INNOVATIONS IN TIMES OF CRISES

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John F. Kennedy once observed that the word "crisis" in Chinese is composed of two characters - one representing danger (wēi), the other opportunity (jī). Although it turned out that he had not been entirely correct on the linguistics[1], the sentiment is true enough: a crisis presents a choice. This is particularly true today.

1 http://www.pinyin.info/chinese/crisis.html

Innovations in times of crises

In every industry, organizations are bringing their most creative and solution-oriented ideas to market in record time. Around the world, liquor distilleries have shifted their production to hand sanitizers. In Italy, a start-up engineering company began quickly using 3D printers to create life-saving valves for breathing ventilators.

In Belgium, a filter producer for industrial applications has turned its expertise into the production of excellent face mask filters and many digital printshops have included plexiglass shields and community face masks in their production and marketing schemes, while Professor of cryptography and privacy specialist Bart Preneel of KU Leuven designed an internationally acclaimed contact tracing app.

Necessity forces companies to innovate. However, waiting for a crisis is not a sustainable innovation strategy, and certainly no one wants a crisis for the sake of innovation. The COVID-19 pandemic provides a natural experiment that allows us to examine conditions that have prompted innovation and to observe and learn how organizations have responded. The circumstances are dire and the effectiveness of many of these innovations remains unknown. Despite this, it is worth observing what is happening and learning from it. Companies should take note of these lessons and apply them to remain innovative, whether in the midst of a crisis or in a position of strength.

"Innovation and creativity love crises and constraints."

The effect of a crisis on innovation

Without any doubt, the covid-19 health crisis will teach us that it has resulted in several innovations: new drugs and medical devices, improved healthcare processes, manufacturing and supply chain breakthroughs, novel collaboration techniques, more rapidly drafted (weeks instead of years) and freely available standards and ATPs.

What all these innovations have in common is that they solve problems, and that they have also been driven by the "inate" human desire to help, to connect with other people, and be part of the solution "when the going gets tough".

In addition, crises present us with the following unique conditions that allow innovators to think and move more freely to create rapid, impactful changes:

Uniting around a common purpose

During a crisis, the energy is focused on a clear purpose and we will often experience a wave of new ideas, as individuals feel compelled to share insights that they normally would keep to themselves. Just think of the Apollo 13 mission to the moon (probably best known in the version featuring Tom Hanks and Ed Harris) when an explosion on board of the rocket forced NASA engineers to improvise to save the crew. Under the famous leadership dictate, "Failure is not an option," the Huston-based engineering team successfully rallied to design a makeshift device to clean the air from the lethal carbon dioxide so the astronauts could survive the trip home, using only items available to the astronauts on board. A crisis can set the imaginary forces and energy into motion to take actions in support of a purpose that would be unthinkable in times of calm.

Changing the usual perspective

A crisis can result in new insights, putting the spotlight on vulnerabilities and problem areas, that have always been ignored or went unnoticed. When a crisis hits, we are forced to confront the truth about how our systems work (or don't). The areas where things could be done better or more efficiently become glaringly obvious. All of a sudden, opportunities for innovation will burst forth like mushrooms from out of the ground.

Rethinking ingrained habits

As organizations grow, they harden their structures to create predictability, efficiency, and stability. Crises tend to change all that. For example, the COVID-19 crisis has overturned the value chain of medical devices and personal protective equipment, leading to the startup of locally based production plants and a shift from cheap labour to guaranteed delivery times and volumes and product conformity.

Focus on action

A crisis demands immediate action and change – the normally slow pace of ideation, decision making, and implementation increase dramatically. An organization that usually gets trapped in "the intense study of the obvious" now must force itself to quickly create experiments, see what happens, and experiment some more. This process of experimentation allows the freedom to test different thinking, to fail fast, to learn, and to move forward – in short, to innovate.

Innovating during the aftermath of a crisis

"For some organizations, near-term survival is the only agenda item. Others are peering through the fog of uncertainty, thinking about how to position themselves once the crisis has passed and things return to normal. The question is, 'What will normal look like?' While no one can say how long the crisis will last, what we find on the other side will not look like the normal of recent years."

