

Trombik Engineers Ltd.

Trombik Engineers Ltd. is an independent engineering office, located in Zurich, Switzerland, proudly representing over 40 years of successful firm history.

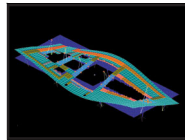
The record of achievement includes nearly all fields in civil and structural engineering. Thanks to the emphasis on structural dynamics, especially machine foundations, promoted since the formation of the company in the year 1959, Trombik Engineers Ltd. reached international recognition.

In keeping with world's recent industrial developments, Trombik Engineers Ltd. is able to offer the full range of services with regards to static and dynamic analysis, layout and design of concrete, steel and associated structures. In addition, we offer specialised services in the field of noise and vibration control, structural acoustics and structural physics. Since 1998, all our services and processes are in accordance with the requirements of international standard ISO 9001 (Quality Control System).



Civil Engineering

Civil engineering regarding domestic buildings, commercial properties and industrial constructions. Consulting, planning, design, project and execution drawings as well as construction supervisions for new constructions, extensions and renovations.



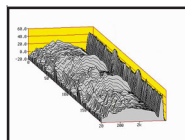
Structural Dynamics

Dynamic design for civil engineering works regarding natural, human, wind or machine induced vibrations. Case studies, numerical analysis and sourcing for all kind of structural dynamic problems and vibration phenomenon, including earthquakes, impacts, blasts and fatigue effects.



Sound, Vibrations and Structure-Borne Sound

Recording, measuring and studies of sound, vibration and structure-borne sound at their source and their transfer. Analysis, assessment, prognoses, preventive measures.



Structural Acoustics, Structural Physics

Planning and projecting of sound and vibration measures. Calculations, analysis, prognoses, case studies, verifications according to current codes. Steady state and transient thermal transfer and vapour diffusion calculations. Thermal and humidity protection, overall energy considerations regarding thermal insulation.



Measurements

Vibrations, sound and structural-borne sound measurements using firm-owned instruments of highest measurement precision class. Structural dynamics measurement campaigns: vibration and natural frequency recordings. Airborne sound and subsonic noise isolation measurements according current codes.



Machine Foundations, Elastic Supports

Consulting, design and construction supervision for all sorts of elastic support applications as well as for all conventional and spring supported machine foundations; starting from small applications (i.e. PC) to large-scale machines (i.e. turbo generators).



Spring Elements

Complete range of high accuracy spring supports for high and highest loads is available. These height-adjustable TROMBIK Spring-elements have been enhanced and optimised based on long experience and can be applied to all load areas and purposes.

Machine Foundations Elastic Supports

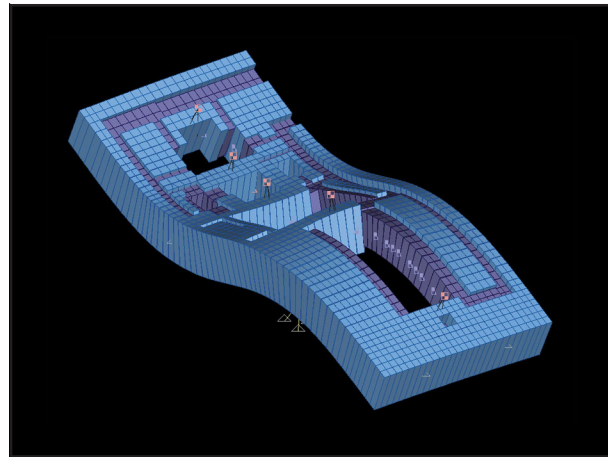
Engineering Dimensioning, Design Criteria Restructuring, Upgrading Vibration Isolation Spring Elements

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Machine Foundations, Elastic Supports

