# **TESSERACT** ENGINEERS

Portfolio

**Call:** (+30) 211-001-1627

**Address:** Zoodochou Pigis 49-51, Athens, 10681, Greece

**Email:** info@tesseract-engineers.com

**Website:** www.tesseract-engineers.com

**Social:** Instagram, Facebook, LinkedIn

# Who we are

We are a group of highly skilled engineers and practitioners possessing both industrial experience and strong research expertise in the fields of structural, earthquake and geotechnical engineering. We bring together an interdisciplinary team of experts in all engineering fields to accomplish the highest quality projects for our clients and maximize their benefits. Our members possess strong analytical skills and deep theoretical knowledge, while our close collaboration with the academia and access to state-of-the-art technologies allows us to implement fresh solutions and to support the most ambitious architectural concepts and demanding infrastructure projects.

# What we do

Engineering service based on scientific proficiency, research, innovation and excellence is the firm’s founding philosophy that leads to the highest quality projects for our clients. Our mission is to deliver structural solutions of the highest calibre, all while adhering to the project's time and cost restrictions. Conducting research and leveraging innovation may allow the firm to stay up-to-date with the latest developments in the field, enabling it to provide cutting-edge consultation.  Our solutions are supported by advanced numerical modelling and technical experience that lead to efficient, safe and high-performing structures.

# Services

## We provide

comprehensive support through all project stages, starting from the conceptual phase to the detailed design, construction, and the post-construction period. Our company specializes in the following key services:

- **Advanced Structural Design Services**
- **Structural Assessment & Retrofitting of Existing Structures**
- **Foundations & Retaining Structures**
- **Ground Investigation Consultation**
- **Geotechnical Design Services**
- **Construction Supervision**
- **Construction Support**
- **Quality Control for Materials**
- **Project and Design Management**
- **Research & Development**

The innovative, cost-effective solutions and sustainable approach that we provide guarantee you the economic success of your construction project.

# Our Team

## Moris Kalderon PhD, MSc, DIC
Partner | Civil Engineer

Moris was born in Larisa, Greece. He obtained his diploma in Civil Engineering from the National Technical University of Athens, in the discipline of Structural and Geotechnical Engineering. After his graduation, Moris gained construction experience working for Archirodon NV as a Site Engineer for the New Double High-Speed Railway project in Tithorea, Greece. Subsequently, he received a Master's degree from Imperial College London in the field of Soil Mechanics. After completing the program, Moris joined WSP in London, where he focused on the design of major UK infrastructure projects. In 2023, Moris was awarded a PhD from the School of Mechanical Engineering of the NTUA, in the field of acoustic and seismic metamaterials, as an EU Marie Skłodowska-Curie fellow. In 2021, he founded with Antonis Mantakas the Athens-based firm Tesseract Engineers. His goal is to provide advanced engineering services by combining industry knowledge and innovation through his research and academic experience.

## Antonis Mantakas MSc, DIC
Partner | Civil Engineer

Antonis was born in Athens, Greece. He graduated from the School of Civil Engineering of the National Technical University of Athens (NTUA), with specialization in Structural and Geotechnical engineering. After completing his degree, he worked in collaboration with Grid Engineers and the NTUA and gained experience in the field of soil dynamics and earthquake engineering. Subsequently, he received a Master's degree from Imperial College, London in the field of Soil Mechanics and Business Management. Following his studies, Antonis joined Ramboll, a leading engineering consulting firm, where he focused on the design of high-rise buildings, piled-raft foundations and offshore wind farms both in the United Kingdom and Denmark. In 2021, Antonis and Moris Kalderon founded Tesseract Engineers with the aspiration to integrate high quality engineering services with research and industry practice. At the same time, Antonis is an EU Marie Skłodowska-Curie fellow and is pursuing a PhD at the School of Civil Engineering of the NTUA in the field of earthquake engineering.

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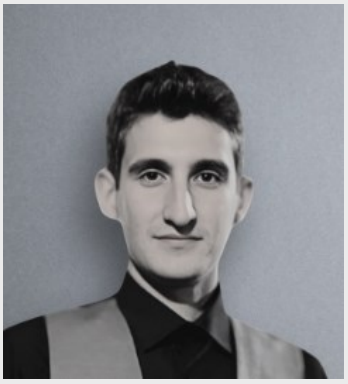
# Our Team

## Minoas V. Bampatsikos MSc, MEng
Design Engineer

Minoas was born in Agrinion, Greece. He graduated from the School of Civil Engineering of the National Technical University of Athens (NTUA), in the discipline of Structural Engineering. After completing his degree, he worked in production studios in Italy (LGSM_A) and Spain (ENSAMBLE Studio) and gained experience in the field of construction and design. Subsequently, he received a Master of Science again from the National Technical University of Athens (NTUA), in the field of Structural Design and Analysis of Structures. Following his studies, Minoas joined the firm of advanced engineering software, MIDAS IT Co. Ltd, serving as structural and technical support mainly for the European region. Currently, Minoas is a design engineer at Tesseract Engineers with specialization in advanced 3D numerical modelling and CAD design.



