

A fully equipped laboratory

With an investment of 2 million Euro, Evercompounds has created a well-equipped testing and analysis laboratory, which functions as the heart of the Research & Development department. Covering 1,000 square meters, it has everything needed to design new compounds or re-engineer existing formulas to improve their characteristics, costs, and performance.



Evercompounds' s central research laboratory

It just came into operation, following an effort that required careful planning and a two million Euro investment. It is the new, highly equipped research and development centre for Evercompounds, the CM Manzoni Group company active in the design, formulation, and production of rubber compounds for a large number of application sectors -- from medical to aerospace and from household appliances to cables, including construction, pharmaceuticals, pipes, and the automotive industry. The heart of the centre is the laboratory, which takes up 1,000 square metres of the complex in Fusignano, province of Ravenna. This complex covers over 33,000 square metres, with 17,000 of that intended for production.

Why such a large investment? We discussed it with Denis Venturoli, the company's Head of Research & Development. "This," he explained, "is a project close to the owner's heart. It confirms CM Manzoni Group's attention to research and innovation and had a number of goals, first and foremost being to improve the after-sales service we provide our customers."

The research objectives

In fact, the laboratory aims to support the activities of all companies in the group, especially Evercompounds, on projects that could have different purposes, but with prominent commercial input, in other words, the need that emerges from a close relationship with the customer. Apart from the development of newly formulated compounds, the thrust of the research activity mainly concerns the re-engineering of existing compounds to improve their properties, reduce costs, evaluate a new material, or solve problems encountered during the production or use of a technical item. The study may be limited to simple instrumental exams or may be extended to experimentation of new formulas.



“We are particularly based on a database with over 4,000 formulas,” continued Venturoli, “organized according to various criteria that then help us focus our research, such as the specifications, application sector, and composition. Based on the purpose of our study, research in our database can provide us with a starting point, from which we can create various laboratory versions of new compounds that must respond to certain characteristics. This is a service we provide to all of our customers, especially those that produce technical items and operate in more dynamic manufacturing sectors, for which there is a continuous search from better performance and greater competitiveness, stimulated by an ever-changing market.”

The role of the specialists

In order to meet the increasingly specific requirements from its customers, Evercompounds decided to organize its Research & Development activity into divisions, entrusted to specialists, who increase their knowledge of a specific sector, or adjacent areas, through constant dialogue with the companies. “We are convinced,” stated Venturoli, “that the ‘multi-purpose’ technician, capable of juggling all fields and for all applications, is destined to progressively disappear from the compound industry to leave room for a more modern approach based on an increasingly in-depth knowledge of each merchandise sector. The construction of this type of skill, which can only be gained in the field and in a continuous exchange with customers, becomes strategic for us in order to go beyond the role of mere suppliers, but to become partners, able to participate in projects in which the goal is the finished product and all of its characteristics, not just the compound.”

In the light of this concept, the strategic value of the investment for the new laboratory and research, involving 10% of the entire Evercompounds workforce, is even more understandable.



The flagship of the Research and Development Centre is the 1.5 litre Intermix laboratory mixer.



Carefully chosen instruments

The equipment chosen and purchased (see box) therefore meets this requirement of the Fusignano company. "It allows us", added Venturoli, "to cover all of the most frequent needs in our type of activity. We decided to rely on external facilities only for a limited number of analyses and tests. These are laboratories or universities with which we have long-standing relationships. I am referring, for example, to research carried out with scanning electric microscopy (SEM), DMA (Dynamic mechanical analysis) for the thermal analysis of the viscoelastic properties of materials, and gas chromatography and mass spectrometry.”

In particular, the laboratory's flagship is the 1.5-litre Intermix, a small quantity mixer which, explains Venturoli, "has a rotor design similar to that of factory mixers and which allows us, thanks to our expertise, to obtain test mixes with characteristics substantially identical to those we would obtain in production. This allows us not only to control the quality of the product, but also to precisely define the cost of the mixing process, as early as the design stage, from the point of view of energy consumption and its impact on the cost of the finished product."

