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RESEARCH GIVES COMPANIES A HAND IN THE PRODUCTION OF PPE: THE ANTI_COVID-LAB PROJECT

More than 20,000 masks analysed and certified in 3 months, 250 requests to test materials destined for the production of PPE (Personal Protective Equipment) by Italian companies, of which about 40% come from SMEs in Southern Italy. These are the key numbers from the Anti_Covid-Lab, the laboratory set up during the lockdown by the University of Catania and the INFN Southern National Laboratories to check the functional qualities of fabrics destined for the manufacture of masks and other PPE to prevent contagion during the CoViD-19 crisis.

Established very quickly within the BRIT (Bio-nanotech Research and Innovation Tower) services centre of the University of Catania, the Anti_Covid-Lab was created with a very clear and urgent objective: providing high-quality technical-scientific assistance to Italian businesses that wished to convert part of their supply chain to producing masks and other medical devices according to the standards set forth in the current law.

The laboratory was created thanks to the work of a task force composed of staff of the University of Catania and of INFN with scientific and technical skills in various disciplines. In particular, INFN employed its knowledge and technological developments in the field of high-pressure devices. These were cultivated in the context of the IDMAR project that was financed by the Sicily Region's department of industry for supporting Research Infrastructure.

The Anti_Covid-Lab was inaugurated on 31 March, a time when the provision and sale of PPE was a question of national interest and, already halfway through April, it had been accredited by the Italian Institute of Health to issue a technical report needed for the certification according to the UNI14638 (surgical and medical use masks) standard. Over the last few months, numerous companies coming mainly from the textile sectors have turned to the lab. These included companies active in the areas of

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fashion, mattresses, or sails; other companies were already producing medical devices of another type (prosthetics, analysis kit). Yet other companies came from very different sectors, such as the recent case of a business producing telephone and power distribution network components.

At the Anti_Covid-Lab, above all, the certification test for the UNI14683 standard for surgical and medical use masks is performed. This involves three types of analysis: the “Bacteria Filtering Effect” test, the “Breathability” test (via the measurement of differential pressure), and the “Bioburden” test. The latter aims to verify the sterility of the package. The “Bacteria Filtering Effect” test, which is particularly complex, consists of sampling aerosols with a “multi-stage cascade impactor” test system for applying the regulations on the requirements for medical-use face masks. The latter are intended to limit the transmission of infection agents between patients and clinic staff during surgical operations and other medical contexts with similar requirements (EN-14683:2019). The test system uses an “inertial impactor” and a controlled air intake system that simulates the normal breathing process. The aerosol produced containing a standardised quantity of bacteria is taken in by the system and made to pass through the fabric to be characterised, thus enabling the impactor to measure the bacteria-filtering properties of the fabric being tested. The characterisation system was created thanks to a multi-disciplinary collaboration (engineering, chemistry, physics, and microbiology) between the University of Catania and INFN Southern National Laboratories and will keep operating and continuously improving to offer a service to companies who express their need for it.

The Anti_Covid-Lab also implements analyses that include the “characterisation of materials”, especially for examining the wettability of fabrics, necessary for evaluating the hydrophobic or hydrophilic nature of the material, through the measurement method called the “sessile drop technique”. Morphological analyses of the materials, on the micrometre and sub-micrometre scale, are also performed at the laboratory upon request using scanning electron microscope (SEM) techniques. ■

Anti_Covid-Lab analysis service: <https://www.unict.it/it/ateneo/news/anticovid-lab-come-contattare-il-laboratorio-il-test-di-tessuti-dpi>