It is increasingly clear our era will be defined by a fundamental schism: the period before COVID-19 and the new normal that will emerge in the post-viral era: the "next normal." In this unprecedented new reality, we might witness a dramatic restructuring of the economic and social order in which business and society have traditionally operated. And in the near future, we will see the beginning of discussion and debate about what the next normal could entail and how sharply its contours will diverge from those that previously shaped our lives.

Belgium is a top innovator in the fight against coronavirus

Source: Wim De Preter - De Tijd 7-7-2020

Belgium is the fourth most innovative country in the fight against the coronavirus, according to a ranking by UNAids, the UN programme that coordinates the fight against AIDS. The authors collected information on more than 1,000 innovations in 32 countries and developed an algorithm that allocates points based on the number of projects and their innovative content.

The US resolutely takes the lead, followed by Israel and Canada. Belgium closely follows in fourth place, ahead of Switzerland, the UK, Estonia and Italy. North America and Europe dominate the rankings. The authors also ranked innovative cities. This is led by a trio of American tech cities: San Francisco, New York and Boston. But in this ranking too, Belgium is doing very well, with Antwerp (12), Brussels (18), Ghent (30) and Leuven (51).

The report mentions five companies as 'notable Belgian innovators':

1. Lasercut, a Ghent company that makes partition screens and face shields.
2. Materialise, the Leuven 3D specialist who quickly developed a hands-free door opener
3. Byteflies, the Antwerp maker of a technical plaster to relieve nursing staff.
4. Andaman7, the Brussels-based creator of a free covid information module that can be built into apps.
5. Ergotrics, the Antwerp inventor of an inflatable cushion for use with covid patients in intensive care.

Between the publication of this article and today, many other developments have seen the light of day. Some of them (and the list below is surely not exhaustive) are showcasing the industry's flexibility and efforts to help mitigate the devastating impact of the virus.

Flemish manufacturing industry can make anything!

When the corona crisis broke out, West Flanders entrepreneur Christof Vermeersch (weaving mill Calcutta) promptly decided to respond to the call from the federal government: to provide a fabric for mouth masks to protect the Belgian population, in accordance with the strictest standards of the specifications.

Top-level innovation was involved, Calcutta succeeded in this task and, with its innovative fabric, achieved standards that far exceeded the bar. Calcutta has proven in the past to be able to make complex tissues for the medical sector, among others.

As a result of corona, every effort was made to adapt the production apparatus, taking into account the standards imposed by virologists. "The fabric developed by Calcutta exceeded all the prescribed requirements (filtering, air permeability, washability, durability, reliability, patented innovation, etc.) with absolutely exceptional scores."

In the meantime, Calcutta has passed the tests leading to the "**COVID-19 approved by Centexbel"** certificate!


© Photo: Devan

Devan: Textile finish with high activity against coronavirus

10.09.2020

The Bi-ome fabric coating technology from the supplier of specialty chemicals Devan Chemicals NV, Ronse/ Belgium, show high-performance virus-reducing capabilities both on unwashed and intensely washed fabrics.

According to independent testing, Bi-ome is proven to achieve 99% and higher virus reduction, including that of SARS-CoV-2, on samples before washing and retains 98.5% even after 25 wash cycles. During recent months, Devan has worked closely with a series of international 3rd party laboratories to test different fabric substrates against a wide range of enveloped viruses. Before washing, samples treated with Devan Bi-ome score very good to excellent (99% and higher according to ISO 18184) results on virus reduction. Different substrates, like polyester (PET), cotton and their blends, were exposed to enveloped viruses like SARS-CoV-2, feline corona, vaccinia (the EU standard for enveloped viruses) and porcine respiratory viruses (swine flu). Devan is further improving its formulas to improve wash resistance even more and at the same time keep the economical add-on cost as low as possible. Devan's Bi-ome is already endorsed by a wide range of companies. Their collections span diverse applications including bedding, apparel, travel accessories, and transport. Bi-ome is a non-metal non-leaching quat silane-based chemistry. The product is BPR (EU, TR) and EPA registered and OEKO-TEX class 1 registered. Through its nature it is inherently biodegradable.

Source: https://www.techtextrends.com

VIRASE® reduces over 99% of viral activity

BekaertDeslee introduced a hi-tech addition to the Sleep Dimension 'Clean'. Clean promotes solutions for a fresh and healthy long lasting hygienic sleep environment.

