Did you know...
Two major companies provided products made in Luxembourg for the 206-storey Burj Khalifa Tower in the United Arab Emirates. The tallest man-made tower includes 600,000 m^2 of Guardian Luxguard low-emissivity glass and 3,000 tonnes of ArcelorMittal steel beams.

Advanced materials, competitive production technologies

Luxembourg's manufacturing sector was established over a century ago during the heyday of the nation's steel industry. Over subsequent decades, the focus shifted from traditional materials to **high added value niche products,** many of which have become the market leaders of today.

Advanced materials produced in Luxembourg include **composites, nanomaterials, high performance steel, biodegradable and recyclable materials, glass, concrete, rubber and plastics.** The sector also demonstrates expertise in the functionalisation of surfaces. The main fields of interest and expertise include highly automated production lines, cyber-physical manufacturing systems, robotics, additive manufacturing and the reduction of energy consumption and waste production.

Building a bridge between business and academia

The **Materials Research and Technology Department (MRT)** of the **Luxembourg Institute of Science and Technology (LIST)** translates cutting-edge materials research into applied technologies in the fields of material development and production at laboratory scale as well as the modelling, characterisation and testing of materials.

Nanomaterials and nanotechnologies are a key research field in which the MRT specialises in multifunctional ferroic materials, transparent and optical tuneable electronics, nano-enabled medicine and cosmetics, and new surface treatments, while bio-based and functional composites, adhesion and interface engineering are central to its research on composite materials.

At the **University of Luxembourg,** the Physics and Material Sciences Research Unit is dedicated to R&D and innovation in photovoltaics, energy materials, nanomagnetism, polymer physics, the theory of condensed matter physics, complex systems and statistical mechanics as well as theoretical solid-state physics. The Research Unit in Engineering carries out strategic research projects in the fields of construction and design, energy and environment, automation, mechatronics, and geophysics.

Luxembourg is home to the headquarters of global steel producer ArcelorMittal. Its high-performance steel produced in the Grand Duchy is used in large construction projects worldwide, including the One World Trade Centre in New York, the Bow in Calgary, the Federation Tower in Moscow and the Shanghai World Financial Centre in China.

By substituting common steel with ArcelorMittal's high-strength Histar®, the weight of steel columns is reduced by 32% and of beams by 19%. The lighter structures enable savings in greenhouse gases, with a 30% reduction in carbon emissions during production.

High(-tech) facts

High-tech components supplier Saturne Technology specialises in the design and configuration of high-tech laser applications for cutting, drilling, welding, resurfacing and laser sintering as well as in additive manufacturing of high-performance metals. In 2015, the company configured and commissioned **the world's largest additive manufacturing machine.**

If you write with a **ballpoint pen,** there is a very good chance that the ball at its tip was made in Luxembourg, where hard materials manufacturer CERATIZIT produces **12 billion** such balls every year. This represents 40% to 45% of the global production.
CERATIZIT produces unique hard material solutions for cutting tools and wear protection for industrial clients including automotive, energy and stone working. It's technologies can be found in drills, tooth wheels and other abrasion resistant applications.

The new production line of International CAN S.A. has a production capacity of **12,000 cans per hour or 60 million cans a year.** The company is currently expanding its activities in Luxembourg and produces, among other things, aluminium cans for aerosol products.

An innovation made in Luxembourg: Air Cargo Covers

DuPont™ Tyvek® is a unique nonwoven fabric that offers a high level of protection. Tyvek® Air Cargo Covers help reduce loss of perishable items by limiting the exposure to their environment, decreasing the impact of sudden ambient temperature changes and allowing excessive moisture to escape.

With a presence in the Grand Duchy for some five decades, DuPont de Nemours produces polyester films, high-tech construction materials, medical packaging and industrial personal protection equipment. The Luxembourg production plant also serves as a key regional research and development centre.

Trailblazer

IMPROVING THE EFFECTIVENESS OF WORLDWIDE RAPID RESPONSE

When disaster strikes, every minute counts. Luxembourg is helping to provide faster connectivity and improved coordination for a more efficient humanitarian response – all with one goal in mind: saving more lives.

SATELLITE-BASED TELECOMMUNICATIONS

In 2011, Luxembourg launched **emergency.lu, a public-private partnership that offers a satellite-based telecommunications platform allowing rapid response to natural disasters and humanitarian missions.**
Two hours after an alert is given, teams are airborne. Once they are on the ground, it typically takes less than an hour to connect a telecommunications terminal to an inflatable antenna for a satellite connection. Working in close collaboration with the United Nations World Food Programme, emergency.lu draws on the expertise of three Luxembourg-based companies – Hitec Luxembourg, SES and Luxembourg Air Ambulance (LAA). Ericsson Response is also involved in the project and serves as technical partner.

HAITI

Immediately after the January 2010 earthquake, Haitian President Préval was standing in the ravaged streets of Port-au-Prince holding his cell phone, which he was unable to use to call for help. Effective aid deployment was impossible because all telecommunications were down. Following Haiti, Luxembourg understood that a solution had to be developed to restore telecommunications within several hours of a major natural disaster in order to improve aid coordination and save lives.
Thanks to emergency.lu, aid workers can now register their phones and laptops on the system to communicate and improve the delivery of critical services.

TRANSPORTATION DURING EBOLA OUTBREAK

Luxembourg Air Ambulance is a non-profit founded in 1998 that operates **rescue helicopters and ambulance aircraft** worldwide, saving human lives and preserving people's health. In 2015, LAA put new medical equipment for the transportation of patients with highly infectious diseases into operation. This medical evacuation module can be used to transport Ebola patients safely, while ensuring that the crew and the airplane don't come into contact with the pathogen. The development of this special isolation ward for the Learjet 45 XR took several months and covered all medical and aeronautical requirements. Pilots, medical staff and ground handling staff were also required to take a special training course in cooperation with Doctors Without Borders.
Cargolux operated several flights to Monrovia during the Ebola crisis and provided medical supplies during critical times. ●

emergency.lu
The entire service chain – including air transport, satellite infrastructure, terminals and related services – is funded by Luxembourg and provides:

ADVANCED MATERIALS TO PREVENT CONTAMINATION

DuPont Tyvek® protective clothing – produced by DuPont de Nemours Luxembourg – is designed to keep wearers safe by repelling liquids and aerosols while remaining permeable to both air and water vapour. Due to its outstanding qualities, it was the **personal protective equipment chosen for the workers dealing with the aftermath of the nuclear disaster in Fukushima, Japan.** Healthcare workers and other involved in fighting the deadly Ebola virus rely on **Tychem®,** another DuPont brand that includes an entire line of **protective garments and accessories that helps prevent contamination.** ●

FAST TRACK DIAGNOSTICS

Fast Track Diagnostics (FTD) is one of the leading global suppliers of real-time PCR multiplex **testing for infectious disease detection.** Rare infections such as Ebola can quickly spread and become a general health hazard. The FTD test is simple to use and minimises uncertainty in the diagnosis. ●