

CAREER PROSPECTS

The "Structures & Materials" major offers opportunities in:

INDUSTRY SECTORS

- Major construction groups in civil engineering, offshore, wind power
- Project managers in infrastructure projects (road and rail)
- Transport industries
- Public or private materials research organisations
- Research labs in the field of sports
- Certification and inspection bodies
- Companies working in industrial risk management

POSITIONS TARGETED

- Civil engineer in infrastructure
- Transport engineer
- Design engineer
- R&D engineer in materials and structures
- BIM manager
- Methods engineer
- Assistance to project managers
- Maintenance and rehabilitation engineer
- Technical inspection engineer
- Project management, risk management



PROJECTS

This major's project aims to implement the project management and team work methods, taught throughout the semester, with visiting lecturers, on a real industrial or research issue.

In Year 4, **3 themes are to be chosen** from the following:

- Automotive project with a systems engineering approach
- Structural project with a BIM approach
- Materials research project, with research labs

In Year 5, **industrial projects are offered among**

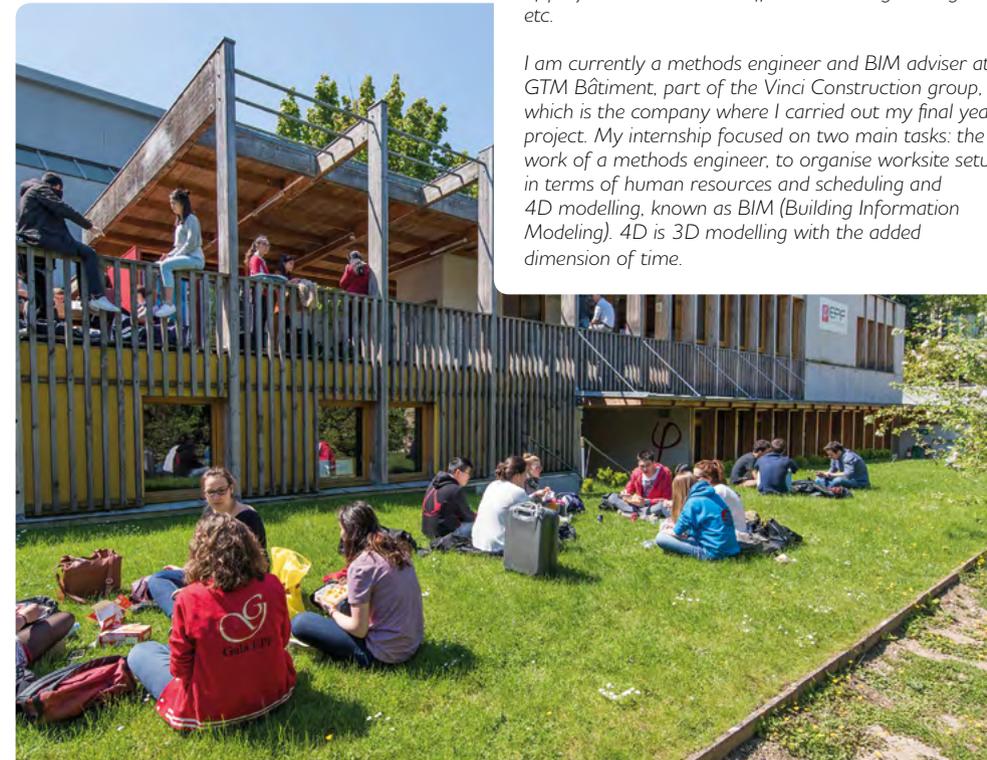
- Building structure project
- Civil engineering project
- Structures for Transport project

ANY QUESTIONS?

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For further information please check the "Application process for international students" section on our website www.epf.fr/en



Audrey DIVET
Methods Engineer and BIM Adviser,
GTM Bâtiment (Class of 2015)

An advantage of the "Structures & Materials" major is that it is relevant to many fields. **With this program, students acquire a knowledge of mechanics and materials that is applicable in all the industry sectors that use them, in other words, nearly all of them: aeronautics as well as cosmetics!**

Courses are very comprehensive and varied, with very practical teaching like metal construction or reinforced concrete; but also more theoretical courses like fracture mechanics or the finite element method. All this comes with some basics on European legislation and a variety of projects, construction, offshore, civil engineering etc.

I am currently a methods engineer and BIM adviser at GTM Bâtiment, part of the Vinci Construction group, which is the company where I carried out my final year project. My internship focused on two main tasks: the work of a methods engineer, to organise worksite setup in terms of human resources and scheduling and 4D modelling, known as BIM (Building Information Modeling). 4D is 3D modelling with the added dimension of time.