The Guangdong Detection Center of Microbiology, an independent and internationally accredited lab in Guangzhou, China confirms the instant efficacy of the BekaertDeslee VIRASE® bio-technology in Report N° 2020FM10630R01D.

BekaertDeslee is first in the industry to provide proof of a higher than 99% reduction (a 2-Log reduction) of viral activity within 2 hours on the surface of an in-house produced mattress textile (variances are possible depending on the fabric construction).

The test protocol was executed in accordance with the international standard for determination of antiviral activity of textile products, ISO 18184:2014. This test confirms that VIRASE®, a special formulated textile finish, proves immediate and substantial antiviral effect on enveloped viruses.

Source: https://www.bekaertdeslee.com/

Liebaert expands its medical range with COVID-19 approved fabrics

Over the last 3 months Liebaert has developed and tested a wide range of fabrics that can be used for the outside and inside of washable face-masks. These fabrics are characterized by a high level of comfort and have been "COVID-19 Approved"by the textile Laboratory Centexbel. They can be used in a one layer or multi-layer construction.

*The "COVID-19 Approved" fabrics have a filtration of more than 70% according to EN16890-2:2016 and a permeability rate of more than 100l/m2/s according to ISO9237:2019. When used in combination with other fabrics they can easily achieve a filtration efficiency above 95%. For more information on the Centexbel testing method click here.

Nanostitch® C40

Produced on the finest warp-knitting machines in the world this tightly knitted fabric provides great breathability and a very effective filtration efficiency. The 195 gsm fabric is made out of Lycra® and Nylon. It's "COVID-19 Approved by Centexbel" and can be used in a one-layer construction for community masks. We currently use this fabric as the outer-layer for our multi-layer face-mask and achieve a filtration efficiency of more than 95% according to EN16890-2:2016. Fabric is currently available in stock in a multitude of colors.

Source: https://www.liebaert.com/

Company from Deerlijk experiments with virus-inhibiting substances

"Corona only survives 2 hours on our substances".

A textile company from Deerlijk tries to treat fabrics with virus-inhibiting liquids. The intention is to use that special fabric for seats or cushions, for example. The COVID-19 virus can survive for days on objects. People can become infected, for example, by sitting in a chair.

By treating the substances with virus-inhibiting fluids, the virus can only survive for 2 hours. "It is mainly schools, hospitals and hotels that are asking questions," says Gunnar Vandaele of the textile company Finipur in Deerlijk. "We can treat any fabric, just think of a pillowcase or a sofa. By treating them with a virus inhibiting fluid, we reduce the chance of the corona virus. We add an antibacterial effect. In this way, we prevent people from becoming ill from a bacterium when they sit down in a cinema or hotel seat, for example".

"We are in full testing," says Vandaele. "We are now working on several recipes, because we have to make a different chemical combination depending on the material. If all goes well, the anti-viral compound can be delivered as early as September. We can then, for example, treat cinema seats on an industrial scale. Once the substances have been treated with our product, the corona virus only survives for 2 hours. Otherwise, it can quickly survive up to 8 hours. So we reduce the risk of contamination.

Source: vrtnws.be / Florence Depauw

SIOEN filters for face masks

The filters provided by the Belgian government are intended to be inserted in home-made masks or in face masks providing an opening for a filter cloth.

Sioen, one of the world market leaders in technical textiles, won the tender for the production of 6 million filters.

Sioen's technical premium product is 100% Belgian. The filter cloth is produced in Liège at the Sioen group's needle felt plant, Sioen Technical Felts. Cutting takes place at Coatex, the Sioen site in Poperinge, using high-performance cutting machines. Even the packaging is a 100% Belgian affair, for which the Sioen group relies on Belgian partners.

The material (non-wovens) of the filter belongs to the category of technical textiles. Both the material and the masks are subjected to standardised tests that evaluate its bacterial filtration efficiency, its breathability, its resistance to flow splashes, its microbial cleanliness and biocompatibility. A whole series of difficult words that the ordinary citizen has no knowledge of but that make the difference between life and death.

The aim of the filter is to provide the highest possible level of protection without compromising usability. The filter is machine washable at 60°C (using a program that takes at least 30 minutes) but also sterilisable with a 10-minute program at 100°C.

