Competences in the M+E sector

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Description through 2 vocations in the French context:

Electro-mechanical technicians

Metal-cutting technicians

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Electro-mechanical technicians

Electro-mechanical technicians

Electro-mechanical technicians

French title:

- technicien électromécanicien (ROME code: 52 131)

And also…:

- technicien électronicien de développement
- technicien électronicien d'études
- technicien en électrotechnique études
- technicien de laboratoire en électricité
- technicien de laboratoire en électronique
- technicien de recherche en électricité
- technicien de recherche en électronique
- technicien en télécommunications études

Electro-mechanical technicians

description of skills

- In French, they are called "**electro-mechanical technicians"**
- The **ROME** number is **52 131** (technicien électromécanicien / techniciennes électromécanicienne)

National definition of the vocation:

- Participates in the creation of a production method or products ensuring its technical feasibility, with the help of documentation connected with electricity, electronics, electrical engineering, telecommunications or electro-mechanics.
- Searches for the components required for the construction of prototypes and makes tests and measurements aimed at reaching a perfect compliance with the specifications.
- Takes part in the drawing up of the technical specification providing the basic data, the directions for use, the minutes of the tests, the block and cabling diagrams and possibly, the instruction booklet.
- The field of his/her activity can be spread from the implementation of mechanical mountings to the maintenance of equipment.

General conditions of the implementation of the vocation:

- This vocation is mainly carried out in laboratories during the day with regular schedules.
- According to the dimension of the project, the activity can be practiced either alone or in teams.
- Some mechanical setting works or activities implemented directly on the building site lead to special working conditions (complex positions, lasting travels, etc.).
- In other respects, computers are often used.

Electro-mechanical technicians

description of skills

Training and experience:

- This vocation can be reached from level 4 and level 3 vocational training qualifications (CFPA, BAC Technologique, Scientifique ou Professionnel, BTS ou DUT) in the fields of electricity, electronics, electro mechanics or electrical engineering.
- The mastery of production processes and the knowledge of the contents of the different positions favour the access to this vocation.
- In the public sector, this vocation can be reached through competitive examination under specific recruitment and training level conditions.

Basic technical skills:

- To participate in the choice of a method thanks to documentation and theoretical proposals contained in the specifications
- To search for the necessary components from technical catalogues
- To draw-up, by hand or computer-aided, a detailed diagram with electronic systems or electric cabling
- To design and implement the prototype in accordance with the specifications thanks to tests, measurements and different assembling
- To suggest improvements and, after agreement, to implement them
- To participate in the realization of the technical file

Electro-mechanical technicians

description of skills

Associated skills:

- To know a foreign language and notably the technical English
- To know the basis of computer processing
- To know the basis of automation

Abilities linked to the vocation:

- To maintain constant technical and functional relations within and outside the enterprise
- To analyse the technical problems and from this, deduce the relevant methods and techniques
- To solve problems alone
- To rigorously respect the controlling methods
- To permanently update one’s knowledge on technologies

Specific activities:

- Practiced activities:
  - Installing and start-up of material
  - Modification of block diagrams
  - Drawing up of diagrams on computers
  - Construction of mechanical mountings

Electro-mechanical technicians

description of skills

Specific activities:

- Practiced activities:
  - Technical assistance for manufacturing departments
  - Equipment maintenance and repairs
  - Participation in the drawing up of manufacturing methods
  - Writing of technical specifications

- Used technologies:
  - Electronic processes (electronic cards)
  - Surface-mount technology (electronic cards)
  - Coil

- Manufactured products:
  - Industrial and professional equipment (electric engines, measurement instruments, medical equipment, automatic devices, etc.)
  - Consumer equipment (TV, hi-fi, sound, video, etc.)
  - Data processing equipment (computers, printers, robots, etc.)
  - Telecommunication equipment (telephone exchanges, switches, etc.)
  - Transmission and detection equipment (navy, land forces, air forces, etc.)

Electro-mechanical technicians

description of official qualifications

French Level	*Name of the qualification*
Below level 5, a person is said to be unskilled No Level 5 qualification for this vocation (metal-cutting technician)	
Level 4	*TP technicien d'industrialisation en électronique* Industrialisation in electronics
Level 3	*Technicien supérieur en conception de systèmes électroniques de sécurité* Design of safety electronic systems *Technicien supérieur en électronique, électrotechnique et automatisme* Electronics, electrical engineering and automation *Technicien supérieur en informatique et électroniques industrielles* Industrial computing and electronics *TP concepteur développeur de systèmes électroniques* Design and development of electronic systems

TP: Titre Professionnel / Title with vocational aim (continuing training only)