## Fotis Patrinelis MEng
Design Engineer

Fotis was born in Tripolis, Greece. He obtained his diploma in Civil Engineering from the National Technical University of Athens (NTUA) in 2023, specializing in structural engineering. His diploma thesis focused on the earthquake behavior of a multi-story reinforced concrete building with tunnel form construction and lightweight concrete. After graduation, Fotios served his compulsory military service in a remote area before joining his father's independent technical office in Tripolis, where he gained hands-on experience in topography operations, structural and architectural design, and managing client budgets. Moreover, he has attended online courses in Sustainable Energy Design of the Buildings and Project Management from the National and Kapodistrian University of Athens (NKUA), in order to apply a holistic approach to integrated design. Currently, he is working for Tesseract Engineers and his interests lie in structural design, with a parallel emphasis on the architectural configuration, aiming to balance the basic needs of the users: functionality and aesthetics.

# Our Team

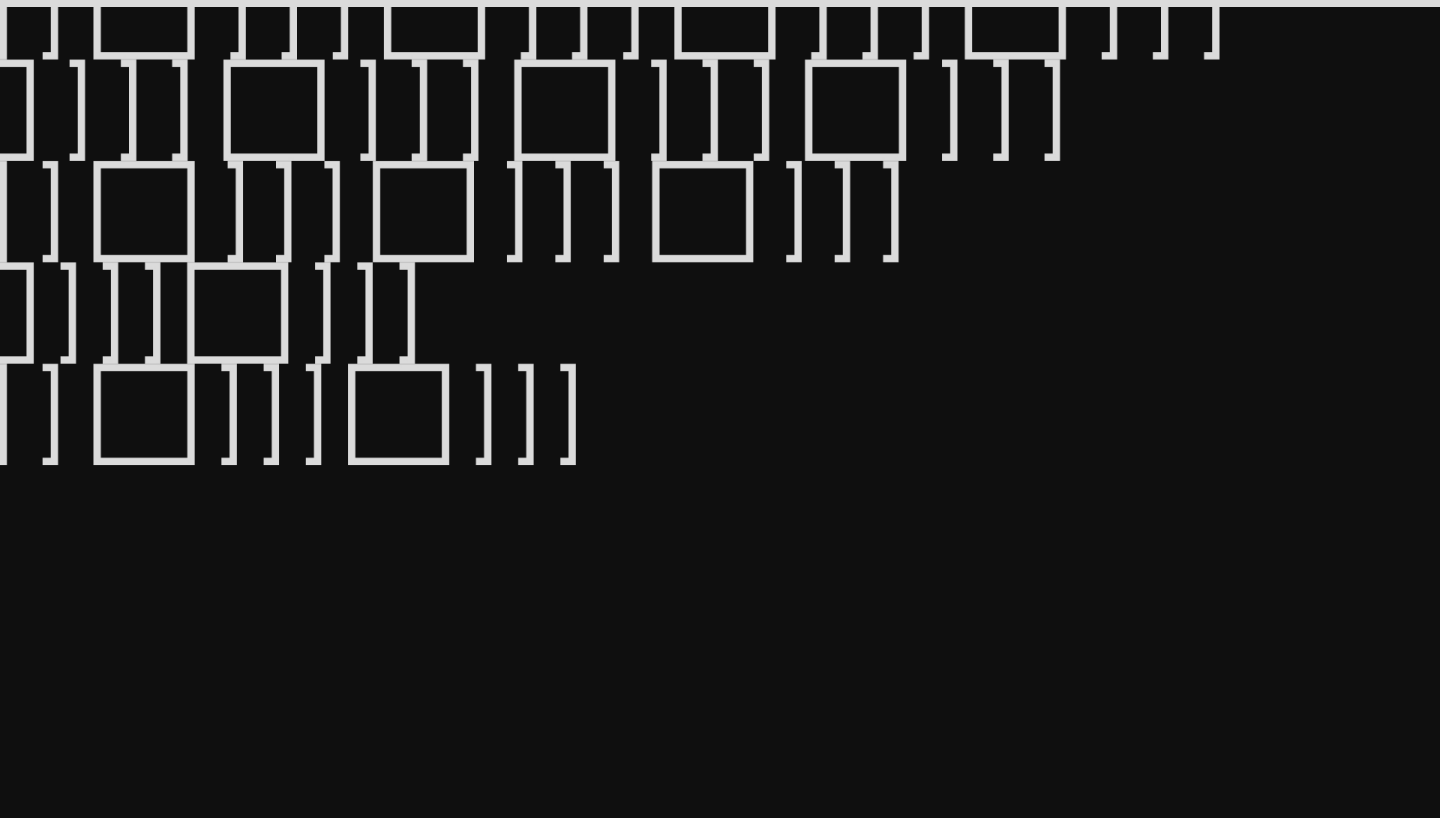
## Stavros Theodorakis MEng
Technical Director

