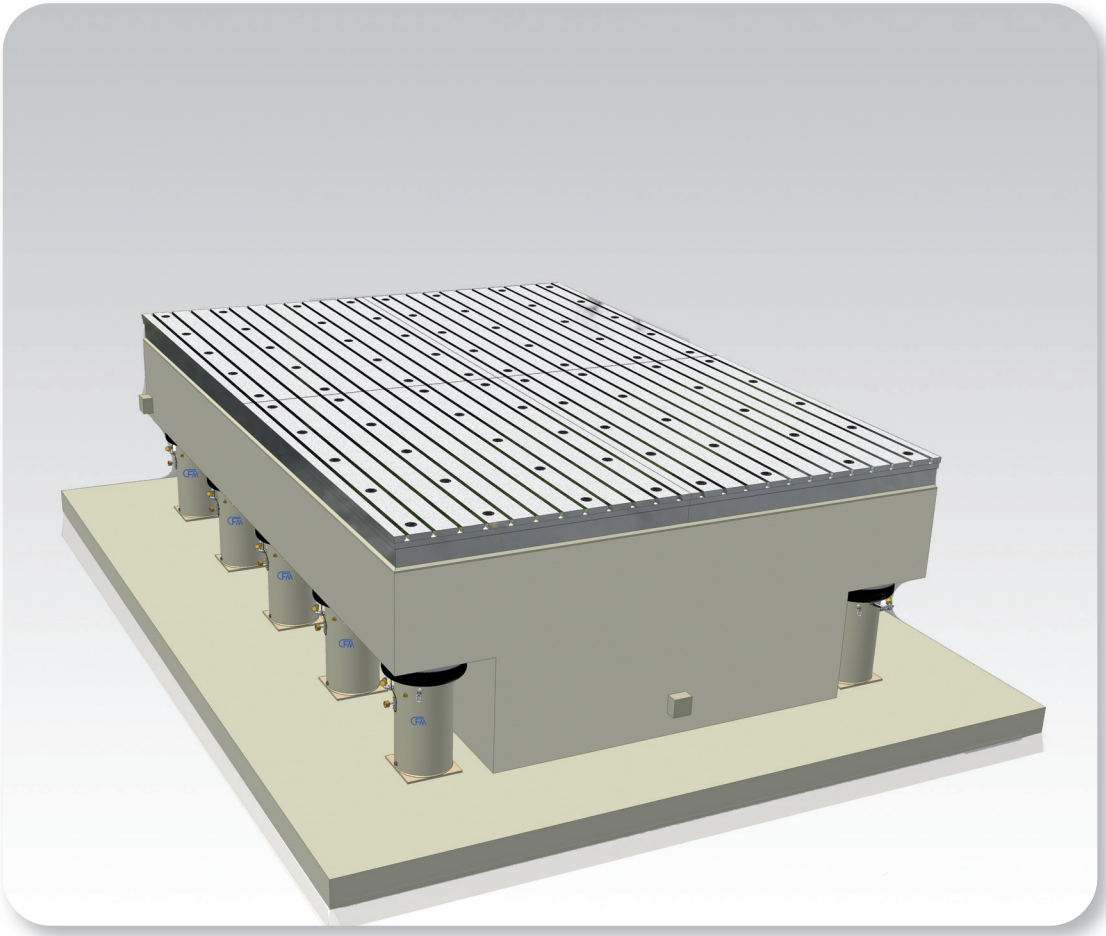
ITBONA
a CFM Schiller Company

Vibration Isolation Systems

...we design and manufacture individual solutions

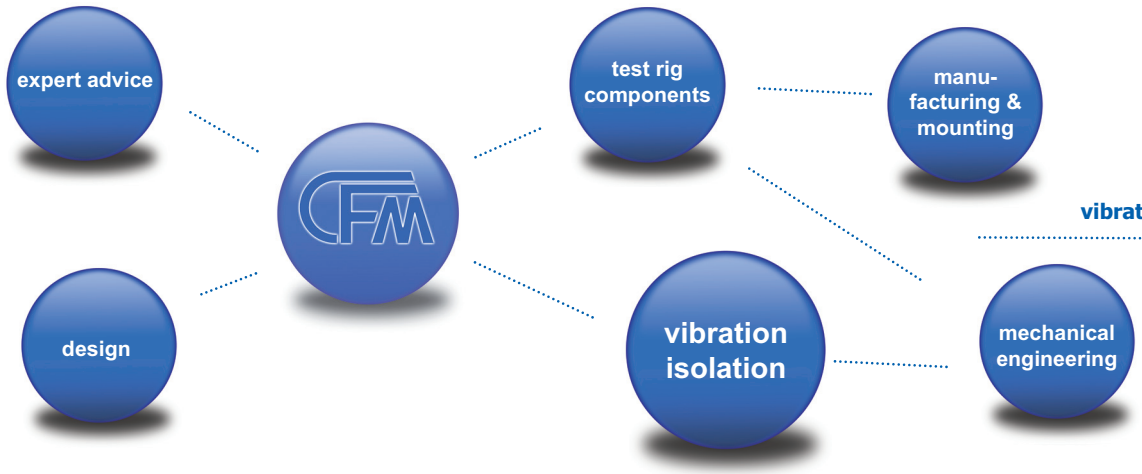


Vibration Isolation

Air Springs
Steel Spring Isolators
Level Control Systems

Vibration Engineering
Vibration Isolation Systems

CFM Schiller looks back on more than 30 years' experience in the areas of vibration isolation systems and vibration foundations. Since the beginnings, our core business has been to create solutions for problems concerning the safety of people, buildings and plants by employing vibration-isolated bearings. The increasing productive efficiency of machines and test rigs, chiefly in the automotive industry, is leading to a constant increase of disturbances emitted into the environment.



vibration isolation