Electro-mechanical technicians

description of official qualifications

French Level	*Name of the qualification*
Level 3	*BTS Conception et industrialisation en microtechniques* Design and industrialization in micro techniques *BTS Electrotechnique* Electrical engineering *BTS Génie optique option instrumentale* Optical engineering option: instruments *BTS Génie optique option photonique* Optical engineering option: photonic *BTS Systèmes électroniques* Electronic systems *BTS Techniques physiques pour l'industrie et le laboratoire* Physical techniques for the industry and laboratories

BTS: Brevet de Technicien Supérieur / Higher Technician's Certificate

Electro-mechanical technicians

description of official qualifications

French Level	*Name of the qualification*
Level 3	*DEUST Optique électronique et communications* Electronic optics and communications *DEUST Process industriel électromécanique* Electromechanical industrial process *DEUST Sciences pour l'ingénieur mention techniques électroniques et communications option systèmes électroniques et télécommunications* Sciences for the engineer, specialised in electronic techniques and communications, option: electronic systems and telecommunications *DUT Génie des télécommunications et des réseaux (GTR)* Telecommunication and network engineering

DEUST: Diplôme d'Etudes Universitaires en Sciences et Techniques / University Scientific and Technical Studies Diploma

DUT: Diplôme Universitaire de Technologie / University Technological Diploma

Electro-mechanical technicians

description of official qualifications

French Level	*Name of the qualification*
Level 2	*Licence PRO électricité et électronique option ingénierie des systèmes de radiocommunication* Electricity and electronic option: radio communication system engineering *Licence PRO électricité et électronique option optronique* Electricity and electronic option: optronic *Licence PRO électricité et électronique spécialité métiers de la microélectronique et des microsystèmes* Electricity and electronic option: microelectronic and microsystem vocations *Licence PRO électricité et électronique mesures hyperfréquences et radiocommunications* Electricity and electronic, ultra high frequency measurements and radio communications *Licence PRO mécanique option groupe motopropulseur et son environnement* Mechanics option: power unit and its environment *Licence PRO mécanique option internationale en mécatronique* Mechanics option: international mechatronics *Licence PRO réseaux et télécommunications option électronique des communications* Networks and telecommunications option: communication electronics

Licence Pro: Licence Professionnelle / Vocational Licence

Electro-mechanical technicians

description of skills

Practice place:

- Workshops
- Offices
- Building sites
- Laboratories

Working conditions:

- Travels

Metal cutting technicians

Metal cutting technicians

French title:

- technicien d’usinage (ROME code: 52 211)

And also…:

- technicien de fabrication de la construction mécanique et du travail des métaux
- technicien d’atelier automatisé
- technicien en forge mécanique et en estampage
- technicien de production automatisée
- technicien en soudure / soudage
- technicien en traitement de surface
- technicien en traitement thermique
- technicien de production en métallerie et serrurerie
- etc.

Metal cutting technicians

description of skills

- In French, they are called “**techniciens d’usinage**” (“machining technicians”)
- The **ROME** number is **52 211**
  “Technicien de fabrication de la construction mécanique et du travail des métaux”

National definition of the vocation:

- Organizes the production from a technical file in connection with the supervisory staff;
- Follows it through, respecting quantity and quality requirements as well as deadlines;
- Depending on the size of the enterprise, can be lead to optimize automated or flexible production systems and to control and manage the flow of tools and parts.
- Can also have to use computer-aided programming (CAP), computer-aided manufacturing (CAM) and computer-aided production.

General conditions of the implementation of the vocation:

- This vocation is generally carried out either in offices or in workshops during the day with regular schedules.
- However, the follow-up of some projects might require shift work (2*8 or 3*8) or work during the week-end.

Metal cutting technicians

description of skills

Training and experience:

- This vocation can be reached from level 4 and level 3 vocational training qualifications (BAC Professionnel or Technologique, CFPA, BTS or DUT) in the field of general mechanics.
- Indirect access can be granted through alternation training or promotion from within the company (for workers that gained an experience of several years in the field of mechanics and metal working).
- In the public sector, this vocation can be reached through competitive examination under specific recruitment and training level conditions.

