

IMAGE LEAFLET

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## Fields of activity

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- Static and Dynamic Analyses
- Engineering Seismology and Soil Dynamics
- Dynamic Measurements and Vibration Insulation
- Probabilistic Analyses and Fragility Curves
- Short-Term Dynamic Analyses for Extreme Loading
- Software Development
- Product Development
- Engineering Expert Reports

## Static and Dynamic Structural Analyses

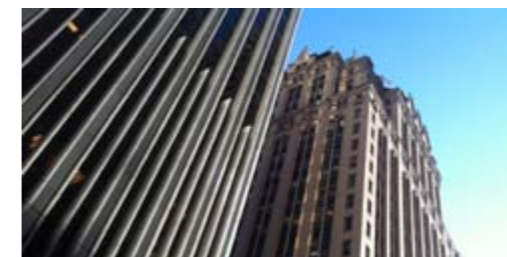
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We conduct structural analyses for all kinds of simple and complex problems and can create calculation models using the entire software range from easy-to-use small software design packages to highly sophisticated finite element programs such as INFOCAD and ANSYS. SDA-engineering GmbH is specialized in

- Structural Design
- Plant Engineering
- Tanks and Vessels
- Machine Foundations

dynamic structural analyses with a scope of services ranging from the investigation of individual structural components to the time-consuming simulation of load-bearing structures subjected to dynamic loads as a result of earthquakes, induced vibrations and impacts. Typical application areas are:

- Masonry Structures
- Pipeline Construction
- Existing and Historical Buildings
- Retaining Structures



## Static and Dynamic Structural Analyses

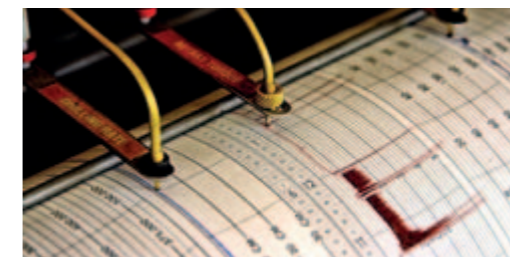
We are able to provide you with economical solutions for structures under planning and with upgrading strategies for existing structures conform to European or International Standards. If necessary, load-bearing reserves from non-linear material behaviour are taken

into account and innovative design procedures are applied in order to verify the structural safety and serviceability. Furthermore, useful life estimates and damage analyses also enable an economic evaluation of planned and existing buildings.

## Engineering Seismology and Soil Dynamics

We perform site-specific seismic hazard analyses and calculate seismic loads for the requested earthquake recurrence periods. Therefore, a probabilistic model is used that incorporates the surrounding seismicity in a large-scale and allows the consideration of parameter uncertainties. Soil dynamic calculations are used to further specify the local soil conditions. Based on an input seismic motion at engineering bedrock - given by a

code spectrum or out of a site specific seismic hazard study - the motion and response spectra at the free-field level or at any other level at depth is calculated. The networking with colleagues worldwide and the cooperation with RWTH Aachen University in research projects ensures that the high expertise in this field considers the current state-of-the-art.



## Measurements and Vibration Isolation

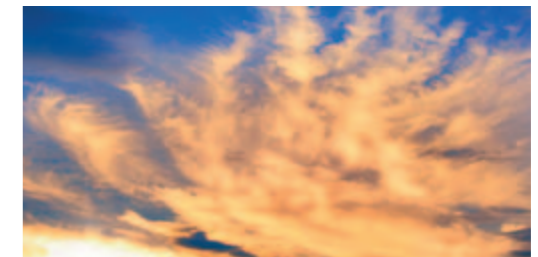
The assessment of the vibration behavior of existing buildings and the calibration of numerical models can be carried out based on structural dynamic measurements. The necessary technical equipment, including several geophones and highly sensitive velocity- and accelerometers are readily available. Powerful professional and in-house software packages are used for evaluating the

measurement results for short- as well as long-term measurements. The analyzed measured vibrations can be utilized for the assessment of vibrations induced by machines, bell ringing, rail- and road traffic or explosions. The assessment results are used for the development and suggestion of appropriate active and passive vibration control measures.