The spectacular rise of a 100% Belgian "masks" industry

About ten companies have launched local production lines in the Belgium. Their manufacturing capacity: more than 600 million masks per year, mainly surgical masks. For most of them, it is a diversification strategy. Viable? In any case, the gamble has been taken. In February, no one would have bet on this small rectangular mostly blue superposition of filtering layers, spontaneously associated with the medical world. Besides, at home, it's quite simple, nobody made them. But seven months later, everything has changed, our protective mask was the subject of endless discussions, and aroused the appetite of entrepreneurs.

Since the beginning of the crisis, companies in Flanders and Wallonia have worked out business plans, invested in machinery and raw materials and made room in their factories to assmbly new machines. Their overall objective: the launch of a viable local production of masks.

Some of them are big players in Belgian industry such as AB InBev or Ontex, others are companies already active in protection - Deltrian, filtration, Van Heurck, workwear - and then more traditional industrialists such as Weimat, a manufacturer of plastic parts for the automotive and aeronautics industries, Altifort Boart, active in the production of high-precision tools for the steel and glass sectors, or Ducaju, a specialist in the packaging of luxury food products. There are also surprises such as Cartamundi, world leader in the card game sector.

Millions of investments

At D.t.o. in Ypres, the first surgical masks left the industrial building rented for the occasion at the beginning of August. But the idea was born at the beginning of the crisis. At that time, the company active in the trading of ready-to-wear clothing from Asia to Europe redirected its business towards masks. With the help of two partners - an engineer for the construction of the machine and future mask production, and an ultrasound specialist for the "welding" of the masks - a machine was designed and the supply of raw materials secured to ensure the first three months of production. But from October onwards, they plan to produce the intermediate "meltblown" layer to market a product that is totally "made in Belgium".

Cartamundi also surrounded itself with partners to develop a brand new technology to produce original FFP2 and FFP3 masks. Machine manufacturer Cloostermans and the University of Antwerp, joined together in a spin-off called Medimundi, and invested 3.5 million euros to launch the innovation.

Ducaju, for its part, took advantage of the tool developed by one of its Chinese suppliers. It acquired two of them and was one of the first, in mid-May, to launch production. Finally, at Bru Textiles, in the south of Antwerp, an entire room was built for the project named BruMed: an ISO certified "clean room" to house three machines. 35 people work in this unit in two shifts. Four million euros were invested in the installation and in the purchase of raw materials.

80 to 100 million masks will be produced by Ontex, when production is launched. For the moment, the machines are still being tested. But the biggest project is the one supported by the federal government and carried out by the Flemish companies Van Heurck and ECA. Objective: 190 million surgical masks and FFP2 masks per year. In all, Belgian manufacturers should be able to supply, in the long term, more than 600 million masks (all types combined) per year. With that, the shortage experienced in March and April seems a distant memory.

If the wearing of nose-mouth protection is becoming widespread everywhere, the "mask" sector is booming in many European countries, many citizens are wearing face masks made from washable fabrics and Asian firms continue to sell in large quantities in our country.

A study, carried out by McKinsey, identified the needs for Belgian health workers at the height of the crisis at more than 200 million masks per year (18 million per month). For the general public, there is no official estimate. Today, the customers are companies, municipalities, pharmacies, nursing homes and citizens. It is assumed that the demand for masks will be greater after the crisis than before. Wearing a mask is something that will last. Families have them in their wardrobe and if someone falls ill, they put on a mask to go out, to go to work. It will become part of everyday life.

Source: Le Soir

Local mask production and decontamination lines

One of the important lessons learned at the very outbreak of the coronavirus was the need to locally produce the necessary protective gear for our healthcare workers. The universal shortage and our dependence on Chinese suppliers of the necessary protective equipment urged the Walloon authorities to set up locally based mask production and contamination lines as soon as mid-March 2020.

Faced with the emergency, the call launched by the Walloon government was very quickly relayed to entrepreneurs by Biowin, the biotech competitiveness cluster. With the support of the Walloon financial tools - SRIW and Sogepa - a project was initiated with the industry, including the biotech company Univercells, which specialises in the production of vaccines, and the Deltrian group, which specialises in filtration systems.