Stavros was born in Nikaia in 1955. He studied Civil Engineering at the National Technical University of Athens (NTUA). In the years 1979-1980, he worked at NTUA in the Reinforced Concrete Laboratory under the supervision of Professor Theodosios Tassios. In 1983, he joined the Ministry of Public Works. However, he resigned in 1989 and has since been employed in the private sector, specializing in project design. He has actively participated in the structural design and planning of various significant public projects, including the Olympic Aquatic Center, the Olympic Indoor Hall (OAKA), energy production facilities, the Metro, monument restoration, etc. Stavros is particularly involved in seismic design of structures and seismic policy. He has served on the Board of Directors of the Earthquake Planning and Protection Organization, and various scientific committees responsible for drafting regulations, technical specifications, etc., related to seismic constructions. In this scientific field, he has numerous presentations at conferences and has delivered many lectures.

## Prof. George Gazetas
Senior Geotechnical Engineering Consultant

Emeritus Professor of Geotechnical Engineering at the National Technical University of Athens (Greece) for over 30 years, following an academic career in the US, where he taught at SUNY-Buffalo, Rensselaer (RPI), and Case Western Reserve University. His main research interests have focused on Earthquake Engineering and Soil-Structure Interaction. Much of his research has been inspired by observations after destructive earthquakes. An active writer and teacher, he has been a consultant on a variety of geotechnical and earthquake engineering problems in the industry, both in the private and public sector. He is recipient of many awards, including the James Croes Medal, the Alfred Noble Prize, and the Walter Huber Civil Engineering Research Prize from the American Society of Civil Engineers (ASCE). He has given several prestigious lectures sponsored by international geotechnical societies, including the 2009 "Coulomb", the 2013 "Ishihara", and the 2019 "Maugeri" Lectures. In 2015 he received the "Excellence in University Teaching" award from the Institute of Science and Technology of Greece, and in March 2019 he delivered the 59th Rankine Lecture in London.

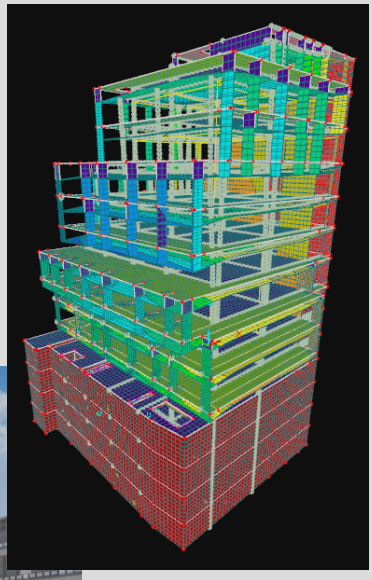
Selected Works



# “Piraeús Gate” – Urban Development

| | |
|---|---|
| Sector | Commercial-Residential |
| Location | Piraeus, Greece |
| Year | 2024 |
| Architect | Tsolakis Architects |
| Client | DKG Development |

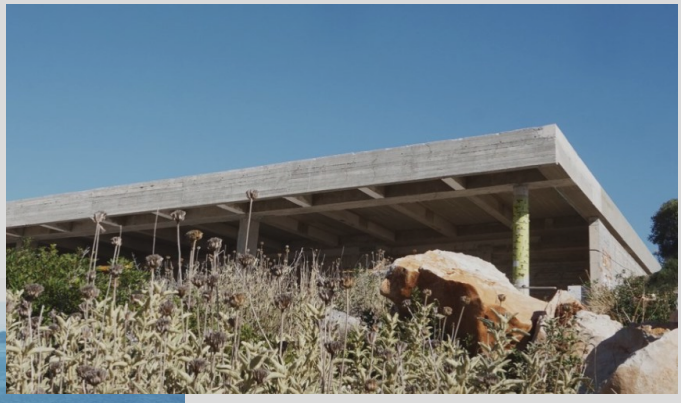
The Piraeus Gate project is an extensive urban regeneration initiative that encompasses various greenfield and brownfield developments in office, retail, residential, and hospitality sectors. Tesseract engineers have been appointed as the structural engineers for the project, responsible for both conceptual and detailed design as well as structural supervision. The team is closely collaborating with Tsolakis Architects to provide advanced solutions for several complex structures, including a 15-storey office building and the restoration/retrofitting of an old 7000m² industrial complex, which will be converted into student housing.



