



Smaller,
more precise
and more intelligent



SCIENCE,

MICROTECHNOLOGY,

TECHNOLOGY TRANSFER

Microtechnology cluster

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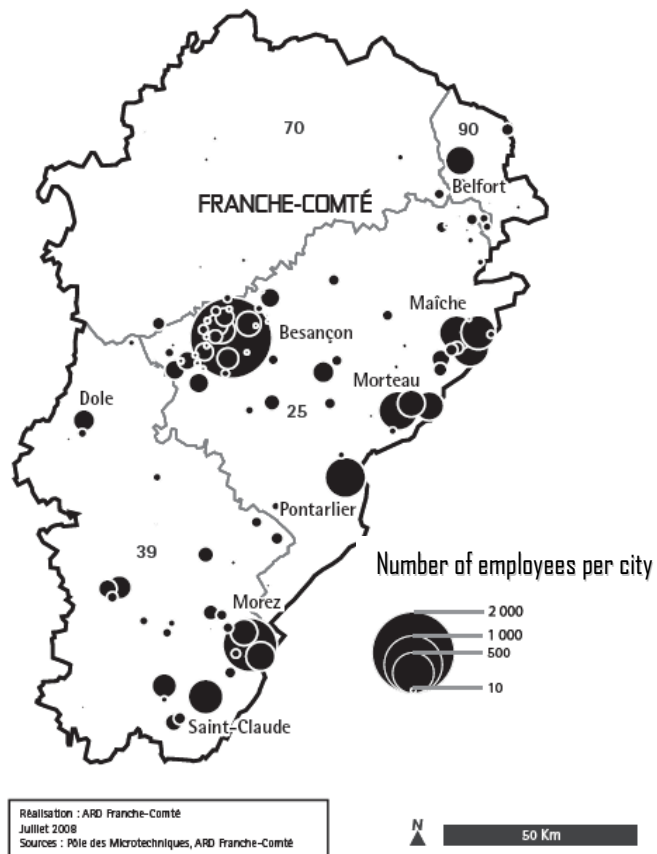
One of the 2 leading regions for microtechnologies in Europe

- ✚ 1st industrial region in France
 - No. 1 for toys, watch-making, eyewear, woodturning-woodenware and **microtechnology**
- ✚ 2nd region for cutting and die stamping
- ✚ 3rd region for
 - the automotive industry
 - Birthplace of PSA PEUGEOT-CITROEN, 2nd largest European car constructor
 - Surface treatment



Franche-Comté, The region for Microtechnologies

Employment in the microtechnology field
- year 2008



INDUSTRY

- 406 companies identified as microtechnics companies,
 - 47 of which are affiliates of groups
 - 399 SMEs
- 11,000 employees
- € 1.3 thousand million turnover, and 1% of global exchanges

RESEARCH

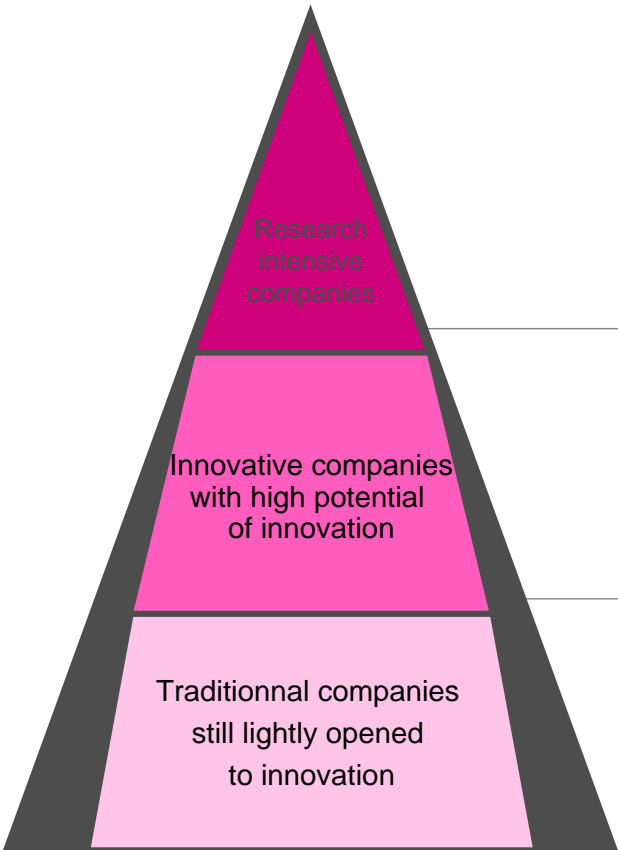
- 450 private researchers and 600 public researchers
- Carnot Institute (Femto-Innovation)
- Technology centre (MIMENTO lab - € 13 million in equipment)