Aware of the role that entrepreneurs have to play in overcoming this crisis, Hugues Bultot, the director of Univercells, set up a project in just a few days. *"We have identified machines in China that we can bring back quickly. We can also develop a white zone very rapidly. We also know the specificities of the textile industry. We handle it to make bioreactors. We are clearly at the disposal of the public authorities to help even if our speciality is in vaccines. We can find solutions together. We are ready to help set up such a project. The world will work tomorrow on another paradigm with relocations. We must therefore work today on a long-term vision. I believe in this new paradigm. That is why I am participating in this project."*

Alongside the mask production line, the Walloon government has federated three industrial players (Lasea, Sterigenics and Ecosteryl) around three research centres (Materia Nova, Giga and Centexbel) and the CHU of Liège to set up a mask decontamination line.

The Mons company AMB Ecosteryl, which specialises in the treatment and sterilisation of medical waste, has adapted its technology to develop a decontamination "oven" in about twenty days that was implemented in the Ambroise Paré hospital centre in Mons in May for validation. Normally, the University Hospital of Mons uses 430 surgical masks, 10 FFP2 masks and some 135 single-use gowns per day for a capacity of 415 beds. Today, the hospital consumes 2,000 surgical masks, 400 FFP2 masks and 750 disposable gowns (and 200 washable ones) every day. All of this represents a huge amount of waste and an astronomical increase in costs for the institution while supply remains relatively tight. According to Stéphane Olivier, the director of the CHU, "the price of the surgical mask, usually 25 cents, has skyrocketed. Some FFP2 masks (of good quality) were bought at 7.15 euros/piece at the peak of the crisis, they are now trading at 4.15 euros/piece."

These factors led the Walloon government to encourage the search for decontamination solutions so that the masks could be reused, up to 4 times in the best of cases. *"With the production of masks for which the Deltrian company has been selected, decontamination will allow us to regain a certain autonomy in this sector, whose strategic importance is now being measured,"* points out Elio Di Rupo, Walloon Minister-President.

Under the aegis of the University of Liège and Professor Eric Haubruge, three companies have been selected to develop different technologies: Lasea (UV), Sterigenics (plasma) and Ecosteryl (dry heat). The CHU of Liège also worked on a **hydrogen peroxide technique**. The Walloon Region has released a budget of 250,000 euros to finance the various research projects.

AMB Ecosteryl's solution implemented in Ambroise Paré's intensive care unit is based on **dry heat**, an essential component of the technology used in the waste shredders that Ecosteryl sells worldwide. In this case, the residue of the waste shredded and sterilised by microwave is still heated to nearly 100°C to make it completely inert.

In the case of decontamination, Ecosteryl has isolated this "oven" to treat the masks. The capacity of the apparatus, deliberately limited in size to be easily installed as close as possible to the users, will be close to 2,100 surgical masks at a rate of 175 masks per 2-hour cycle, or 1,440 FFP2 or even close to 150 gowns.

The machine, which costs 6,000 euros (which ensures it will pay for itself very quickly), has undergone in-depth analyses and tests according to the guidelines set up by the Federal Agency for Medicines and Health Products (FAMHP), with the help of the microbiology laboratory at Centexbel and the American laboratory Nelson Labs. The results show that the reused masks retain their breathability and filtration properties. After decontamination, they even have a lower microbial load than new masks.

source: L'Echo

DeMaND Study

Development of Methods for Mask and N95 Decontamination (the DeMaND study) and reuse for healthcare workers at the frontline

FUNDED BY Open Philanthropy April 1 – June 30, 2020

Open Philanthropy Project

The aim of this study is to identify and test, simple low-cost safe decontamination methods to enable medical masks and N95/FFP2 respirators reuse in healthcare settings where there are critical shortages.

STUDY PARTNERS

- University of Washington/ Seattle Children's Hospital (USA)
- University of Chicago-Loyola (USA)
- University of Alberta (CAN)
- University of Calgary (CAN)
- George Washington University (USA)
- University of Liège (BEL)
- **Centexbel (BEL)**
- Stanford University/4C Air, Inc. (USA)
- Stryker Ltd (CAN)
- Nelson Laboratory (USA)
- BSI, LLC (UK)
- NIOSH/CDC (USA)
- University of Colorado (USA)

Centexbel teams up with the very best universities in the world to find a solution for mask decontamination and their reuse in third world countries

The World Health Organisation (WHO) asked Centexbel to partner with the big USA and Canadian tech universities, including the University of Stanford, Chicago, George Washington, Seattle, and Calgary in a study on the decontamination of both medical and N95/FPP2 masks for healthcare workers at the frontline.

