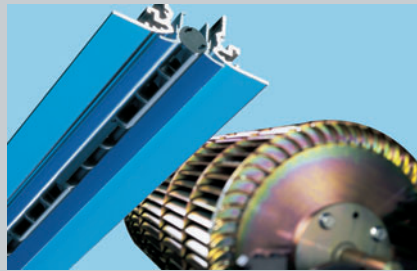




The Innovation Company

LTG Aktiengesellschaft

Railway Technology - Systems, Components, and New Solutions



We do everything for railways that can be improved with air.

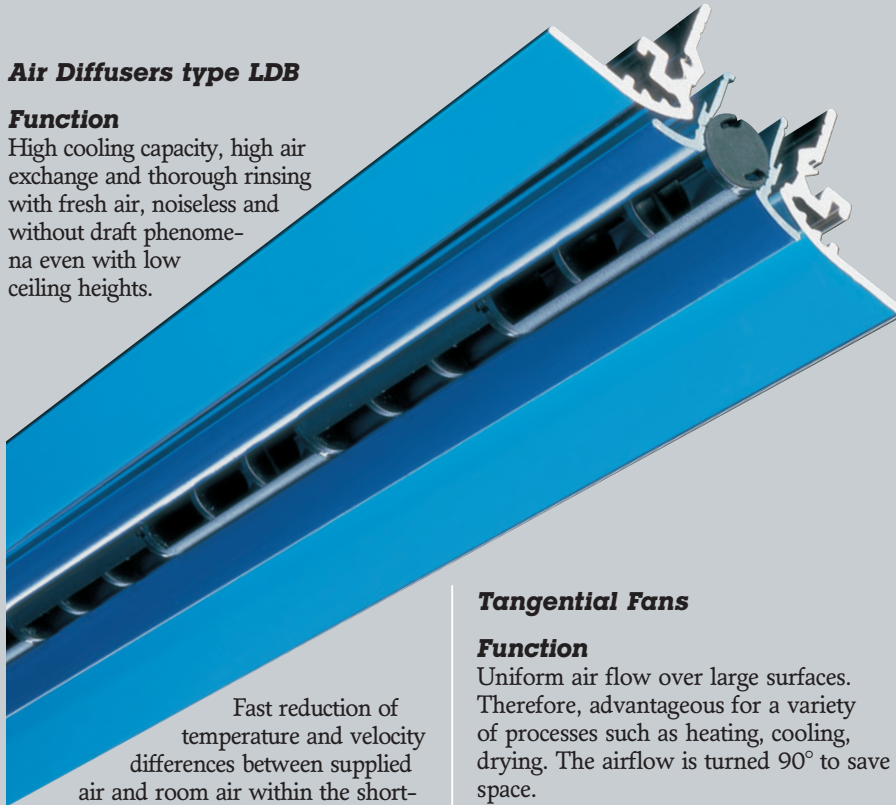
Components and Systems

Rail vehicles are in use for long periods of time. That's why only the best is good enough also when it comes to details.

Air Diffusers type LDB

Function

High cooling capacity, high air exchange and thorough rinsing with fresh air, noiseless and without draft phenomena even with low ceiling heights.



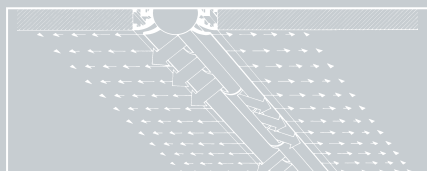
Fast reduction of temperature and velocity differences between supplied air and room air within the shortest distance from the diffuser.

Product Range

- for installation in ceilings, walls, perimeters, floors
- varnished in any color (RAL), anodized, chromium-plated or gold-plated
- single-, dual-, three-, and four-slot version
- all-metal versions available (type LDW)

LTG System clean®

Airborne particles such as dust, tobacco smoke, carpet abrasions, or grease easily deposit in close proximity to the air diffusers. The LTG System clean® almost completely avoids these deposits. Part of the clean supply air is directed as an air curtain along the ceiling thus keeping airborne dust particles from polluting the ceiling. Consequently, maintenance expenses are significantly reduced.