TRAINING IN MICROTECHNIQUES

- 1200 new workers every year in microtechnics, from holders of basic diplomas to engineering degrees
- 2 Universities
- ISIFC (Institute of Engineering of Franche-Comté)
- ENSMM - National School of Mechanical Engineering and Microtechnics
- Two high schools
- One apprentices' training centre

Innovative approach

Estimation about companies' repartition

Typology of enterprises in the microtechnology field	Number in the Franche-comté region	% of PmT members in the category
 <p>Research intensive companies</p>	30	90%
<p>Innovative companies with high potential of innovation</p>	100	50%
<p>Traditionnal companies still lightly opened to innovation</p>	270	10%
Total	400	

The competitiveness cluster

Background and missions

- ✚ Cluster created in 2005 by the government (71 competitiveness cluster in France)
- ✚ Our main objectives:
 - To detect and help the emergence of innovative and collaborative projects.
 - To propose the strategy of the microtechnic industry
 - To reinforce links between **industry** / **training** / **academic research**

Facts & Figures

✚ Multi-markets and Multi-technologies cluster

✚ Few figures

- 100 members
 - 60% SMEs
 - 5% Groups
 - 20% Research laboratories
 - 15% training centers
- Among our 60 SMEs, 40 have less than 50 employees
- Team : 5 persons (Director, Assistant, 3 business development associates)

Cluster strategy

3 priorities

- Innovation
- Skills development
- International cooperation

The strategy focuses on

5 Technological axis:

- Micro manufacturing and micromanipulation
- Micro-injection, Micro-moulding
- Surface treatments
- Microsystems
- Nano-materials

4 markets are targeted

- Medical devices
- Transport and energy (automotive industry, aeronautic...)
- Measures and controls
- Luxury

Three main types of actions

Innovative projects

- 135 projects received the label « competitiveness cluster » from the Pôle des Microtechniques & 70 benefit from public subsidies
- Portfolio of 53 active projects
 - Budget 96 M€ in which 50 M€ of public aid

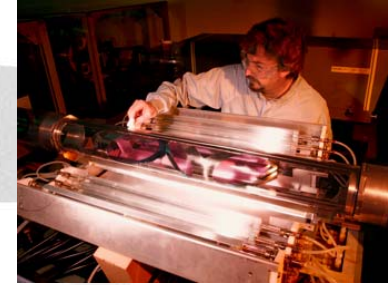
Thematic workshops

- Objectives : generate synergies & foster the emergence of innovative projects
- 4 market-oriented workshops
- 4 transversal workshops

Collective actions for microtechnic industry promotion

Exemple of innovative projects

NEWPIM



NEWPIM for Powder Injection Moulding

Objectives :

- To reduce the time-to-market through simulation and modelling of the PIM process,
- Increase reliability and productivity of the process through the improvement of the existing feedstock,
- Spread the PIM process to new market through the development of new feedstock.

Consortium :

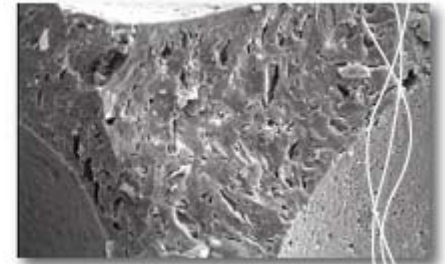
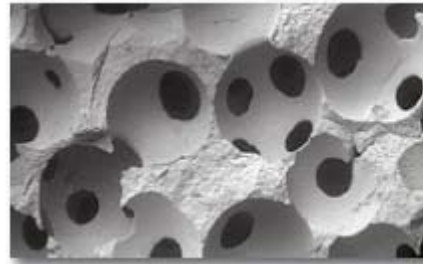
- 6 PME, 3 groups, 4 research centers
- Label of Plastipolis competitiveness cluster

Budget : 4,1 M €

- Public subsidies : 1,9 M€
- Financial organisms : FUI, EU, local authorities (Région, CG 25, CG 39)

Exemple of innovative projects

HOBBIT



Development of a new concept of hybrid resorbable implants made of a polymer matrix and of bioactive ceramics loads

- Technological challenges
 - Mechanical performance
 - Osteoconductive and osteoinductive properties
- Economical Benefits
 - Reduce risks for complications and infections after surgical operations
 - Surgical operation is no more needed to remove prothesis

Partners : 5 SMEs, 2 labs

Budget : 2,8 M€ - Public aid : 1,7 M€

Ex. of workshop – Innovation workshop

Objectives:

- To write the prospective road map for the microtechnic (5 axis) ;
- To contribute to the emergence of collaborative and innovative projects from the needs of the companies.