This particularly involves analyses on the operational stability of vehicles and their components as well as flexural fatigue tests on steel and aluminium structures.
We offer our customers high-tech, reliable products of the highest quality! The CFM products are manufactured on our premises using state-of-the-art manufacturing technology. Long-term partnerships with carefully selected partners ensure a consistently high standard of quality. Our aim is to entertain long-lasting business relationships based on co-operation with satisfied customers. Our employees guarantee our success. Co-operation is marked by mutual support, open communication and a flat hierarchy.

Principal office in Roetgen

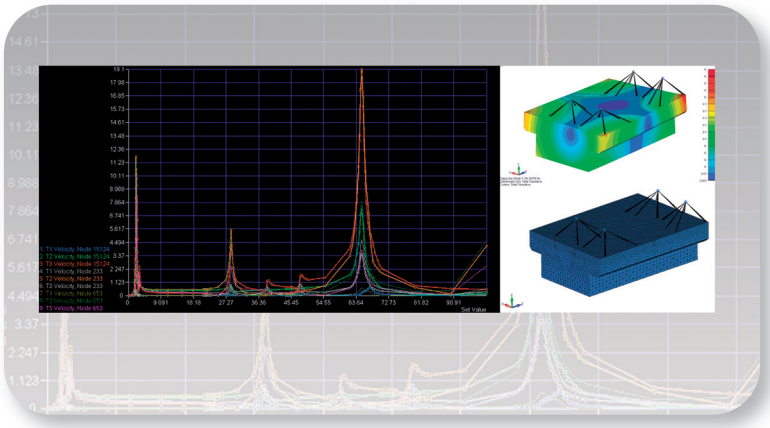
CFM Schiller GmbH

Engineering

In the engineering segment we offer complete solutions from one all-in supplier. This particularly includes:

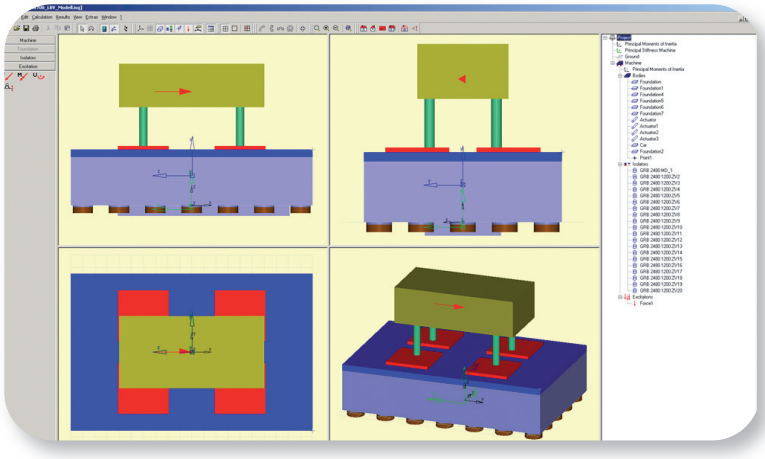
- Calculation of elastic bearings using state-of-the-art computing technology and a large amount of experience
- Calculation and detection of vibration amplitudes
- Calculation of oscillation amplitudes under consideration the free mass forces constituting the exciting forces
- Design and construction of seismic masses made of concrete, cast iron, or a combination of both

calculation



Natural frequency calculation and force response analysis

- Static and dynamic calculation of seismic masses, with a particular attention to stiffness and natural frequency
- Preparing the construction detail, which includes form work and reinforcement plans, as well as bending instructions iron flexibility table for the concrete foundations
- Force Response Analysis



Vibration amplitude analysis

The principle of vibration isolation

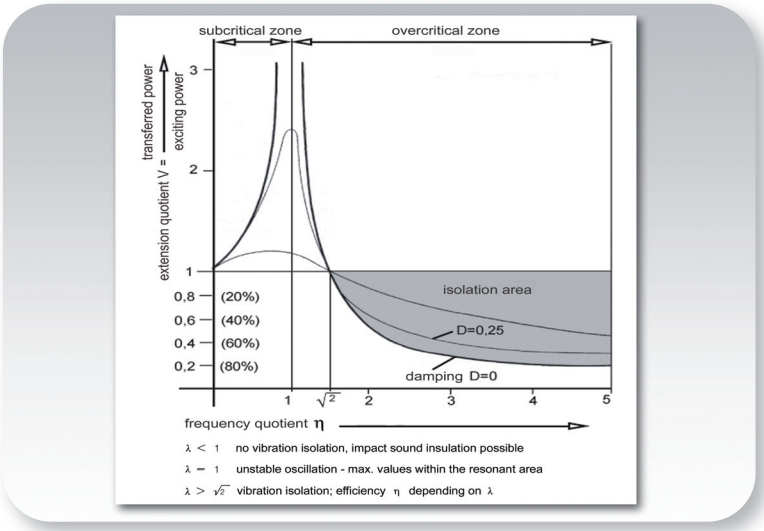
The vibration-isolated installation of a vibrating object, which usually emits sinusoidal or pulsed forces, leads to a significant reduction of interfering forces when dimensioned correctly.

It is particularly important that the vibration amplitudes generated as a result of this vibration-isolated set-up are kept within tolerable limits. This is why our isolators are fitted with damping systems. Some even allow an adjustment of the damping effect.

Selecting the appropriate vibration isolation

Selecting the appropriate vibration isolation is fundamental in order to obtain the best possible isolation effectiveness. The crucial factor here is the relationship of excitation frequency and natural frequency of the spring element.

$$\eta = \frac{excitation\ frequency}{natural\ frequency} = \frac{f_{err}}{f_o}$$

