

KEY TECHNOLOGIES

Processing plastics and composites to manufacture industrial parts

SPECIAL EQUIPMENT

The equipment is broken down into laboratory equipment and industrial processing machines.

A – Laboratory equipment in six fields:

Chemical analyses: FT-IR spectrometry (Nicolet 460 ESP Protege and 510 M), IR microscopy (Spectra-Tech Advantage), IR mapping (Spectra-Tech Advantage), Gas chromatography (Carlo Erba HRGC 5300 Fisons GC 8000 Series), Liquid-phase chromatography (Watters), Quantification of chemical groups using nano and micro assays

Component analysis: X-ray Fluorescence Spectrometer [PW 2404 Philips], Load factor in a muffle furnace (ISO 3451) [Nagat LAB 92], Thermogravimetric analysis (ISO 7111) [Mettler-Toledo TG 50; Perking-Elmer TGA 7], Rate of extractable matter (ISO 5427), Water content determination (Karl Fischer method) (ISO 760) [Mettler –Toledo DL37KF], Water absorption (ISO 62), Volatile product content (ISO 62) [Mettler PL 16],

Physicochemical analyses : Static and dynamic wettability measurements [GBX Digidrop], Image analyses at macroscopic and microscopic scales (lateral resolution at 15 µm), Differential scanning calorimetric analyses (ISO3146) [Perking Elmer DSC 7; Mettler DSC 20], viscosity measurements in solution (ISO 307, 1628) [Lauda VB2 L], Density (pycnometer method) (ISO 1183), Density (Archimedes principle) [Mettler AG 245 Scale and BalanceLink V2-20 software]

Behaviour tests : Spectrophotometer [Minolta CM 2002], Fire resistance tests (ISO 1210, [UL94]), Ageing tests in controlled temperature and hygrometry (- 80 to 300°C) [Heraeus HC 7033]

Mechanical and Rheological Analyses: Vicat temperature (methods A and B) (ISO 306) [MIE/JPS], Buckling temperature under load (H.D.T) (ISO 75) [MIE JPS], Shore A or D hardness (ISO 868) [Zwick 7206], Traction, bending and compression tests (ISO 527, 178, 604) [MTS 30/M; Lloyd Easy 20], IZOD and CHARPY impact measurements (ISO 180 and 179) [Analogue Zwick I (Resilience ranging from 0.55 to 50 J); Mechanical Zwick], Weight-drop impact (D42 1235), Multi-axial impact tests (ISO6603) [control engineering], Dynamic Mechanical Thermal Analyses (DMTA) [Rheometric Scientific MK 3], Hot-process fluidity (MFI/MVI) (ISO1133) [Göttfert MPF; Prodemat Melt-Index M3350], Hot-Melt fluidity (MFI/MVI) (ISO1133) [Göttfert MPF; Prodemat Melt-Index M3350], Capillary rheometry (ISO 11443 with and without Rabinovitsch and Bagley corrections) [Göttfert Rheo –Tester 1500], Internal mixer [Haake Rheocord 90]

Sampling: Injection moulding of testing samples (ISO 294), Rotating microtome [LEICA RM 2145], 3D pantograph [CharlieRobot], Hot press

B – Processing machines using 9 techniques:

Compounding [Buss E 46 B]; Celextral BC 45; K-Tron T20]

Calendering [Samafor TA 800]

Extrusion [Fairex 45 26 D; Cincinatti Miliacron CMT 35; Ide ME 60/3; Mai Virgino TN 35/300]

Film blowing [CGM 4530 HTM DW 700, Kuhne SBF 300]

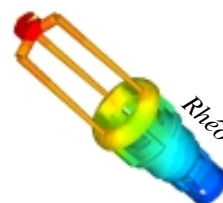
Extrusion blow moulding [Serta ESH 2 SDT 300]

Injection [Arburg 320 M 50 t; Demag 50/320-200 50t; Ferromatic Milacro Electra 50 S 50 t; Demag D 60 NC III 60 t; Engel ES 330/80 80 t; Negri Bossi V85-300 85 t; Billon Hercule H 260 Dixit 500 90t; Klauss Maffei 90/340 B2 90t; DK Codim 80/200 100t; Battenfield BA 1000 CDC 100t; DK 600-150 150 t; Sandretto Otto 150 612/150 150t; Stork SX 2000-1000 200t]

Thermoforming [Illig SB 53 C-1; Illig UA 100 ED; Formech 450; Rigo TAD SB 500x350]

Decorative and assembly equipment: Hot stamping [Publigrph PUB 8; CERP 40; Giulanelli GPS –8-EP], Serigraphy [CER SeriaMax 15; Dubuit CX 15; Dubuit107; Dubuit 109; Dubuit 118], UV tunnel [Dubuit 4030], Exposure unit [Dubuit Laboscreen 125B], Pad printing [Tampoprint Hermetic 61], Cutting press [Dailloux 125 25 t], Ultrasound welding [Mecasonic Oméga 20-30], Mirror welding [Codirep PC 230]

Control and metrology equipment: Profile projector [Hauser H 601 H-DR], Column-tire gauge [Tesa Micro-hite], Dimensional check [Zumbach ODAC P80]



METHODS, SKILLS AND EXPERTISE

Plastic processing is an advanced field in Normandy. More details about this industry can be found in a document by the *Comité Economique et Social de Basse Normandie* (Basse Normandie social and economic committee) on the website: www.cesr-basse-normandie.fr.

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- ▶ Technological watch for companies
- ▶ Technical and technical-economic audits for companies for their own purposes or for different organisations
- ▶ Pre-industrial studies for companies on the following :
, Choice of materials (polymers, additives, and fillers), choice of processes (feasibility, profitability, and optimisation), product and process improvement
- ▶ Product and tool design
- ▶ Tool testing (injection or thermoforming moulds, nozzles)
- ▶ Compounding (polymer – natural-synthetic polymer, fillers, special additives polymer)



Analysis laboratory

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For further information:

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THE TEAMS

The work teams include 5 doctors, 4 engineers, 2 technicians, and a secretary. Operational activities are broken down into eight fields: Industrial and scientific research relations: business relations, development of analysis methods (1 project manager), polymer materials (1 project manager – 1 engineer), processing and compounding (2 project managers), documentation (2 engineers), laboratory analyses, secretariat

SUPPORT TO BUSINESS SET-UP PROJECTS IN BASSE-NORMANDIE

The Basse Normandie Region has rolled out all its resources to support business projects in the following areas:

- ▶ General funding
- ▶ Business project support
- ▶ Training programs
- ▶ Corporate user services at operations site
- ▶ Technology transfer to companies: www.gravir.org and www.ismra.fr and www.ispa.fr