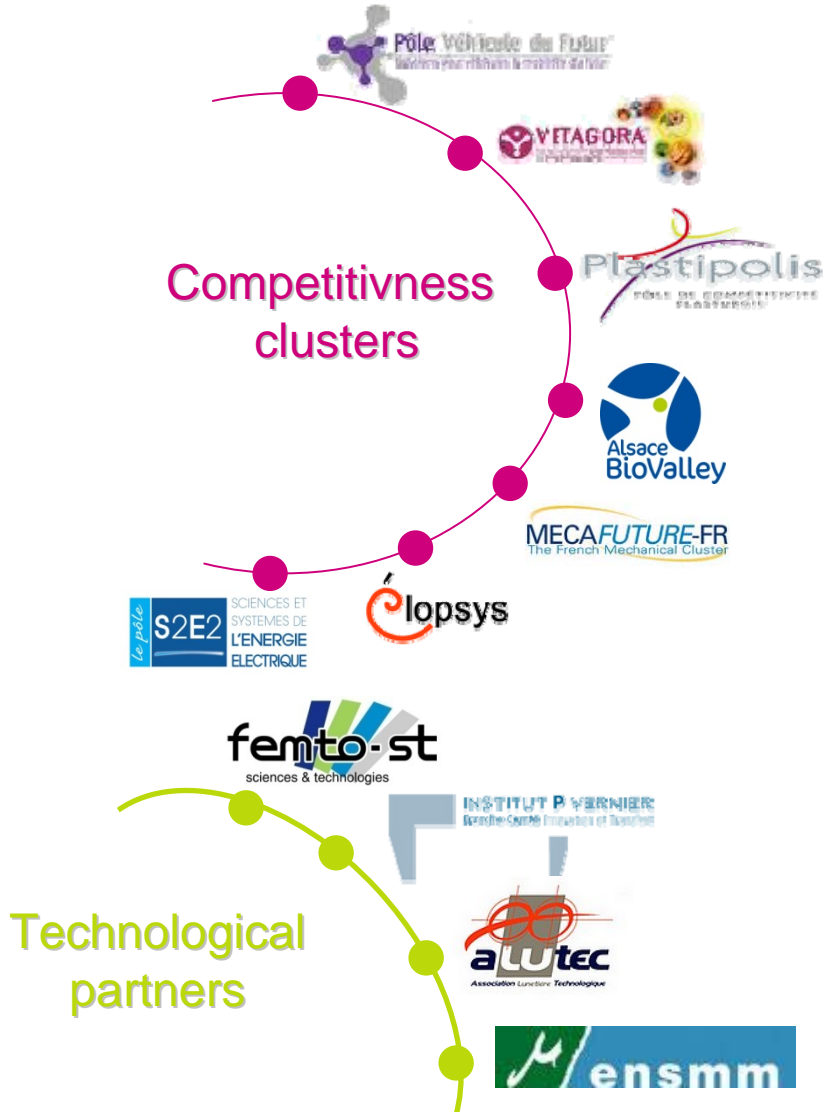
The actors :

- Enterprises representative / Researchers / Actors of the local economic development

Method & results :

- Interviews and meetings with the researchers of the labs
 - first version of the road maps;
- Interviews in the enterprises (around 30 already planned)
 - Innovative approach of the firms
 - Second version of the road maps
 - List of technological needs
- Emergence of collaborative projects