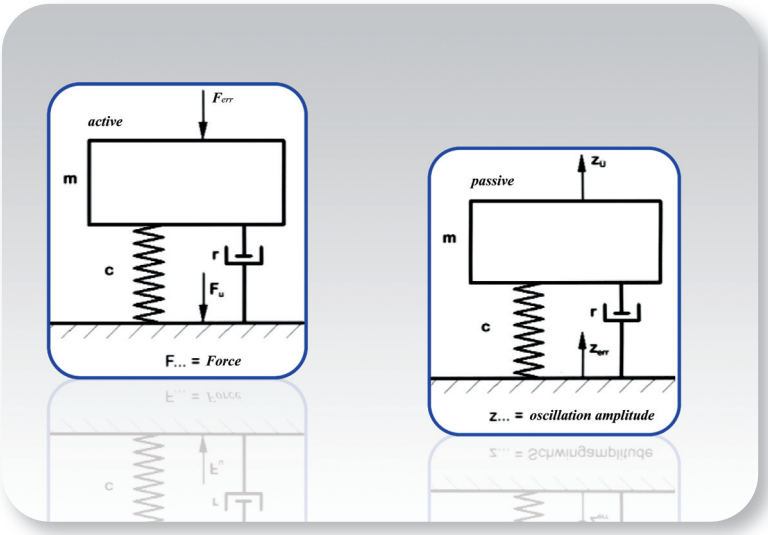


Effective isolation starts at a relationship of η=√2. As a rule, the frequency tuning relationship is adjusted to a value between 3 and 4. In the case of particularly high requirements, it is possible to achieve higher values, which, however, will approach the economical limit.

The isolation efficiency is calculated as follows:

$$J = \frac{\left(\frac{f_{err}}{f_o}\right)^2 - 2}{\left(\frac{f_{err}}{f_o}\right)^2 - 1} \bullet 100\%$$

In vibration technology you regard active and passive vibration isolation



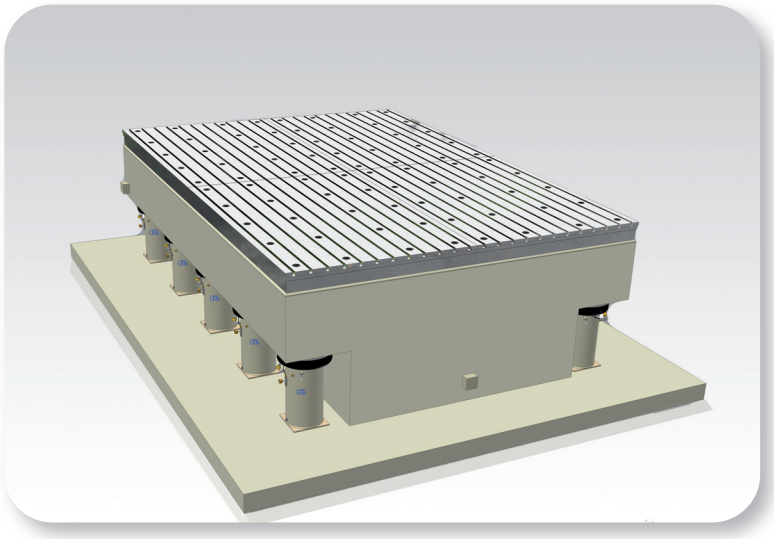
Active and passive vibration isolation

active / passive

Seismic Masses

Concrete foundations and mounting plates on air springs or steel spring isolators are ideally suited for vibration-isolated mounting of machinery or test-rigs.

On the one hand, the seismic masses serve as the rigid basis for the machine, and on the other hand they serve as inertial mass. The foundation usually consists of a reinforced concrete structure with a cross-sectional shape and mass adapted to suit the individual application. This



Seismic mass

can realize masses with a weight ranging between 20-2000 t. We carry out the complete design services and on request we also perform the construction work.

A cast iron clamping plate can be designed individually for many applications and provided with T-slots or hole grids on the surface (clamping surface) to accommodate machinery or test rigs.

Active vibration isolation

In active vibration isolation, the vibrations emitted from machines or test systems are reduced to such extent that the adjacent parts of the building, machines and those people working on them are not harmed or affected in any way.

Passive vibration isolation

In passive vibration isolation, the vibration isolation protects sensitive machines or measuring equipment such as precision tool machinery, measuring machines and scanning electron microscopes and laser measuring equipment from vibrations which impact the building from the outside, e.g. from underground.