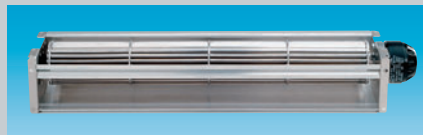


Airflow principle

Tangential Fans

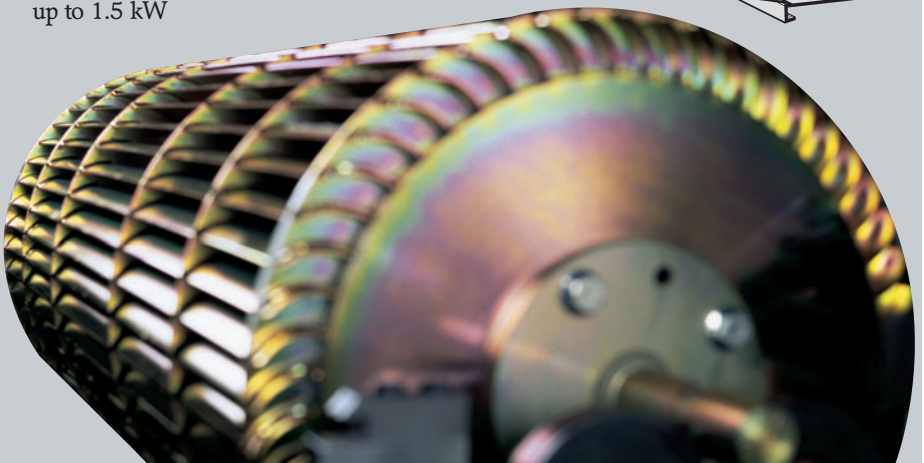
Function

Uniform air flow over large surfaces. Therefore, advantageous for a variety of processes such as heating, cooling, drying. The airflow is turned 90° to save space.



Product Range

- Air/gas temperature: -40 to +700°C
- Impeller diameter: 25 to 800 mm
- Sizes: 60 to 4500 mm
- Airflow rate: up to 160 000 m³/h
- Static pressure: up to 1650 Pa
- Versions with electrical heat register up to 1.5 kW



Generators

Function

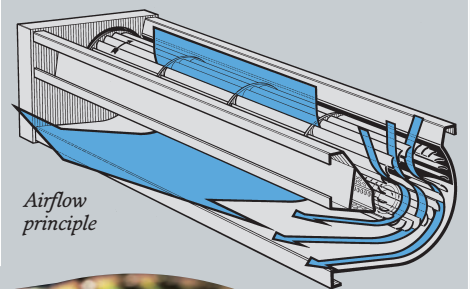
Independent supplemental power generation/storing for refrigerator boxcars



Product Range

Set of hydraulic generators

- 400 V-3ph/50 Hz
- 15 - 30 kVa
- including fittings for installation



Airflow principle

We do everything for railways that can be **improved with air.**

LTG Engineering Services

We are committed to providing results for the utmost benefit of our customers.



Room airflow test

Component functions are also essentially affected by factors such as the installation situation, sizing of the A/C supply media, or a component setting matching actual requirements. LTG Engineering Services support the customer to achieve best results with our products when used in vehicles, e.g. through room airflow tests using scale models, CFD (Computational Fluid Dynamics) room airflow simulation, computation and dynamic simulation of air duct and water pipe systems.

Most tasks have been completed to our customers' satisfaction not by reinventing the wheel but by coordinating the knowledge and experience of the user and of LTG Aktiengesellschaft specialists.

Our state-of-the-art R&D lab offers any means to provide computational and experimental air technology services, thus ensuring optimum conditions to answer, in detail and professionally, any question.



Reverberation chamber for acoustic measurements

Goals we helped our customers achieve

- increase competitiveness
- reduce investment costs
- lower power consumption/operating costs
- ensure the best in thermal comfort
- safer planning and operating stages

Our Range

- Room airflow and wind channel lab tests for simulation and optimization
- CFD (Computational Fluid Dynamics) room airflow simulation
- Air duct and water pipe system computation and dynamic simulation
- Filtration and separation process computation and investigation
- On-site and lab acoustics and aerodynamics investigation to evaluate noise, sound level, attenuation properties, flow rate and pressure level
- Microbiological, gravimetric, and chemical testing of air and humidification water
- Designing and measurement-based technical verification of air technology products
- Designing of airflow/aerodynamics of your subassemblies, machines, and plants



One of the room airflow test rooms



LTG Aktiengesellschaft with its state-of-the-art R&D center

LTG Aktiengesellschaft

We have been working with air for more than 80 years.

Europe's very first air conditioning system was built by LTG. Until today, essential air technology innovations originate from our company.