# “Euthea” – Residence in Meganisi

| | |
|---|---|
| Sector | Residential |
| Location | Meganisi, Lefkas, Greece |
| Year | 2023 |
| Architect | Ateno studio |
| Client | Private |

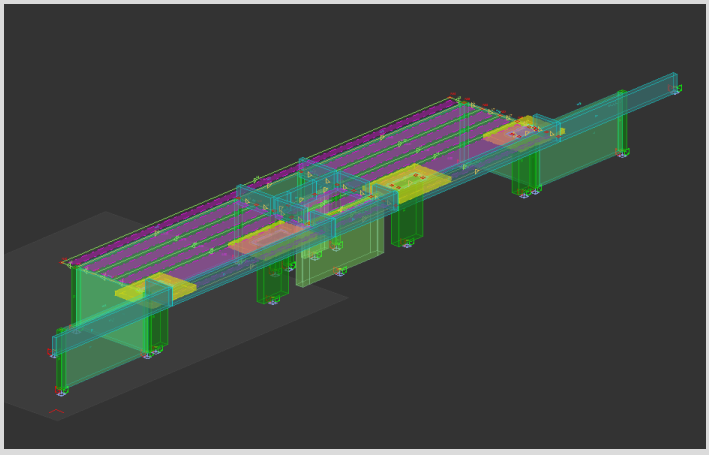
Located on a yet uninhabited peninsula of Lefkas’ Meganisi, this project takes on the task of installing the first inhabitant, and by extension the responsibility of setting an example for future developments. The primary goal was a harmonious integration of a residence into the natural landscape, causing minimal disruption to surrounding ecosystems. Tesseract Engineers in collaboration with Ateno studio undertook the conceptual design and subsequently carried on with the structural detailed design as well as consultation/supervision during the construction phase.



# “Terra Mare” - Underground residence in Syros island

| | |
|---|---|
| Sector | Residential |
| Location | Tria Langonia, Syros, Greece |
| Year | 2023 |
| Architect | Ateno studio |
| Client | Private |

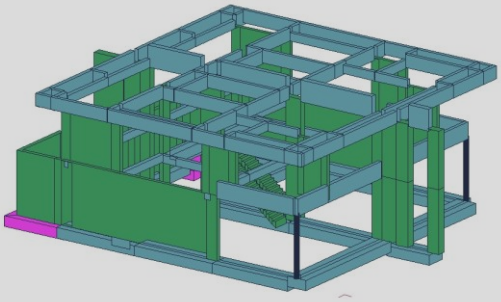
The villa comprises an underground residence located in Tria Langonia, Syros, 50m away from the coastline. Influenced by the island’s traditional architecture, it blends into the natural landscape while stating a contemporary approach to a cave house concept. The building is characterised by large openings, a central ‘’funnel’’ for natural lighting and a large beam in the façade of the villa. Tesseract Engineers in collaboration with Ateno studio undertook the conceptual design and subsequently carried on with the structural detailed design as well as consultation/supervision during the construction phase.

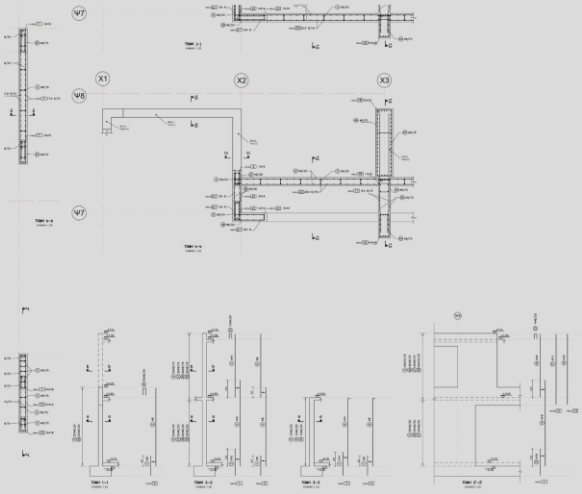


# “Party Wall” - Twin Houses in Dikastika

| | |
|---|---|
| Sector | Residential |
| Location | Marathonas, Greece |
| Year | 2022 |
| Architect | Ateno studio |
| Client | Private |

Dikastika Twin Houses are located 100m away from the coastline of Marathonas and comprise a two-storey villa separated in the middle by a “bold wall”. The building is characterised by large openings, spans and cantilevers. Tesseract Engineers in collaboration with Ateno studio undertook the conceptual design and subsequently carried on with the structural detailed design as well as consultation/supervision during the construction phase.