Damping action

The damping action is the physical property of the ability to limit vibrations to a permissible level. Damping always causes the conversion of mechanical energy into heat. With viscous dampers this occurs through fluid friction. With air springs this occurs by a change in volume.

CFM Schiller offers clients a broad spectrum of vibration isolation elements for their individual applications. To this end we apply air springs, steel spring isolators and elastomer spring isolators.

Air spring systems

CFM air spring systems are predominately employed with elastic bearings, each of them having a low inherent frequency of between 0.6 Hz and 2.5 Hz.

Air springs GRB with additional volume

Air springs series GRB 2480-1200 ZV • GRB 1820 • GRB 1240 • GRB 780

These air springs have integrated capacity reservoirs with a pneumatic activation option. The piston is made of steel and the cover plate aluminium.

The belted rubber bellows are manufactured from high-quality elastomer materials with a vulcanized wire belt. It therefore possesses sound vertical and lateral characteristics.

Particular advantages over conventional air springs:

- With T-shaped foundations housing for the air springs is not required.
- Requires considerably less space, because the additional capacity is integrated.

Air springs

Air springs series MAS 500 • MAS 320 • MAS 230 • MAS 55 • MAS 10
Air springs series BZ 320-DS • BZ 210-DS • BZ 120 • BZ 120 • BZ 85
Air springs series RB-SH 220 • RB-SH 280 • RB-SH 310 • RB-SH 420

Steel Spring Isolators

We offer various types of steel springs for the vibration isolation of machines and plants. The choice of isolators depends on the required load range and the test-frequency employed.

Roughly speaking, steel spring isolators are able to achieve natural frequencies ranging between 2 and 6 Hz. As opposed to air springs, they are not height-adjustable.

Steel spring isolators

The steel spring isolators type P51 are housed in a compact plastic casing, a cast iron casing is used for types P60, P71 and P80. They contain helical springs according to DIN 2098.

Types SSI and UPM are manufactured as an all steel welded construction. Highly-effective viscous dampers are also available for this type in order to dampen high amplitudes.

Steel springs under foundation

Level control units

We employ level controls for the automatic level control of air spring systems to suit different requirements, from the simple mechanical solution MC 300 S to the active position control with microprocessor µC300. All of them are 3-point control systems.

Level control systems

MC 300-S

The MC300 is a mechanical pneumatic level control unit for applications wich do not require external monitoring.

- 3-point control system with maintenance and control unit
- Control accuracy ±0.1 mm

LC 300/302

Electro-pneumatic level control system offering external equipment monitoring.

- Level position of all 3 systems
- Inlet pressures
- Raising and lowering, using key switches on the control unit
- Switching the natural frequency of the air spring suspension on the control unit (LC 302 only)
- Control accuracy ±0.1 mm

EC 300

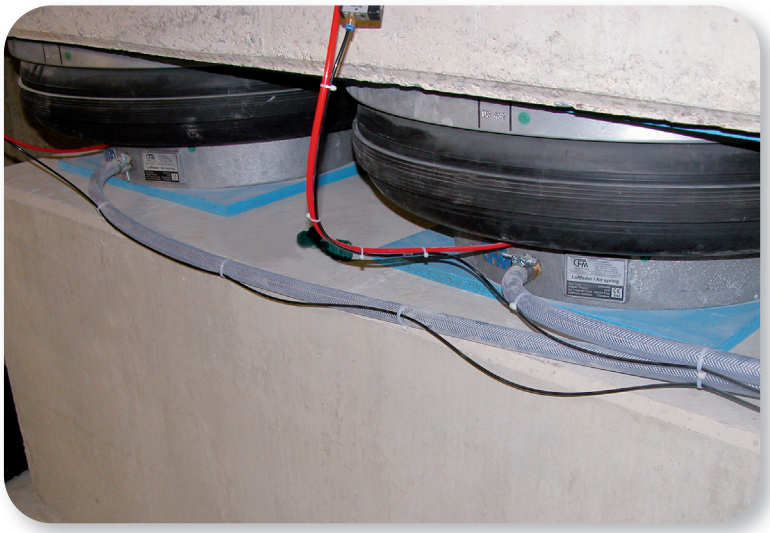
Electronic-pneumatic level control unit with analogue position encoders and electric control valves. It also offers external equipment monitoring.