We involved the University of Liège in the project because of our common research activities on mask decontamination methods.

But this study was of a totally different nature. The challenge here was to find a method to decontaminate masks in low-resource countries where modern equipment is not available!

The solution was **Methylene Blue** (a cheap chemical that had already proved effective against malaria).

Our colleagues from the microbiology lab, the physical lab and our coating researchers were involved in the study.

The kill curves - showing how fast the virus is deactivated - were measured by using a COVID mouse surrogate virus, a COVID pig surrogate virus and also by using the actual COVID-SARS-2 virus.

Our task was to assess whether the masks remained intact for their safe reuse after the decontamination treatment.

Conclusion

Next to being enormously proud that our expertise in the evaluation of medical masks complements the expertise at the very best universities in the world, we have been able to provide proof that the decontamination method based on the use of Methylene Blue for deactivation of the COVID-virus is very effective and does diminish the efficiency of the masks.

The findings of this study will soon be published in the renowned medical journal The Lancet

Covid-19 spikes production of antimicrobial additives for plastics!

Covid-19 has put health in the spotlight. However, the pandemic has sparked an even greater interest in hygiene-enhancing plastics additives such as antimicrobials.

The Covid-19 pandemic has brought the need to keep things clean into sharp focus. As a consequence, recent months have seen a renewed interest in additive technologies that help preserve the properties, and the hygiene performance, of plastics products used in all sorts of applications. This article is focused on biocides and antimicrobials that tackle bacteria on plastic surfaces. Covid-19 is a virus, not a bacteria, but its spread has led to numerous discussions over if, and how, antimicrobials may be able to help keep it at bay.

Source: www.compoundingworld.com

Aside from today's Covid-19 concerns, there is a lot of development work going on to make antimicrobials better at fighting bacteria. This is especially challenging in a world where regulations on their use are increasing in severity - one person's life saver can be another's health hazard.

Antimicrobial technologies are employed to protect polymer materials from mould, mildew, fungi, algae, and other organisms capable of damaging their integrity. They can be added to a variety of plastics to offer protection against microbial attack of the final article, helping to retain its original performance and aesthetics and extending its lifetime.

Where optimum conditions for growth exist, fungi, algae and bacteria may colonise and degrade the plastic by utilising material within the bulk, or on the surface, of the article. This growth can result in surface staining, pitting, reduction of structural strength, embrittlement, change in conductivity or flexibility, bad odour and other physical or mechanical property changes.

Antimicrobial additives can counter this growth and help to retain the mechanical properties of flexible products used for roofing membranes, geomembranes, pool liners, floor coverings, gaskets in white goods and many more applications - especially in plasticised PVC products. Plastics used in pipes, window frames, and cladding (siding) can also benefit from their incorporation into compounds. Biocides used in natural fibre reinforced polyolefin composites, for example, prolong useful lifetime in automotive interior panels. Biocides are also widely used in plastics products intended for application in hospital and healthcare environments.

The pandemic effect on the demand for antimicrobial additives:

The Covid-19 outbreak has served to remind us that viruses, bacteria, and other harmful agents not only represent an ongoing substantial risk to our health, and that a disease can spread much faster than what we have seen in last few decades. In a world with global supply chains, the risk is greater that a pathogen could circulate quicker and therefore become deadlier.

BioCote in the UK says it has seen a substantial increase in enquiries about incorporating antimicrobial additives into surfaces and products. In early 2020, BioCote engaged an independent laboratory to test its technology against a strain of feline coronavirus. As a result of this testing, the company says it was one of the first to prove that its antimicrobial technology was effective with a reduction of 90% in two hours against feline coronavirus strain Munich.

Swiss company Sanitized says tests conducted by independent laboratories have confirmed that a treatment with its Sanitized T99-19 and Sanitized T11-15 products reduces the viral load on polyester textiles by up to 99% (in accordance with ISO 18184:2019). Tests were performed using a feline coronavirus with structures and mechanisms similar to SARS-Cov2. Sanitized T99-19 uses a patented ammonium silicate compound technology; Sanitized T11-15 utilises silver technology. The company says the additives "are the perfect tool for an antiviral and antibacterial treatment of face masks, protective professional medical clothing, bed linens, or mattresses. The formulation of both products remains completely untouched, thus ensuring that it will continue to offer outstanding protection against bacteria."