## Probabilistic Analyses and Fragility Curves

Probabilistic analyses are needed to evaluate safety relevant buildings. The SDA-engineering GmbH executes probabilistic analyses with the finite element software ANSYS, for which special program modules using the ADPL-programming language were developed. Furthermore we offer the calculation of fragility curves for buildings and components. The fragility curves are determined using

the traditional simulation approach with Monte-Carlo simulations. A reduction of the computational time is achieved by using „Response surface models“, which enable an efficient evaluation of fragility curves. If necessary, highly specialized algorithms are applied for considering simultaneously multiple response variables.



## Short Term Dynamic Analyses for Extreme Loadings

The design of safety relevant structures and components requires the consideration of highly dynamic loads as result of actions like explosions, air plane crashes or missile impacts. The investigation of these exceptional load cases is getting more and more important since the attacks of 11 September 2001 at the World Trade Center in New York. The specified loads are extreme dynamic impacts, which affect structures or structural components within the time range of milliseconds. The

analysis and design of structures under impact loads is a challenging task for the responsible engineers. A realistic estimation of the impact is quite complex and not sufficiently regulated in the relevant design codes and guidelines, so that experimental tests or time consuming simulations are unavoidable. The SDA-engineering GmbH is well experienced in executing short term dynamic analyses and offers highly dynamic calculations on request.

## Engineering Expert Reports

SDA-engineering GmbH offers the preparation of engineering expert reports in the application fields of Structural Statics and Dynamics and Engineering Seismology. The expert reports represent the state-of-the-art and if necessary, investigations beyond the state-of-the-art are

carried out based on our experience and research activities. Furthermore, SDA-engineering GmbH exhibits extensive experiences in approval procedures for building products and conformity procedures of products on national and European level.



## Software Development

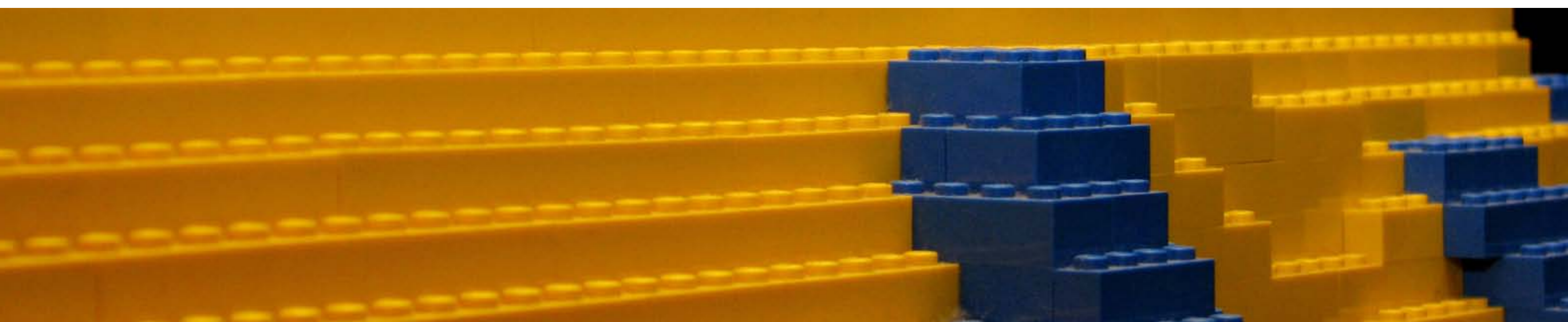
SDA-engineering GmbH has a strong background in software development, combined with expertise in structural engineering consultancy. This combination guarantees the development of software packages for optimized design procedures,

which fully meet the demands of the engineering practice. In the development process special attention is paid on intuitive handling and detailed documentation. Moreover we offer the development of highly specialized software packages for user-related problems.

## Product Development

Another field of activity of SDA-engineering GmbH is the transfer of recent research results into the engineering practice, by means of extensive activities in the interface between research and practise. SDA-engineering GmbH collaborates with universities and is an active partner within collaborative projects of

industrial partners and universities. The results of this fruitful cooperation are innovative product developments with short-term introduction to the market. The obtained project results and products are introduced to professional circles within the framework of advanced training seminars and further educational courses.





SDA-engineering  
Ingenieurgesellschaft mbH  
Kaiserstraße 100, TPH III – B  
52134 Herzogenrath  
Phone: +49-2407 - 5 68 48-0  
Fax: +49-2407 - 5 68 48-29  
[www.sda-engineering.de](http://www.sda-engineering.de)

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