- Control accuracy ±0.05 mm

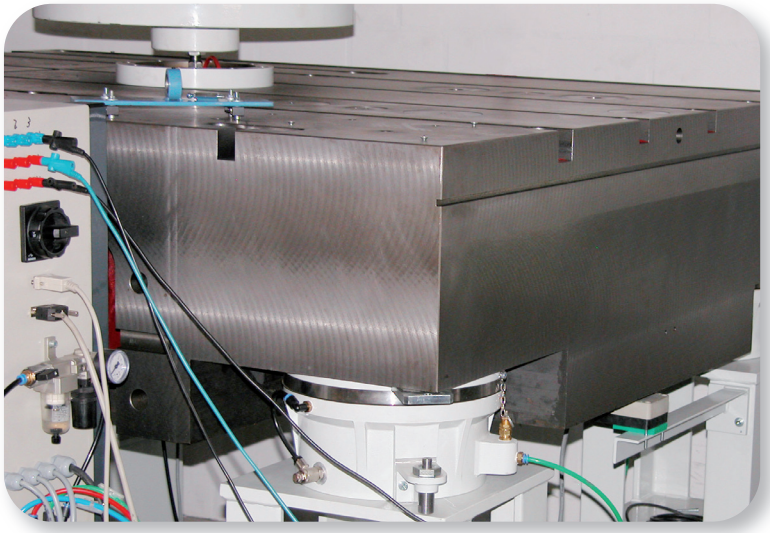
µC 300

Electronic-pneumatic active position control system with micro-processor and controller. This position control system is used to avoid resonance step-ups and minimize the time for vibration. At the same time this significantly reduces the oscillation damping time. Using the µC300 can significantly reduce seismic masses. Please consult our product brochure µC300 for more details.