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EPF
GRADUATE SCHOOL
OF ENGINEERING

MATERIALS RESISTANCE
MODELLING
STRUCTURAL DYNAMICS
MATERIALS BEHAVIOUR
STRUCTURES & MATERIALS MAJOR
METALLURGY
CIVIL ENGINEERING STRUCTURES
NUMERICAL SIMULATION
MASS OPTIMIZATION
COMPOSITE MATERIALS
CRASH AND IMPACT

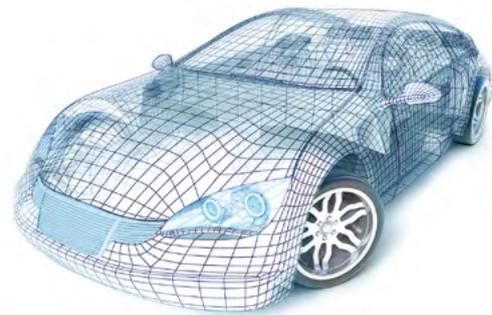
SUSTAINABILITY
SAFETY
RISK MANAGEMENT
STATISTICS
NANOMATERIALS



PROGRAM AIMS

The Structures & Materials major provides EPF students with a wide range of programs on the **study of structures in general, with more specific applications in civil engineering, or Transport related industries (Automotive, train, naval)**. This major preserves the EPF's generalist tradition, training **multi-skilled engineers** capable of working in a variety of industry sectors.

The objective of this major is to **implement innovative technical solutions in the design of complex buildings and structures**, by using the most appropriate materials.



PROGRAM STRUCTURE

The "Structures & Materials" major extends over two academic years and is organised around two in-class semesters, alternating with two internship semesters: a student engineer internship in Year 4 and a "final year project" internship in Year 5.

At the end of this major, students are equipped with a range of technical skills, they are familiar with the industrial approach and open to research. **Teaching is diversified** and very theoretical aspects are combined with practical work in labs, the use of numeric simulation tools, conferences, industrial site visits etc.

A significant part of the major is dedicated to project work and case studies, placing students in a work situation.

COMPULSORY CUs – YEAR 4

COURSE UNIT	
Tools for engineers 64 h 5 ECTS	
Labour law Business game Risk management Statistics for engineering Conferences and visits English	Essential tools for engineers in social and human sciences and in analysis. Knowing them and being able to use them to good purpose.
Materials and processes 64 h 5 ECTS	
Introduction to research Characterising materials Materials plasticity Shaping materials	Knowing the behaviour types of materials and the parameters that define them, in order to select the material appropriate for the part and structure to be built.
Advanced mechanics 64 h 5 ECTS	
Advanced strength of materials Structural dynamics Fast dynamics	Knowing how to model a structure, using structural computation methods, numerical simulation and the appropriate numerical tools to understand how it reacts to constraints and deformations on inert or living matter.
Modelling 64 h 5 ECTS	
Finite Element Method (theory & software) Design-modelling project (example in industry in the form of an engineering consulting firm) Software engineering (CATIA, Abaqus)	Understanding the need to impose boundary conditions in terms of support and load, knowing how to size a structure by optimising it in line with resistance, durability, safety and cost criteria.
Project 150 h 5 ECTS	

ELECTIVE CUs – YEAR 4

COURSE UNIT	
Applications - Introduction to Civil Engineering 64 h 5 ECTS	
Material and products Civil Engineering Design Civil Engineering Structures	Knowing how to design simple structure by optimizing cost, durability and security.
Applications - Introduction to Transport 64 h 5 ECTS	
Material and products in Automotive Stamping Automotive structure - ground link	From material to structures by optimizing cost, security and durability.

COMPULSORY CUs – YEAR 5

COURSE UNIT	
Advanced Material 75 h 6 ECTS	
Microscopic behaviour Composite material Metallurgy Macroscopic behaviour	Knowing how to analyse materials at different scales and knowing characterization of material.
Advanced Structures 75 h 6 ECTS	
Advance methods in structure design Fatigue and reliability Sea structures Fracture mechanics	Estimating a structure's life span, analysing ageing mechanisms, considering rehabilitation, rebuilding or deconstruction methods.

ELECTIVE CUs – YEAR 5 – 1 track to be chosen

TRACK STRUCTURES AND MATERIALS FOR INNOVATIVE TRANSPORTATION	
Structure durability 85 h 6 ECTS	
Smart materials Design and simulation project Conferences and visits	Basic knowledge on new material and new technologies for structures durability. Applied study cases.
Structures and Materials for Transportation 85 h 6 ECTS	
Certification Crash and Impact modelling and simulation Lightweight structures	Understand technical issues in Transportation Industry.
Project Innovative Transportation or Structures 150 h 6 ECTS	

TRACK STRUCTURES AND MATERIALS FOR CIVIL ENGINEERING	
Civil Engineering 85 h 6 ECTS	
Soil and foundation mechanics Concrete structures Underground works Conferences and visits	Understand foundation in soil. Knowing how to choose them. Basic knowledge on geotechnics.
Engineering structures 85 h 6 ECTS	
Metallic construction Earthquake Engineering Snow and wind Practical cases on structures	Knowing how to study a structure in extreme conditions (earthquakes, cyclones, swell, explosions) and knowing the applicable legislation.
Project Building Structures or Civil Engineering 150 h 6 ECTS	