Our investment in staff education, R&D, and technical equipment is far above standard.

Our product range comprises of **components and systems for room air and process air technology, including Engineering Services.**

We only call it quality if our customer says it's the best.

This is our bottom line with design, manufacturing, and testing. Long-term tested for their mechanical function and with computer-aided measuring techniques tested and optimized for performance. LTG components ensure functional safety for many years. All components are harmonized in the way they are built, in their geometry, and in their function to become an integral and efficient system.

We offer:

Air diffusers for ceilings, walls, and floors, LTG cool wave[®], induction units, fan coil units, decentralized ventilation units, flow rate controllers, labair[®] system: components for lab ventilation, axial, radial and tangential fans, LTG Collector System: fans, filters, separators, compactors, presses, high-pressure humidifiers, air diffusers.

Our Engineering Services offer cooperation whenever a task can be completed using air technology.

Our highly qualified staff and a state-of-the-art R&D center provide optimum conditions to provide perfect solutions no matter what the task.

Best results were always achieved when the knowledge of both partners was combined and used well-targeted. Practical examples.

**High-speed train, Spain
Velaro AVE S103
Air conditioning of passenger
compartments**



Linear air diffuser type LDW

**High-speed train, Germany
ICE 3
Air conditioning of operator
compartments and galleys**



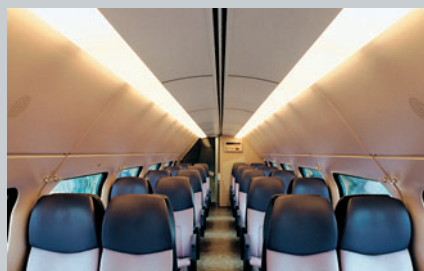
Linear air diffuser type LDB 20/8/1

**Regional train, Slovenia
Desiro ET
Air conditioning of passenger
compartments**



Linear air diffuser type LDB 20/8/1

**Regional train, Netherlands
IRM/VIRM
Air conditioning of passenger
compartments**



Linear air diffuser type LDB 20/8/2

**Metro, Zurich/Switzerland
RABe 514
Air conditioning of passenger
compartments**



Linear air diffuser type LDB 12/-/1
LTG System clean®

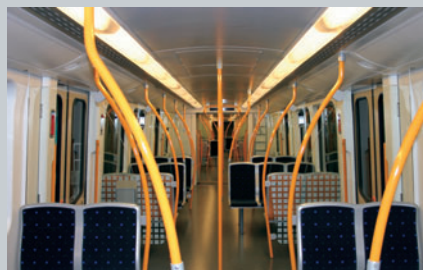
Best results were always achieved when the knowledge of both partners was combined and used well-targeted. Practical examples.

**Commuter train, Kuala Lumpur/
Malaysia – Desiro ET**
**Air conditioning of passenger
compartments**



Linear air diffuser type LDB 12/8/3
LTG System clean®

Metro, Oslo/Norway
Metro MX
**Air conditioning of passenger
compartments**



Linear air diffuser type LDB 12/8/3
LTG System clean®

Tramway, Vienna/Austria
ULF 151
**Air conditioning of passenger
compartments**



Linear air diffuser type LDB 12/8/3
LTG System clean®

Metro, Vienna/Austria
Metro Vienna V-Car
**Air conditioning of passenger
compartments**



Linear air diffuser type LDB 12/8/2
LTG System clean®

Metro, Kaohsiung/Taiwan
Metro Kaoshiung
**Air conditioning of passenger
compartments**



Linear air diffuser type LDB 12/8/3
LTG System clean®

Best results were always achieved when the knowledge of both partners was combined and used well-targeted. Practical examples.

**Regional train, Germany
VT 612
Heating the entrance steps**



To keep the steps clear from freezing, the entrance area is heated using an air curtain.



Tangential fan type TAh 60 with heating register

**Refrigerator car, Europe
Isotherm car WAI 28
Food cargoes**

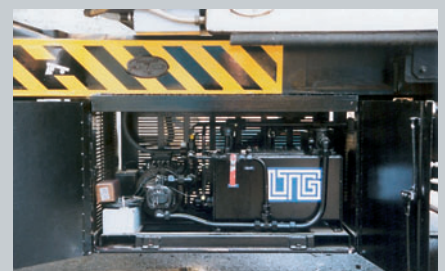


Air circulation in the cargo area using tangential fans to ensure a uniform temperature distribution and a constant temperature level in the entire cargo area. To provide a steady cargo temperature the circulated air inside the boxcar might either be cooled or heated.



