5 | Thermodynamic applications in supply engineering: HVAC

GUNT-RHLine Renewable Heat:

HL 320 Solar thermal energy and heat pump modular system