Basic technical skills:

- To study and analyze a technical file
- To establish technical manufacturing cards with (or without) the help of methods department
- To test the different production tools
- To follow-up the quality of production
- To remedy to production hazards

Metal cutting technicians

description of skills

Associated skills:

- To be familiar with accountancy tools and management methods

Abilities linked to the vocation:

- To apply rigorous methodological processes
- To analyze and synthesize technical information
- To adapt to new technologies and products
- To develop technical and relational links with the working environment
- To apply instructions coming from different sources

Specific activities:

- Practiced activities:
  - Tool design
  - Creation of a manufacturing process
  - Production management
  - Use of computer-aided technologies

Metal cutting technicians

description of skills

Specific activities:

- Action fields:
  - Boiler construction and sheet metal manufacturing
  - Ironworks
  - Precision mechanics
  - Micro mechanics
  - General mechanics
  - Metal structures
  - Piping

- Carried out production:
  - Automated or flexible production
  - Unit or small-batch production

- Carried out operations:
  - Assembling
  - Surface processing
  - Thermal processing
  - Machining

Metal cutting technicians

description of skills

Practice place:

- Sectors:
  - Aeronautics
  - Automotive
  - Mechanics
  - Shipbuilding
  - Other equipment goods

- Size:
  - Small enterprise (0 to 9 employees)
  - Medium enterprise (10 to 499 employees)
  - Big enterprise (500 employees and more)

Working conditions:

- Shifts (2*8, 3*8 etc.)
- Work during week-ends

Metal cutting technicians

description of official qualifications

French Level	*Name of the qualification*
Below level 5, a person is said to be unskilled No Level 5 qualification for this vocation (metal-cutting technician)	
Level 4	*TP technicien d'études en chaudronnerie et tuyauterie industrielle* Industrial boiler and pipe technician *TP technicien en soudage* Welding technician *TP technicien de production en métallerie-serrurerie* Production technician in metal and iron work *TP technicien de production sur lignes automatisées* Production technician on automated lines *TP technicien d'atelier en usinage* Machining workshop technician *TP technicien en carrosserie construction* Coach building technician

TP: Titre Professionnel / Title with vocational aim (continuing training only)

Metal cutting technicians

description of official qualifications

French Level	*Name of the qualification*
Level 4	*BAC PRO Carrosserie option construction* Coach building option: construction *BAC PRO Mise en œuvre des matériaux option matériaux métalliques moulés* Implementation of materials option: moulded metallic materials *BAC PRO technicien aérostructure* Aerostructure technician *BAC PRO technicien d'usinage* Machining technician *BAC PRO technicien modeleur* Pattern maker technician *BAC PRO technicien outilleur* Tool-making technician

BAC PRO: Baccalauréat Professionnel / Vocational baccalaureate

Metal cutting technicians

description of official qualifications

French Level	*Name of the qualification*
Level 3	*BTS Conception et industrialisation en microtechniques* Design and industrialization in micro techniques *BTS Conception et réalisation de carrosseries* Design and construction of coachwork *BTS Construction navale* Shipbuilding *BTS Etude et réalisation d'outillages de mise en forme des métaux* Design and construction of tools for metal forming *BTS Industrialisation des produits mécaniques* Industrialization of mechanical products *BTS Mise en forme des alliages moulés* Forming of moulded alloys *BTS Mise en forme des matériaux par forgeage* Forming of materials by forging

BTS: Brevet de Technicien Supérieur / Higher Technician's Certificate

Metal cutting technicians

description of official qualifications

French Level	*Name of the qualification*
Level 3	*BTS Productique mécanique* Mechanical production engineering *BTS Traitement des matériaux option A traitements thermiques* Material processing option A: thermal processing *BTS Traitement des matériaux option B traitements de surface* Material processing option B: surface processing *BTS Métallurgie extractive et génie métallurgique* Extractive metallurgy and metallurgical engineering *BTS Génie mécanique et productique* Mechanical production engineering *BTS Organisation et génie de la production* Organisation and production engineering

BTS: Brevet de Technicien Supérieur / Higher Technician's Certificate

Metal cutting technicians

description of official qualifications

French Level	*Name of the qualification*
Level 3	*Technicien supérieur coordonnateur en soudage et construction soudée* Welding and welded construction coordinator technician *Technicien supérieur de l'Ecole d'Adaptation aux Professions du Soudage* Technician from the School of Adaptation to Welding Vocations
Level 2	*Licence PRO mécanique option moteurs thermiques et vibrations acoustiques* Mechanical engineering option: thermal engines and acoustic vibrations *Licence PRO mécanique option sciences expérimentales des matériaux pour mécaniciens* Mechanical engineering option: experimental sciences of materials for mechanical engineers *Licence PRO production industrielle option traitement et revêtements de surface* Industrial production option: surface processing *Licence PRO transformation des métaux spécialité fonderie, moules métalliques* Metal processing specialized in casting and metal moulds *Licence PRO transformations industrielles option traitements de surfaces et gestion environnementale* Industrial processing option: surface processing and environmental management

Licence Pro: Licence Professionnelle / Vocational Licence