Tangential fan type TA 90

**Refrigerator car, Europe
Isotherm car WAI 28
Independent supplemental
power generation/storage**



Hydraulic power generator, axle driven. The generator provides a uniform voltage and power frequency, independent of the driving speed, e.g. to operate the air circulation fan. Independent of the railroad power supply.



Tangential fan type TA 90

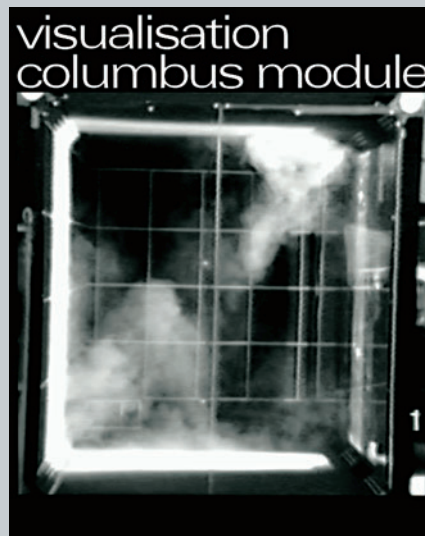
Best results were always achieved when the knowledge of both partners was combined and used well-targeted. Practical examples.

**Regional train, Austria
 City Shuttle
 Improved room airflow**



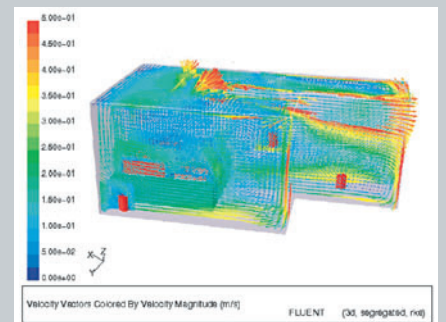
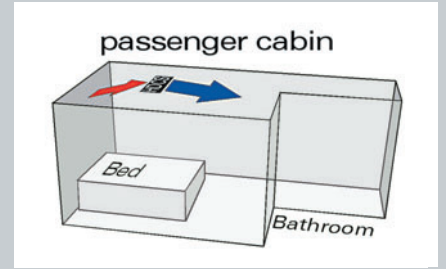
Airflow test, 1:1 scale, to confirm passengers' thermal comfort.

**ISS Space Station
 Improved room airflow**



Optimizing the life support system within the European module of the International Space Station ISS.

**Design of an air conditioning
 unit for mobile single
 compartments**



The air conditioning unit type HDCS requires little room, mixes the extremely cold supply air in low construction volume with the warm air in the compartment, avoids condensation, and creates a comfortable air flow. Integrating a sound absorber and a flow rate controller in the unit also reduces installation time.



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Components for process air technology

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14-11, Shimizu 3-Chome, Kita-Ku
Japan-462 Nagoya
☎ (0 52) 9 91-10 40 · Fax (0 52) 9 14-98 22
E-Mail: main@tohoeng.com

Components for room air technology

Germany

Berlin · Chemnitz · Frankfurt · Freising ·
Herborn · Oberhausen.

Europe

Ladendorf/Austria · Epône/France ·
Wickford/Great Britain · Ermelo/Netherlands ·
Krakow/Poland · Lissabon/Portugal ·
Burgdorf/Switzerland · Ljubljana/Slovenia ·
Istanbul/Turkey.

The Program for Process Air Technology

Components

Axial, radial and tangential fans
LTG Collector System:
Coarse and fine particle filtration
Separating and compacting
Compressing, humidifying

Engineering Services

Technical services for construction engineers
and plant designers during development and
operation of assembly groups, machines and
plants.

The Program for Air Conditioning Technology

Components

Air diffusers for walls, floors and ceilings ·
„LTG System clean“ · Coandatrol® and
Coandavent® air diffusers · LTG cool wave®
chilled fans · Klimavent® induction units ·
Raumluft fan coil units · Airflow control units ·
labair® system

Engineering Services

Technical services for investors, architects,
engineers and plant builders during design,
construction and operation of buildings.
Reliable and precise data relating to the
ventilation or air conditioning system are
given already before realization of the project,
determined by measurements, calculations,
building simulations and experiments.