# Reconstruction & retrofitting of a traditional listed stone building in Ermoupoli, Syros

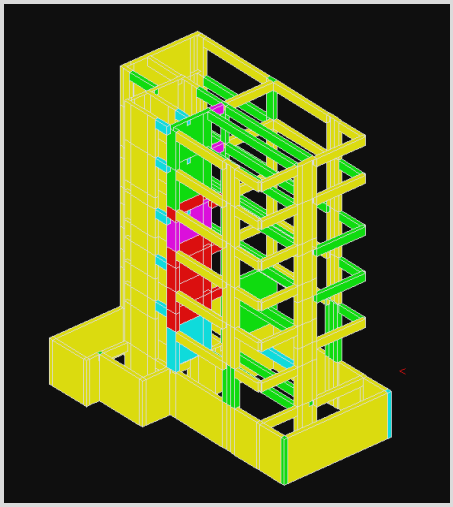
| | |
|---|---|
| Sector | Residential |
| Location | Ermoupoli, Syros, Greece |
| Year | 2023 |
| Architect | CNI architects |
| Client | Private |

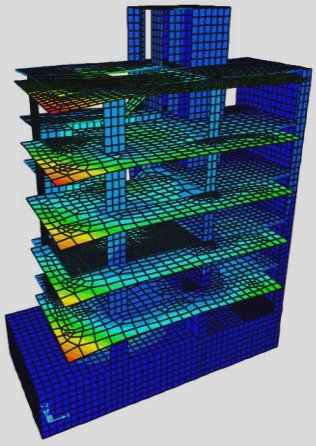
Tesseract Engineers were appointed as the structural engineers for the reconstruction and retrofitting of the traditional house located in Ermoupoli, Syros. The building was initially constructed in the early 1900s and is fully renovated to serve the contemporary needs without however compromising the architectural characteristics and aesthetics of its era. Our design office was involved in the early design stage including site investigation, laboratory testing and detailed design of the retrofitting strategy. Subsequently, Tesseract undertook the supervision of the retrofitting works.

# Residential building in Aetorachis, Athens

| | |
|---|---|
| Sector | Residential |
| Location | Athens, Greece |
| Year | 2022 |
| Architect | Ateno studio |
| Client | Private |

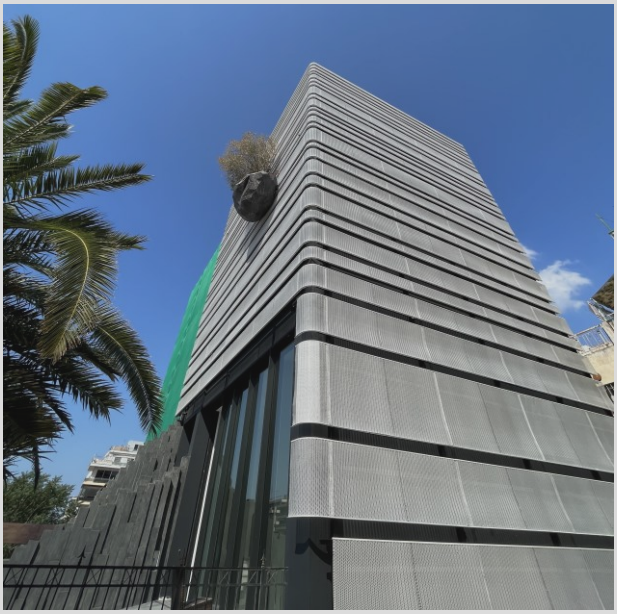
Tesseract Engineers collaborated with Ateno studio to conceptualise, design and finally handover to construction a five-storey residential building in the area of Galatsi, Greece. The building is characterised by curved balconies, wide openings and an external staircase core. The project is ongoing and Tesseract were appointed to provide structural engineering services from the conceptual stage to the detailed design of the structure, as well as consultation and supervision during construction.



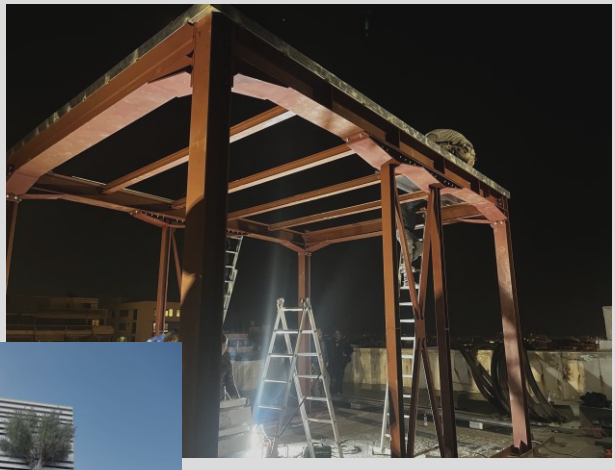


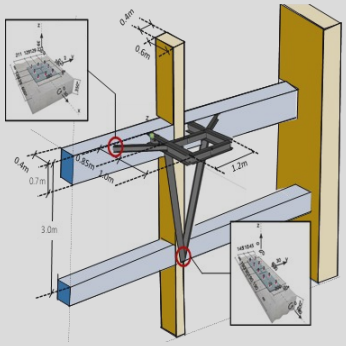
# Reconstruction of six-storey office building in Syggrou 300