An integrated cluster in an interconnected area

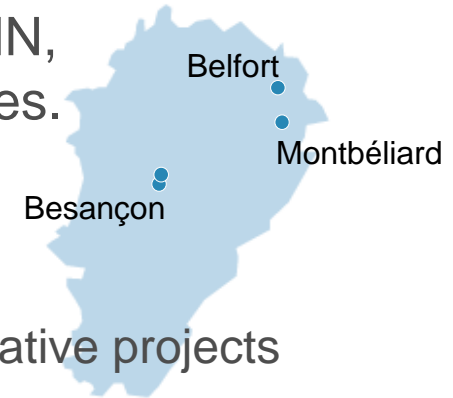


Thank you for your attention

Technology Transfer Institute

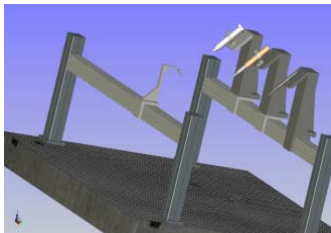
Institut Pierre Vernier

- ✎ Technology transfer centre, created in January 2007
- ✎ Merged 4 technology transfer institutes (IP, CTMN, ITSFC, Préci), 30 employees distributed on 3 sites.
- ✎ Main missions :
 - transfer technologies from labs to industry
 - promote and support SME's involvement in innovative projects
- ✎ Service offering
 - Technology transfer
 - Manufacturing for limited series production
 - Project management
 - Innovation for news processes and new products
- ✎ Collaborations :
 - Close collaboration with Franche-Comte labs (FEMTO-ST, UFC, ENSMM, UTBM, UTINAM,...)
 - SMEs and competitiveness clusters



Institut Pierre Vernier

Skills and know-how



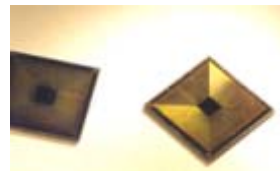
Micro manufactory devoted to precise assembly of small and micro-parts (100 μ m – 5mm)



Femtosecond laser ablation



Piezoelectric micromotor



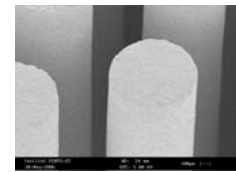
Electromagnetic micro-coils



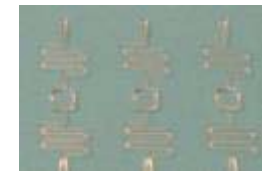
Silicon microparts



Metal microparts



Ultrasonic Machining



Hot embossed microfluidics


- ✦ **Microsystems and micromechanics**
- ✦ **Micromachining (ultrasonic micromachining, femtosecond laser ablation)**
- ✦ **Piezoelectric sensors and actuators**
- ✦ **MEMS and clean room technologies (DRIE, LIGA UV)**
- ✦ **Polymers processing by hot-embossing**
- ✦ **Packaging**
- ✦ **Instrumentation, design of specific tools**

Institut Pierre Vernier


Technological resources

Own resources and access to lab's resources (mainly MIMENTO, Technological platform of FEMTO-ST)


Manufacturing centre :




Femtosecond laser ablation




Dicing



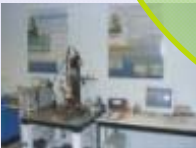
Micromachining




Lapping & Polishing



µEDM




Ultrasonic Machining




Hot Embossing


Polymers



µ-injection




UHP Surface topography




Vision analysis


Metrology



Zygo Interferometer



Flip-Chip



Wire bonding

Packaging

FEMTO-ST Institute

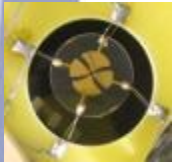
An institute for multidisciplinary research

- Franche-Comté Electronics, Mechanics Thermics, & Optics - Sciences & Techno
- Label “Institut Carnot”
- A wide range of competencies in PHYSICS & ENGINEERING SCIENCES
- A high level MICROFABRICATION TECHNOLOGY facility
- A culture of INNOVATION : from basic research to industrial partnership

- 500 staff people
- 28 M€ annual overall budget including 10 M € operational budget

Research Departments

TIME & FREQUENCY



- High-stability oscillators
- Acousto-electronics & piezoelectricity
- Time-frequency metrology

CONTROL SCIENCES



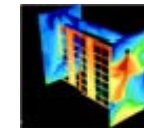
- Automatic control
- Microrobotics
- Micromechatronics
- Micromanipulation & micro-assembly
- E-maintenance & design activity guidance

OPTICS



- Photonics & telecommunications
- Nano-optics
- Optoelectronics
- Non-linear optics
- Biophotonics

ENERGY & MULTIPHYSICAL SYSTEMS



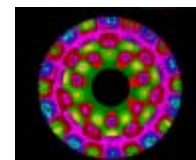
- Energy metrology & modelling
- Energy system design
- Radio protection & medical physics

MICRO NANO SCIENCES & SYSTEMS



- Micro and nano-instrumentation
- Nanosciences
- Micro & Nano-acoustics
- Multiphysical Microsystems
- Micro, Nanomaterials & surfaces

APPLIED MECHANICS



- Mechanical properties of materials
- Structural dynamics
- Material shaping & microfabrication
- Surface microanalysis