In mid-June, the American company, Thomson Research Associates (TRA), said it had seen a 700% increase in companies interested in incorporating antimicrobial technologies that can be used in food contact and potable water applications. Also companies who are manufacturing parts for the transportation industry are looking for antimicrobial solutions to help keep interior surfaces cleaner and more durable.

Viral concerns

It is important to bear in mind that good efficacy of an antimicrobial additive in one material should not be used to infer similar efficacy of that additive in another material.

There can be very significant variations in antimicrobial performance from one material to another, or even between apparently similar grades of the same material from the same manufacturer. For that reason, a generic claim of good performance in, for example, ABS is relatively meaningless. The test results would only apply to the specific material that was tested, even down to the pigments that were used. This applies to efficacy testing against bacteria and mould, but is particularly important for anti-viral claims.

One of the most important, but restrictive, issues in the antimicrobial sector is regulation. The range of available active substances has been reduced over recent years and the number of options for delivering robust performance in polymers is relatively limited.

The effect of antimicrobial additives on the properties of a polymer can be significant, from the visibly obvious such as discolouration or loss of clarity, through those which could easily be missed without testing, such as compromised impact strength or UV stability, to those with potentially catastrophic consequences, such as complete loss of UL94 V-0 flame retardancy.

Standards

Covid-19 inevitably focused the plastics industry on antiviral technologies, as well as other hygiene technologies. Traditionally, hygiene materials have been assessed for antibacterial activity in accordance with ISO 22196 (non-absorbent materials such as plastics) and ISO 20743 (absorbent materials such as textiles). Fortuitously, in 2019, the International Standards Organization finally also added the antiviral testing standards ISO 21702 (non-absorbent materials such as plastics) and ISO 18184 (absorbent materials such as textiles). This gives the industry clear benchmarks when assessing antiviral and antibacterial technologies.

Many of the chemistries already registered with regulatory agencies for use as antimicrobials in plastics have also been found to accelerate inactivation of viruses. In particular, published studies find that copper ions and silver ions have potent effect against a broad spectrum of viruses.

For example, the inorganic additive LIFE CI/AM-00-1A (produced by Life Material Technologies (Thailand)) contains high loadings of both copper ions and silver ions and is registered for use in plastics both with the US EPA and under the EU's BPR. In screening tests, LIFE CI/AM-00-1A delivered stronger antiviral activity than similar additives containing only silver ions and zinc ions.

Cautious approach

While Covid-19 is at the forefront of everyone's mind, claims of anti-viral performance of products should be approached with some caution. Unlike bacteria and fungi, viruses cannot multiply on a surface as they cannot reproduce outside of a host cell. Also, outside of a host cell they undertake no cellular activity and thus do not offer the multiple sites a biocide typically interacts with to produce a biocidal effect. If viruses are present on a surface, they are inactivated by denaturing the capsid protein shell or the glycoprotein envelop. This is readily achieved by the use of surface-applied disinfectants.

There is some limited evidence that encapsulated antimicrobial additives can reduce virus numbers, but typically high concentrations are needed, and no-one yet has test data against the Covid-19 virus.

Netherlands-based Parx Materials, however, announced in early June that independent tests executed following ISO 21702 and using the Human Corona E229 virus showed that its Saniconcentrate (a modified polymer concentrate that carries trace element of zinc and was originally developed to combat bacteria, moulds, and fungi on plastics) also shows a significant effect against this virus.

"The technology is reducing the virus five times faster than on normal solid plastic surfaces," says company CEO Michaël van der Jagt. He adds that the technology also brings down the H1N1 virus by 99.99% in just eight hours in textiles fabricated with the technology. The virus tests were not executed with the Covid-19 virus as this is currently prohibited for commercial laboratories but the E229 coronavirus has a number of similarities.

Van der Jagt says the incorporation of zinc in Saniconcentrate is achieved using a patented method and says the use of zinc was inspired by the defence mechanism in the human skin "where the trace element is vital for a healthy immune system."

