Technologies and competences

Experimental and numerical modelling
Forging forming and related technologies
Flat product forming
Product-process integration

Work in progress

Forging tools
- Manufacturing of a tooling characterisation test bench.

Forging technologies
- Multi-material forging.
- Robotised agile forging.

Cetim / Arts et Métiers ParisTech - Metz: collaboration since 2002

The collaboration between the two organisations, which started in 2002, is aimed at allowing Cetim to team up with a recognised academic partner in order to perform scientific work especially in the field of forging forming. The LAMFM joint laboratory was created in 2004 and work is being carried out in several fields:

Tooling – Explosive bonding applied to forging tools, with exploration of a superalloy coating applied onto a steel-based substrate.

Tooling – Thin coatings applied to hot forging, through identification of PVD, CVD and PACVD type duplex technologies applied to nitrided layers.

Product-process integration in forging
The formalisation work carried out within the scope of a doctoral thesis applied to forging gave rise to the development of Omegam, a design and costing aiding tool.

Product-process integration – Flashless forging
Work has been performed on a “rod” type part in collaboration with a work group from the Forge AFF / Cetim professional commission.

Forging technologies – Cross rolling
A doctoral thesis made it possible to identify and characterise the key phenomena involved and gave rise to the development of Colt, a tooling design application.

Forging technologies – Controlling the forging process through the instrumentation of a press
This doctoral thesis made it possible to identify the key parameters which are to be controlled, the physical phenomena involved and the available monitoring technologies. Workshop validation is scheduled.
Cetim: a technological institute specialised in mechanical engineering

At the crossroads between research and industry, Cetim, a Carnot-labelled technological institute is the French mechanical expertise centre. Cetim is the R&D partner for more than 6,500 mechanical engineering companies. It employs 700 persons, more than two thirds of whom are design engineers and technicians. Its sales turnover is €113 M and its scope of action is leveraged by a network of scientific and technical partners.

Although Cetim is strongly focused on its domestic customers, its industrial intervention capacity extends overseas, especially in French speaking regions.

Cetim steers many innovative projects and, consequently, it is a natural federator for major multi-partner industrial or R&D projects along five main lines of action: design, simulation, tests; manufacturing processes and materials; mechatronics, inspection and measurement; sustainable development; and management and support to small and medium companies.

As an R&D partner for specialised industrial leaders, Cetim proposes a general and multi-disciplinary offer to implement and transform scientific knowledge into industrial applications.

Cetim: efficient and innovative processes

Collective studies
- Forming by plastic deformation: adiabatic cutting, improvement of tooling service life;
- Powders: surface functionalisation by means of thick coatings, medical prostheses made to measure by additive manufacturing, forming of filled polymers;
- Machining: study of high-strength steel machining, quick manufacturing of high-performance cutting tools, development of sensors to improve robots’ accuracy, drilling technologies.

Services
- Process expertise, assistance in the selection of materials and equipment;
- Technical and economic feasibility tests, industrialisation study, qualification of products and suppliers;
- Assistance and training.

Arts et Métiers ParisTech

The École Nationale Supérieure d’Arts et Métiers is a “major Engineering School”.

With 15 research laboratories and 1 doctoral school, Arts et Métiers ParisTech is developing educational and research activities focused on 3 main fields: Mechanical engineering, materials, processes; Fluids and energy systems; and Design, industrialisation, risk, decision. With the support from its contractual research structure, Arts et Métiers ParisTech is “Institut Carnot-labelled” and, as a result, it has become one of the major collaborative research partners for companies. The public and private contracts reach an amount of approximately 12 million Euros per year, with two thirds for research actions and one third for technical assistance actions.

Arts et Métiers ParisTech - Metz: design, manufacturing, control

- Development and industrialisation of new processes: FSW, thixoforming, cross rolling, multi-material forging;
- Robotics: robotised processes (open die forging, FSW, machining);
- Knowledge management: decision aiding tool (forging, cross rolling);
- Inspection of products and processes;
- Design, integrated manufacturing.