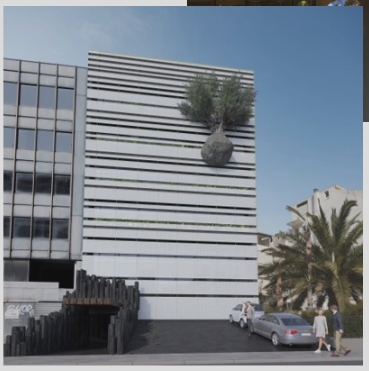
| | |
|---|---|
| Sector | Commercial |
| Location | Athens, Greece |
| Year | 2021 |
| Architect | CNI Architects |
| Client | Syggrou Melathron PC |

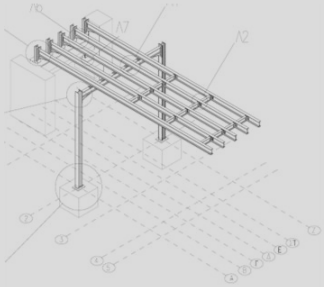


Located in Athens, Greece, Syggrou 300 is a six-storey building constructed in the late 80s. In 2021, Tesseract Engineers were appointed to provide structural engineering services for the full reconstruction and renovation of the building, aiming to develop a state-of-the-art office that serves as the headquarters of a shipping company. Tesseract were involved from the conceptual phase of the project and subsequently provided the detailed design of all the required structural works, e.g., façade, steel structures, construction of additional steel floor, static and dynamic analyses of the structure. Our team was responsible for the supervision of all structural works during the construction phase.



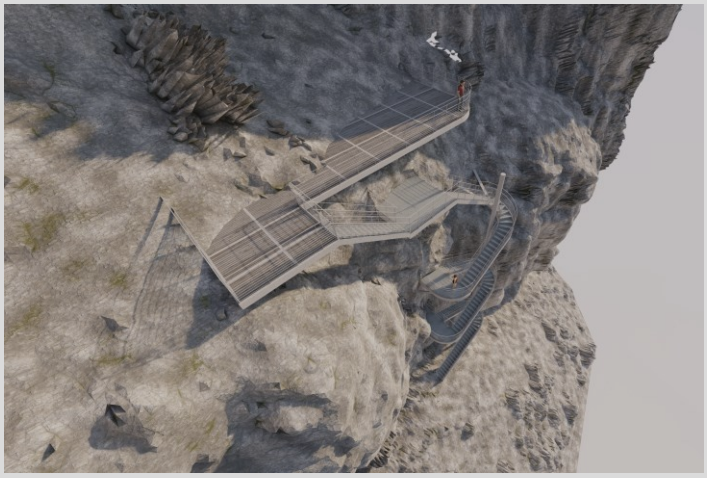




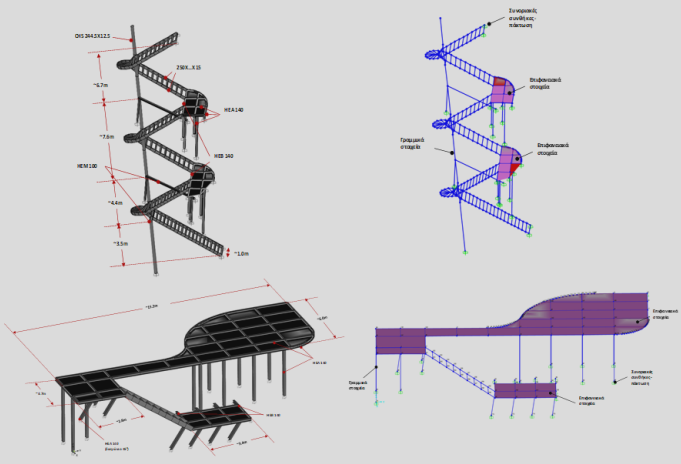


# Access staircase to the cave of Odysseas Androutsos on Mt. Parnassus

| | |
|---|---|
| Sector | Public |
| Location | Tithorea, Greece |
| Year | 2021 |
| Architect | Ateno studio |
| Client | Dimos Amfiklias-Elatias |

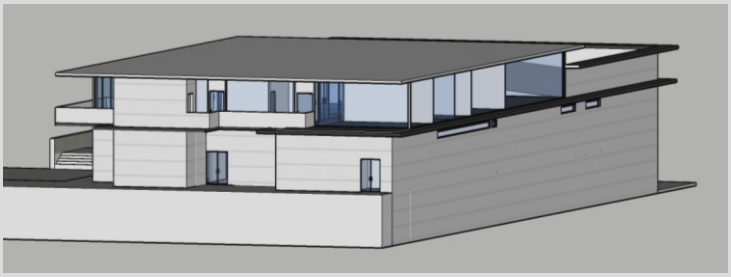


Tesseract Engineers collaborated with Ateno Studio to facilitate the access to the cave of Odysseas Androutsos. A steel curved staircase and steel platform both attached to the steep rocky cliffs were designed as the optimum solution in terms of aesthetics, structural robustness and minimum intervention to the environment. Tesseract provided structural engineering services from the conceptual stage to the detailed design of the structure, working in close collaboration with the architectural, geologists and survey engineering teams.