Biocidal active substances and biocidal products are defined as products that exert a controlling effect on harmful organisms. This definition is broad in scope, and includes the extermination, rendering harmless, or prevention of harmful organisms. The BPR takes a two-pronged approach with regard to biocides: first, biocidal active ingredients must undergo an approval process; and second, biocidal products including approved active substances are submitted to an authorisation process. The approval process consists of a peer review/risk assessment that, when completed and approved, signals that the European Commission has confirmed the substance in question is sufficiently safe and effective and can be used on the EU market. Additionally, the authorisation process requires the biocidal product to be authorised by either the EU or a Member State Competent Authority in which it will be used.

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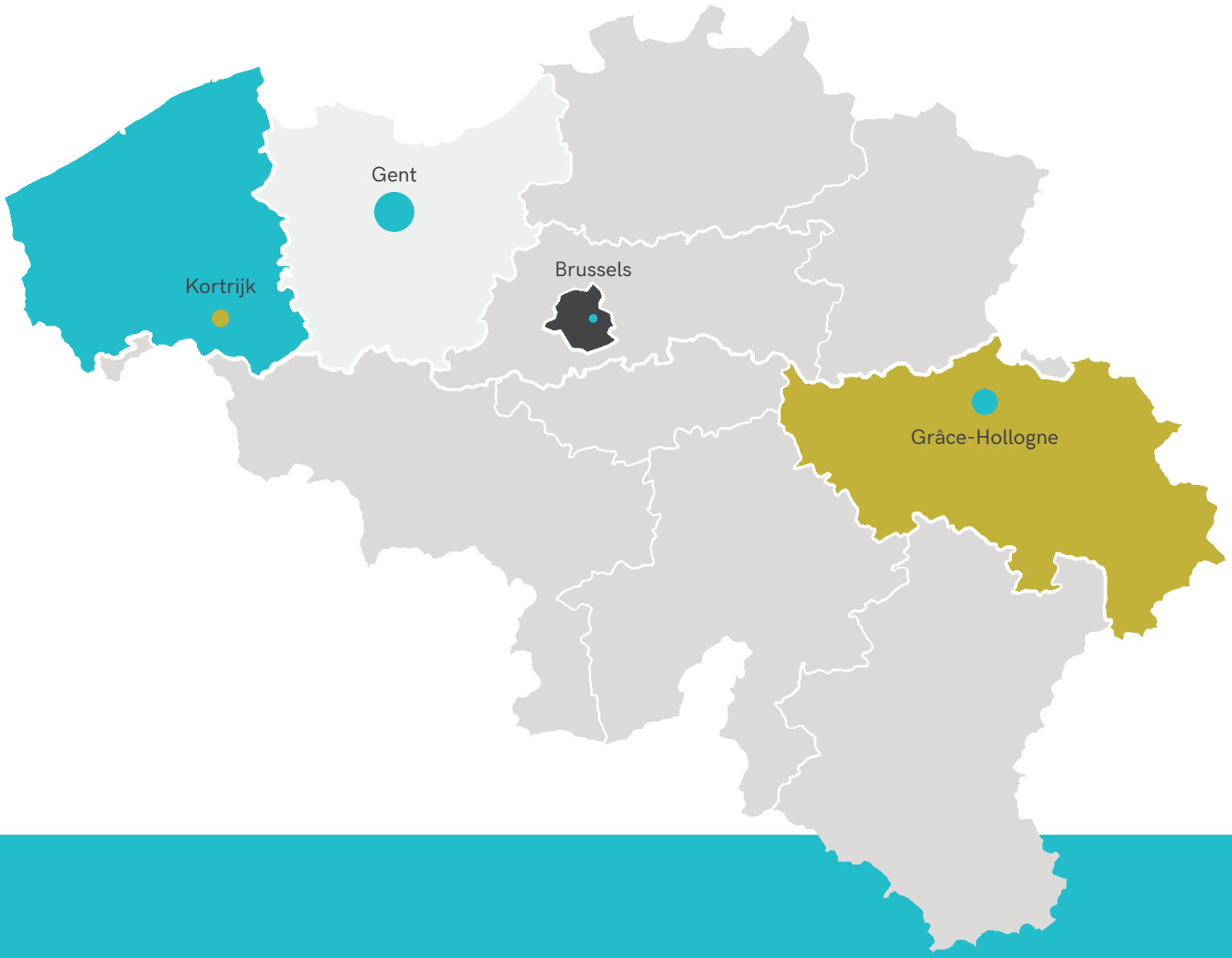

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