

Engineering and Design  
**TECHNICAL  
CALCULATIONS**



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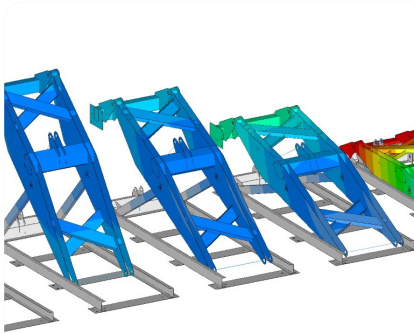


## TECHNICAL CALCULATIONS

**Our team of experts carries out the technical calculations.**

Technical calculations are required for making sure a process or machine will function safely and withstand normal use. We perform structural strength calculations by means of both analytical and finite-element methods. We carry out pressure vessel analyses in accordance with the EN 13445 and ASME VIII standards. Our expertise covers requirements pertaining to lifting equipment also. We provide technical calculations and analyses as a separate service or in combination with our other engineering services.

## SERVICES



### STRENGTH CALCULATIONS

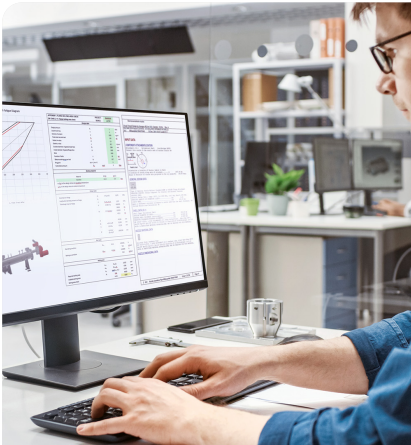
Strength calculations are carried out to guarantee that the structures designed can withstand the strain they will be exposed to. Makron is on hand to offer assistance throughout the product lifecycle, from its design to repair and modernization. We calculate stresses and displacements, verify the structure's strength, design the changes required for the strengthening of the structure, and prepare the required reports. We perform high-quality strength calculations, using analytical and finite-element methods.

### WHAT MAKRON DOES

We offer strength calculations and analyses for a fixed fee and at hourly rates, depending on the project. We provide customer-oriented services for small and large projects alike. Since we work in collaboration with Makron's mechanical design engineers, you can order calculations and design as a single package. Get in touch for a discussion of how we can help you.

### PRODUCTS & EXPERTISE

- Static and dynamic strength calculations
- Seismic calculations
- FEM analyses
- Pressure vessel analysis
- Non-fixed load-lifting equipment analyses
- Structural optimization
- Fatigue life evaluation for welded structures
- Consultation



## PRESSURE VESSEL ANALYSIS

Makron offers pressure vessel analyses carried out with solid expertise and in accordance with the EN 13445 and ASME VIII standards. We will perform the calculations on the basis of your drawings, or, alternatively, a Makron mechanical engineer can prepare the required drawings. Also, we can help you upgrade your existing systems by calculating the strength of the pressure vessel and designing the necessary changes. We can help you to optimize the structures, which creates savings at the production stage because the required structural strength can often be achieved with smaller quantities of raw materials.

### WHAT MAKRON DOES

We perform strength calculations by means of both analytical and finite-element methods. We also offer consultation services related to structural drawings. We check the welding markings and joints to make sure they meet the requirements set by the standards. We can also take care of the pressure vessel design, prepare the required documents, obtain the required approvals, and coordinate the manufacturing.

### PRODUCTS & EXPERTISE

- Pressure vessel design and calculations (PED 2014/68/EU and ASME VIII)
- Inspection of drawings
- Structural optimization
- Modernization of pressure vessels
- Determination of the inspections required for welded joints
- Comprehensive pressure vessel deliveries



## NON-FIXED LOAD-LIFTING EQUIPMENT

We can help with the strength calculations related to lifting equipment, such as lifting beams and grapples, to guarantee that they meet all requirements. We use the finite-element method to calculate structural strength in line with the EN 13155 standard and prepare the required drawings and documents.

### WHAT MAKRON DOES

We can design lifting equipment that meets your specific needs and carry out strength calculations in accordance with the applicable standards. We are more than happy to help answer any questions related to lifting equipment. We keep our expertise up to date through regular training, and we make sure we always have knowledge of the latest regulations.

### PRODUCTS & EXPERTISE

- Strength calculations
- Mechanical engineering
- Consultation

## CONTACT

Contact our experts for more information.



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# MAKRON

A Promise to Complete.

Makron is a complete industry service house for companies with machinery needs. Our core business is providing engineering, production, industrial automation and robotics expertise as a single partner. We work as a contract manufacturer for technology companies. With headquarters in Lahti, Finland, and electrical control cabinet manufacturing in Finland and machine production in Estonia, Makron has a revenue of 19 MEUR, and we employ over 100 professionals.

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