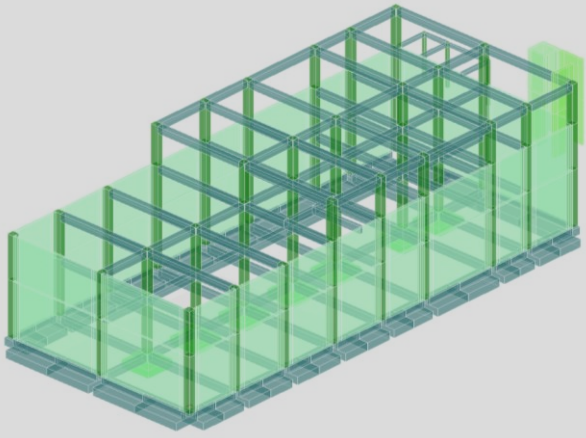


# Industrial unit & Office space in Corinth

| | |
|---|---|
| Sector | Commercial |
| Location | Corinth, Greece |
| Year | 2022 |
| Architect | Giannis Papakyriakos |
| Client | Korinthian Palace Catering |



Tesseract Engineers were appointed as the structural engineers for the detailed design of a 3000m$^2$ industrial unit and office space in Corinth, Greece. The unit serves as the production factory, headquarters and warehouse of a catering company. The high significance and substantial live loads of the structure demanded specialized analysis of the superstructure with emphasis on the minimal deformation of the structural members.



# Sibiu Pitesti Section 3, Romania

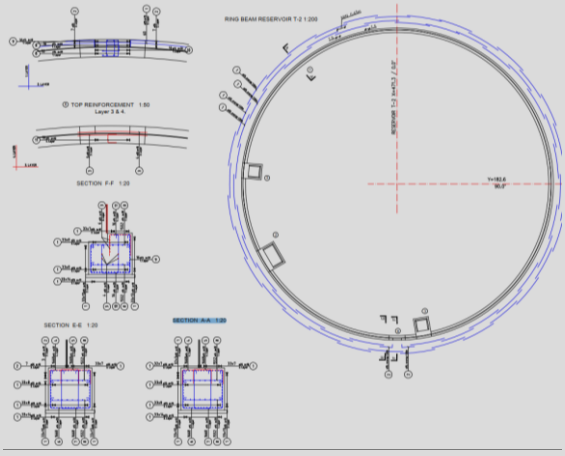
| | |
|---|---|
| Sector | Public |
| Location | Future viaducts between Cornetu and Tigveni kms 44+500 and 81+900, Romania |
| Year | 2023 |
| Client | S.G.S. - STUDIO GEOTECNICO STRUTTURALE S.r.l |

Tesseract Engineers were appointed to provide engineering services for the PAC phase (Construction Permit) of the Sibiu Pitesti Highway Section 3. Section 3 is the most complex part of the highway because it will cross the Carpathian Mountains between Cornetu and Tigveni for 37.4 kilometres, of which 12.5 kilometres will include 48 bridges and viaducts, the Poiana Tunnel, a 1.7-kilometre-long twin tunnel, two interchanges at Valeni and Cornetu, 18 kilometres of consolidation works, the construction of a maintenance and control centre, and work to preserve the environment. In particular Tesseract Engineers will provide the interpretation of the geotechnical conditions and properties of the future viaducts between Cornetu and Tigveni (kms 44+500 and 81+900). The assessment is based on in-situ testing, geophysical/seismic testing and laboratory testing.

# Reinforcement design and detailing for Jubail to Eastern Province water transmission system & Shoaiba Quaiza water transmission system

| | |
|---|---|
| Sector | Industrial |
| Location | Saudi Arabia |
| Year | 2023 |
| Client | Holinger |

Tesseract Engineers provided structural engineering services to Holinger for the construction of the Jubail to Eastern Province water transmission system & the Shoaiba Quaiza water transmission system. The works included Reinforcement design and detailing of the tanks and pipline foundations.



# Experimental campaign for VSoL® MSE retaining wall system

| | |
|---|---|
| Sector | Industrial |
| Location | Athens, Greece |
| Year | 2023 |
| Partners | Grid Engineers \| National Technical University of Athens |
| Client | VSol - Grid Engineers |

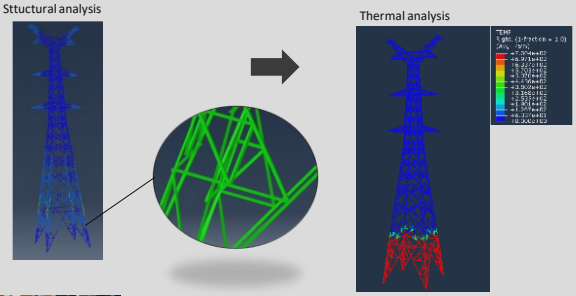
Tesseract Engineers provided support to Boygues Construction's VSol® department in advancing a groundbreaking geosystem application for retaining Walls - the VSoL® MSE wall. Our responsibilities included conducting pull-out experiments on biaxial steel geogrids, conducted at the National Technical University of Athens under various overburden stresses. Additionally, we evaluated the impact of geogrid specimen dimensions and soil density on the reinforcement capacity. The VSoL® MSE wall is characterized as an inherently resilient geotechnical system, ensuring consistently high safety levels. Notably, its design and load-bearing mechanisms not only surpass traditional code requirements in terms of overstrength but also present significant opportunities for material savings, resulting in a more cost-effective design.