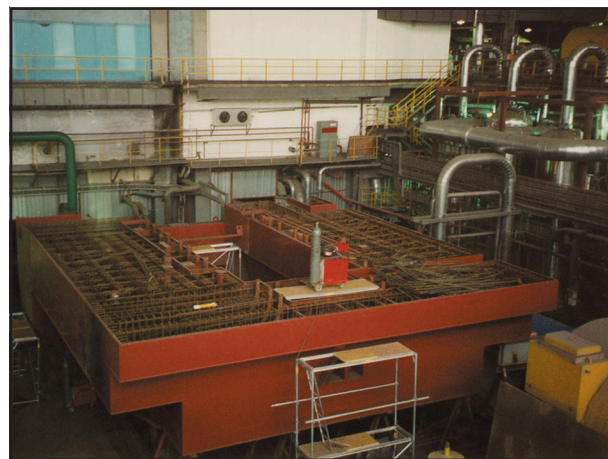
Because of the rotating, oscillating and impacting parts, most kinds of machines have to be installed on foundations. They transmit the dynamic forces down to the subsoil or the adjacent structural members, stiffen the machine arrangement and act as stabilizing mass. Vibration isolation measures can be introduced by supporting the foundation with a system of springs (spring mounted foundation). Advanced, computer-assisted calculation-models allow us to analyse the system and to predict the future behaviour.



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Engineering

Trombik Engineers Ltd. are proud to offer the whole spectrum of engineering services for machine foundations / elastic supports: consulting, planning, static and dynamic analysis, project and execution drawings, detailed construction manuals, construction supervision and measurements; these apply not only to new constructions but also to extensions, reconstructions, and corrective maintenance, and they are offered in the corresponding country-specific requirements / provisions (language, codes).



3

Dimensioning, Design Criteria

The requirements of the foundation can be outlined to ensure a smooth operating under normal condition and to retain its structural integrity under various accidental conditions. Dynamic considerations are an absolute must: analysis of natural vibration (must be situated out of the operating speed), of vibration due to unbalance and of transient vibration (i.e. short circuit). Further governing aspects: the rigidity must maintain the shaft alignment, the vibration isolation must be provided in both ways (source and recipient) and the foundation must resist seismic loadings.



4

Restructuring, Upgrading

A restoration or modernisation of a machine, mainly to extend its life time or to increase output, affects its foundation as well. To achieve an optimal solution, Trombik Engineers Ltd. investigates with the client how to minimise the structural changes regarding time of construction and costs based on coupling our long-term experience, advanced calculations and current knowledge. The best results have been obtained by using / changing to a spring mounted foundation. Trombik Engineers Ltd. provides all the engineering services from one source.

Since the company Trombik Engineers Ltd. was founded, the domain structural dynamics has been attended to carefully. Due to international activity in buildings of major infrastructure and power generation plants, a wealth of experience over many years, regarding machine foundations and elastic supports, has been gathered. All staff members are aware of corresponding problem formulations. Trombik Engineers Ltd. is a member of the Swiss Society for Earthquake Engineering and Structural Dynamics (SGEB).



5

Vibration Isolation

Besides the conventional execution, machine foundations are also often supported by a system of springs to achieve vibration isolation (spring mounted foundation). Trombik Engineers Ltd. as a specialist follows carefully the latest developments in this area. Two different categories have to be separated: source isolation of machines and installations (e.g. elastic support of turbines, condensers, feed pumps, sledge hammer and presses) and receiver isolation as protection for delicate machines and installations, against all kind of vibrations including earthquakes.



6

Spring Elements

Trombik Engineers Ltd. produces a complete range of high accuracy spring supports for high and highest loads. These height-adjustable TROMBIK Spring-elements have been enhanced and optimised based on long lasting experience and can be applied to all load areas and purposes. For the main part, built up of disc springs, as well for the casing parts, materials of the highest quality class are used. Special designs for clients and/or for objects, e.g. helical spring layouts or adapted load areas are possible as well.

- 1 Spring mounted machine foundation, table installation
Battle River 400 MW, Canada
- 2 Shape of an eigenmode of a machine foundation
Dynamic calculations (FE-modelling)
- 3 Prefabricated, lost steelwork
Turow 250 MW, Poland
- 4 System SPRINGLIFT, pre-stress procedure
Test plate and detail of the helical compression spring
- 5 Vibration isolation of a machine foundation
Sheerness 400 MW, Canada
- 6 TROMBIK spring elements for high and highest loads.
Overview spring types.