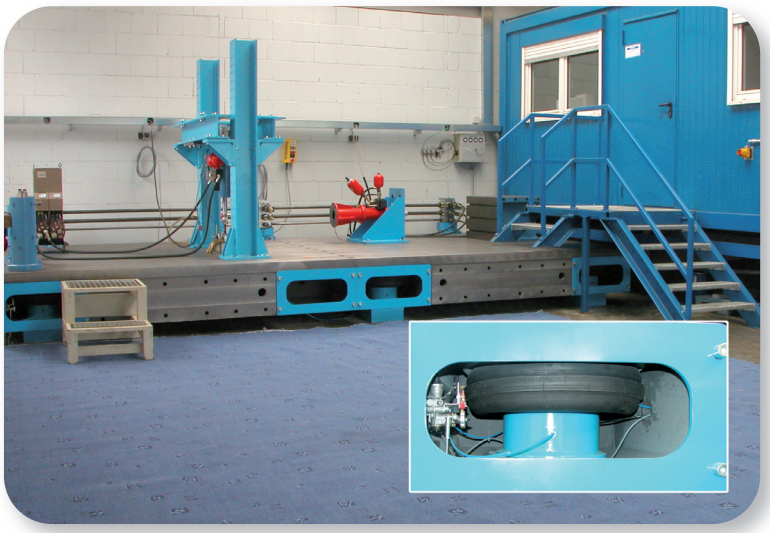
Air springs
systems examples



GRB air springs underneath a foundation



Membrane air springs beneath a mounting plate

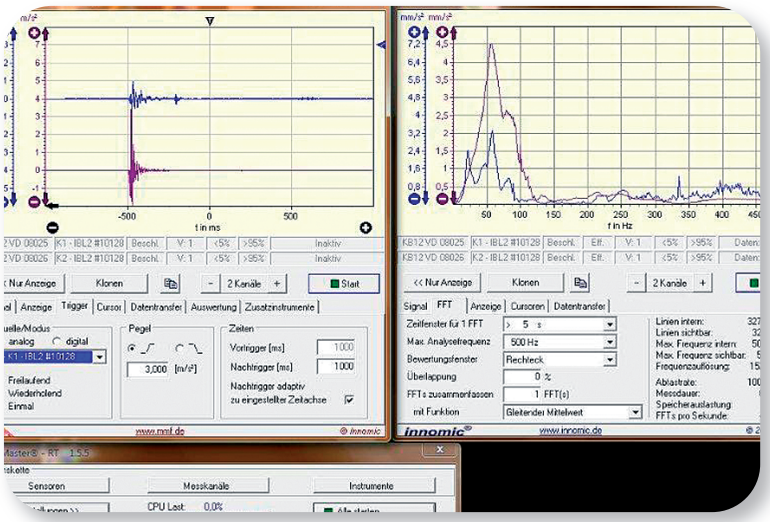


GRB air springs underneath a foundation

Measuring method

We measure vibrations which occur on buildings or machines using state-of-the-art measuring equipment. The acceleration that occurs is measured with highly sensitive seismic sensors.

The results of these measurements form the dimensioning for active or passive vibration isolation. This process is carried out according to DIN 4150, which defines this type of measurement and evaluation in buildings. Measuring vibration acceleration / vibration speed is indispensable, particularly when designing the vibration isolation of high-precision and highly sensitive plants and equipment.



Vibration analysis

We offer high quality produced on our premises!

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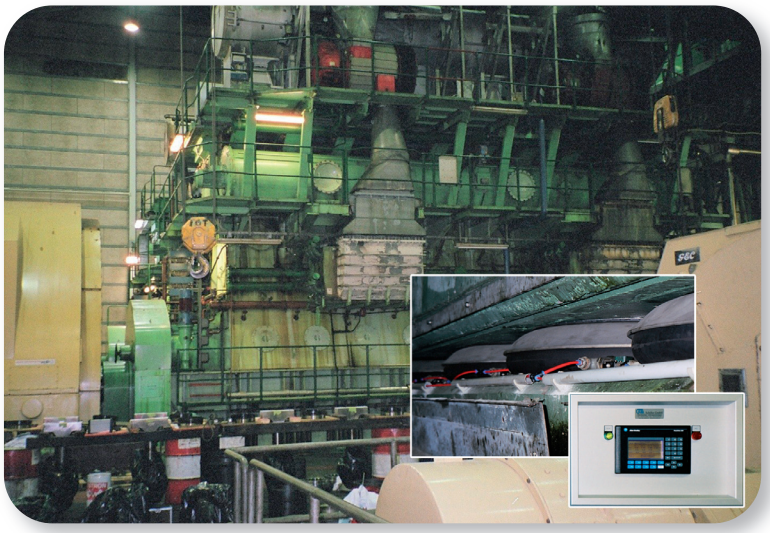
Examples of applications



Air spring for an industrial diesel generator of a power plant

Vibration isolation and damping of structure-born noise:

• All types of test rigs •
• Tool machinery •
• Measuring instruments •
• Tool machinery •
• Cutting mills •
• Presses/Compacters •
• Die cutters •
• Hammers •

Bearing unit for a GVT Ground Vibration Test for aircraft & an air spring bearing for an industrial shredder

• Transformers •
• Heavy equipment in general •
• BHKW modules •
• Diesel generators •
• Compressors •
• Superchargers •
• Refrigerating machines •
• Ventilating systems •
• Air conditioning systems •
• Boiler plants •
• Buildings •
• Inspection/Measuring rooms •
• Measuring stations and control rooms •
• Studios •
• Sprung floors •
• Sports halls •
• Test rigs for entire cars and HGVs •
• Shaft/Axis test rigs cars and HGVs •
• Multi-axial shaking tables •
• Earthquake simulators •
• Railway bogie test rigs •
• Component test rigs•

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