Research & Development

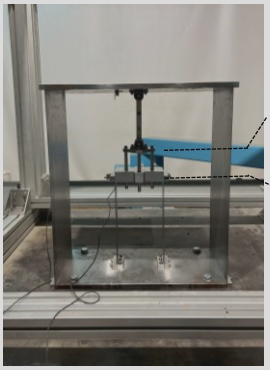
# Research & Development

Tesseract Engineers are in close collaboration with the National Technical University of Athens & ETH Zurich for the development of seismic isolation devices and noise mitigation panels. Tesseract's philosophy is rooted in our passion for exploration, discovery, and comprehension. Through dedication to research, the cornerstone of our practice, we remain on top of the latest advancements and design methodologies. In this way, we are able to assess and propose state-of-the-art concepts and provide solutions to challenging real-life applications.

## Fire modelling & damage assessment of structures




## Novel seismic isolation device prototypes

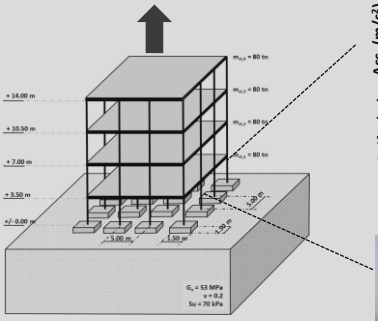


KDamper Prototype

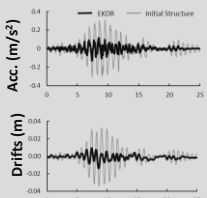
Negative stiffness element

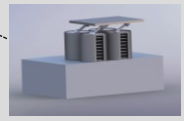
KDamper Oscillating Mass ($m_D$)

Seismic Retrofitting

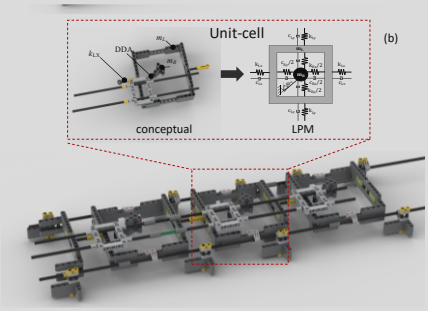


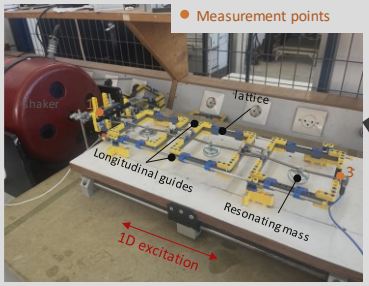
Typical 4-Storey Building

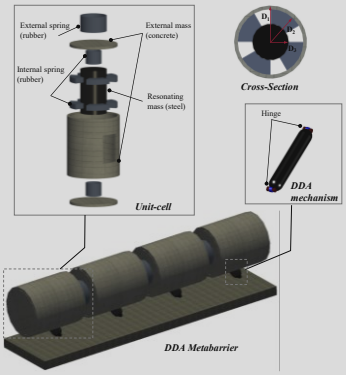


KDamper absorber at base level



# Publications

## In scientific journals

- **Mantakas A., Kalderon M.,** Chondrogiannis K., Kapasakalis K., Chatzi E., Antoniadis I., Sapountzakis E.J., "Experimental testing and numerical validation of the Extended KDamper: A negative stiffness-based vibration absorber", *Engineering Structures, Vol. 321, 15 December 2024, 118894, 10.1016/j.engstruct.2024.118894*
- Sabat R., Cochin E**.**, **Kalderon M**., Lévêque G., Antoniadis I., Djafari-Rouhani B., Pennec Y. (2023) Low frequency sound isolation by a metasurface of Helmholtz ping-pong ball resonators. *J. Appl. Phys., 134 (14): 144502*, June 2023 https://doi.org/10.1063/5.0160267
- K. Kapasakalis, **A. Mantakas**, **M. Kalderon**, M. Antoniou & E. J. Sapountzakis (2023) Performance Evaluation of Distributed Extended KDamper Devices for Seismic Protection of Mid-Rise Building Structures, *Journal of Earthquake Engineering* (2023)
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