The test batches are supplied to the customers so they can conduct in-house moulding tests on their own machines. If they are successful, we proceed with a regular supply. "The tendency, however," emphasized Venturoli, "is increasingly to equip ourselves to be able to follow and evaluate the finished product. The investment we have planned for the future enhancement of the laboratory, are headed in this direction."



Small dosage warehouse for experimental compound formulations.



Oxygen index test, to assess the flammability of a material based on the percentage of oxygen present.

Products for every sector

Evercompounds produces about 70,000 t/year of black and coloured compounds of practically all types of elastomers and in all formats. The most varied sectors are served, and this diversification allows the company to balance the physiological drops that may occur in some areas. For example, when the automotive industry is in stasis, explains Venturoli, "it found excellent counterparts in the medical and energy sectors, particularly in the compounds for the production of cables, an area with a positive outlook. One of the trends that we see growing quite a bit is that of organic compounds. Today producing with a philosophy based on sustainability and respect for the environment has a value that goes beyond that of the product, and the market is very receptive. Research plays an important role in the development of these compounds since we are talking about products with technical characteristics that are inferior to traditional ones, often originating from recycled materials, or food processing waste. We are talking about raw materials that are not refined like those obtained with synthesis processes and do not have the same quality consistency."

The tests and analysis that can be conducted in the new Evercompounds lab, can also be useful for the development of these compounds, which respond to a circular economy concept, which, now more than ever, is current and considered strategic.

FOCUS BOX

Instruments

- Optika optical microscope, equipped with camera for image acquisition, magnification from 6.7X to 90X. Used for surface analysis, dispersion control, problem solving, etc.
- X-rite colourimetric spectrophotometer: to obtain colourimetric coordinates as a colour reference for development and quality control.
- Color Box: compliant with ASTM D1729, ISO3664, with 5 different light source types: visual comparison of colour samples under different light sources.
- Low temperature resistance test - it allows the performance of:
 - Brittleness Test, per ISO 812: test of resistance to impact
 - TR Test, per ISO 2921: elastic retraction test
- Cold chamber for testing changes in properties with temperatures down to -45°C:
- Compression set
- Delta Hardness
- Bending test
- Ozone-resistance test: to test the resistance to atmospheric conditions, according to ASTM D 1149:
- Systems for accelerated ageing:
 - 5 forced ventilation kilns for temperatures from 30 to 250°C for accelerated ageing in air, in compliance with ASTM D 573
 - 3 oil baths for resistance to liquid tests per ASTM D 471, in particular for accelerated ageing in oil
 - 3 Boiling systems with temperature control and refrigeration system for tests of resistance to the most volatile liquids, ASTM D 471
- L.O.I: Limited Oxygen Index per ASTM D2863, ISO 4589-2 for the assessment of the flammability of the material according to the percentage of oxygen present.
- Differential scanning calorimetry (DSC): to measure melting, vitreous transition, crystallization, degree of polymerization, specific heat capacity measurements, and purity analysis
- Thermogravimetric analysis (TGA): for the evaluation of weight loss and therefore of the semi-quantitative composition of a material (compound or raw material), evaluation of the compositional and thermal stability of a material
- Infrared spectroscopy: ATR analysis, for fast quality analysis of primarily organic components in compounds and quality control of raw materials. Instrument equipped with a microscope. In ATR mode this makes it possible to analyse very small materials.
- Xenon Test Chamber: chamber equipped with a Q-SUN Xe-1 xenon lamp that reproduces the damage caused by full spectrum sunlight and rain. In just a few days or weeks, the Q-SUN tester can reproduce damage that occurs during months or years outdoors.
- RPA: dynamic mechanical rheological tester, or DMRT, designed to test raw polymers or rubber compounds. This instrument can evaluate the behaviour of rubber compounds before, during, and after vulcanization in a single test, simulating the compound's final transformation process.
- Zwick AllRound Dynamometer, Fmax 5 kN: with pneumatic grips and MultiXtens extensometer, equipped with a climate chamber for test machine, usable for ambient temperatures up to +250°C (with the possibility to extend it to lower temperatures).