

## Projects

### Technical Consulting Activities

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**Note:**

Due to the confidentiality of the consulting projects, only general categories are outlined and details of the project and the names of the clients are not disclosed. Highly confidential consulting activities are not even listed. Some of the categories listed in the following table include several consulting projects carried out at various periods of time. The contribution of participating coworkers, organizations, and partners to each project is thankfully acknowledged.

| No. | Industry, Client, Partner     | Nature of the consulting activities  |
|-----|-------------------------------|--|
| 1   | City municipality             | Consulting related to design and construction of large reinforced concrete shells for bus terminal         |
| 2   | City municipality             | Consulting related to design and construction of large reinforced concrete shells for large assembly halls |
| 3   | Industry                      | Development of prefabricated shell structures for high dynamic loading requirements                        |
| 4   | Province and city authorities | Investigation of earthquake stricken areas, recommendations for retrofitting                               |
| 5   | Industry                      | Coverage of large industrial spaces  |
| 6   | Province water authorities    | Consulting related to design and construction of dams  |
| 7   | Public authorities            | Power plants (research and project evaluation)   |

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|----|---|---|
| 8  | City municipality   | Consulting related to the maintenance and retrofitting of masonry structures  |
| 9  | Machine industry  | Development of GRP cylinders for spinning machines  |
| 10 | Ship industry   | Engineering investigation of fenders in the ship harbors and related recommendations  |
| 11 | Engineering offices, pipe industry, end users                               | Development of software ADAP(Automated Design and Analysis of Pipelines)  |
| 12 | Pipe producers, material producers, engineering offices, planers, end users | Engineering calculations, consulting related to life cycle analysis, retrofitting, and product development using the pipeline software ADAP                             |
| 13 | Pipe producers, material producers, engineering offices, planers, end users | Design and analysis of various piping systems   |
| 14 | Pipe producers  | Consulting related to the investigation of the long-term behavior of multilayer pipe components and associated product development of for high temperature requirements |
| 15 | Pipe producers  | Product development and optimization of multilayer pipes  |
| 16 | Pipe producers  | Consulting related to the investigation of the long-term behavior of Glass Fiber Reinforced Pipes (GFRP) pipes and associated product development                       |
| 17 | Public authorities, engineering offices, planers, end users                 | Consulting related to retrofitting of aged or damaged pipelines   |
| 18 | Public authorities, insurance companies                                     | Many failure investigation related to piping systems and related engineering recommendations for retrofitting   |
| 19 | Hydropower industry   | Investigation of penstock failure and recommendation for rehabilitation   |
| 20 | Water authorities   | Consulting related to the life cycle analysis of the existing water main pipelines  |
| 21 | Tunnel construction contractor  | Consulting related to the suitability of use of certain polymeric pipes in tunnels and related recommendations  |
| 22 | City water authorities  | Investigation of submerged sub sea piping systems   |

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| 23 | Chemical industry   | Investigation of industrial pipeline failure and recommendations for rehabilitation  |
| 24 | City water authorities  | Development of prefabricated elements as retaining elements in trenches  |
| 25 | Pipe producers, material producers, engineering offices, planers, end users | Consulting related to standardization and composition of guidelines for piping systems   |
| 26 | Telecommunication industry  | Multifunctional materials and structural elements  |
| 27 | Telecommunication industry  | Consulting related to material and structural system development of large scale prefabricated lightweight sandwich composite structure for antenna coverage (conception, material design, system design, consultation related to production, transport, installation, approval, and health monitoring) |
| 28 | Engineering consultant  | Consulting related to retrofitting of penstocks for high pressure requirements   |
| 29 | Flooring panels production company  | Consulting related to failure analysis and improvement of elastomeric flooring panels; development of thermoplastic flooring systems for various traffic requirements  |
| 30 | Special purpose marine vehicles   | Consulting related to development of certain lightweight marine vehicles; Consulting for development of sandwich structures for marine applications  |
| 31 | Elevator industry   | Consulting related to assessment of the elevator cables and improvement of the product; development of multilayer cables of synthetic fibers   |
| 32 | Transport industry  | Consulting related to development of innovative components for automobiles   |
| 33 | Transport industry  | Expertise assessment related to use of adhesives and sealants in public transport systems  |
| 34 | Transport industry  | Use of adaptive and smart materials for safety   |
| 35 | Aerospace industry  | Multilayer glass for impact requirements   |
| 36 | Electric installations for transport industry                               | Investigation of elastomeric isolators and recommendations for use of insulation proper materials  |

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| 37 | Public authorities, material producers, planers   | Evaluation of long-term behavior of water-sealing and drainage systems                               |
| 38 | Various industries  | Numerous engineering simulations related to composite elements and structures                        |
| 39 | Accreditation agencies, material producers, product manufacturers, engineering consultants, end users | Expertise related to evaluation of testing laboratories and institutions                             |
| 40 | Universities, research institutions, industry   | Numerous expertise and consulting related to formulation of research proposals and projects          |
| 41 | Universities, research institutions, industry   | Expertise and consulting related to multidisciplinary projects (for example in biomechanics)         |
| 42 | Universities, research institutions, industry   | Development of testing methods related to biological tissues and organs                              |
| 43 | Aerospace industries, ship industries, and research organizations                                     | Development and design guidelines related to imperfection tolerant composite shells                  |
| 44 | Pipe industries, standardization organizations, and research organizations                            | Development of standards and guidelines for Glass Fiber Reinforced Polymers pipes and flanges (GFRP) |
| 45 | Industry, universities, research institutions   | Knowledge management projects  |
| 46 | Industry and laboratories   | Evaluation and development of laboratories   |
| 47 | Industry, research organizations, universities  | Technology transfer, workshops, courses, Seminars  |
| 48 | Material and product developers, end users  | Standardization of materials, products, processes  |
| 49 | Research institution  | Development of composite HP shells   |
| 50 | Standard organization   | Drainage pipes for tunnel construction   |
| 51 | Industry and universities   | Finite Element simulations, evaluation of simulations as FE expert, and related expertise            |