THE RISE OF THE CITIES
TACKLING DIABETES
SPORT GOES HIGH-TECH
Dear Readers,

The rapid pace of urbanization is one of the most significant megatrends facing the world today. Supporting this growth now and in the future is a challenge for all of us. While the development of cities has brought prosperity, improved the quality of life for many and encouraged innovation, it has had a negative impact on the environment. Our main feature looks at the rise of urban living and how it can continue to grow more sustainably.

At GEA we take our environmental responsibilities seriously and we constantly seek to develop better engineering solutions that use resources more efficiently. Our membership of Blue Competence, a sustainability initiative of the VDMA – the German Mechanical Engineering Industry Association – is an indication of our commitment in this area. You can read all about Blue Competence in our question and answer session with Dr. Thomas Schräder from the VDMA.

Increasing influence in urban areas brings with it a demand for more and different foodstuffs. In India, for example, consumption of milk and milk products is on the rise. The article on page eight looks at how GEA is helping the Indian dairy industry to improve its productivity. One of the world’s most familiar substances is glass. Its uses are many, from bottles and drinking glasses to windows and mirrors. Manufacturing it is almost an art form and there are different processes depending on the product. Our ‘How to do it’ article reveals the process for making plate glass.

Also in this issue we look at diabetes, an illness that is occurring at an alarming rate. While there is currently no cure for this disease, it can be kept under control with the right treatment. GEA is a world leader in the development of production facilities for the manufacture of insulin. Jürg Oleas, Chief Executive Officer, GEA Group Aktiengesellschaft.

Welcome to the sixteenth issue of GENERATE, published by GEA Group Aktiengesellschaft.
Insulin is a hormone that is an important part of the process by which living organisms convert food into glucose – the sugar which cells and bodies use as energy for movement, growth and repair. All animals need it – except for certain insects – and its action is almost identical in creatures as different as nematode worms and humans.

High pressure homogenisation Manufacturing biosynthetic human insulin involves fermenting cells and then separating them in a high speed centrifuge. The cells then need to be ruptured – or disassembled.

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Glass has come a long way since 4000 BC when man first discovered obsidian – a naturally occurring substance produced when the intense heat of a volcano melts sand at the edge of its crater – and used it to coat the tips of spears. Today glass is a very competitive, high-tech global industry. Its startling adaptability is what makes it so popular. Through subtle alterations in its chemical and physical composition, we can process it into many different shapes and textures. Its applications extend to pharmacy, electronics, optics, construction and lighting, among many others. Akkali-barium silicate glass is used to absorb harmful x-rays from televisions. Glass ceramics, very resistant to thermal shock, are ideal for cooker hobs, gas or coil fire windows and even missile nosecones. Glass optical fibers that can guide light and transmit images round corners are used in endoscopy, in changeable traffic warning signs, and are key to telephone and internet technology.

**Medical breakthroughs**

The applications of glass in the field of medicine are many and varied. Its pristine and non-porous qualities make it ideal for sterile environments. Biocompatible glass is used extensively to repair and replace diseased or damaged bone, for example. Glass is also playing a key role in the treatment of malignant tumors. As an alternative to external beam radiotherapy, alumina-silicate glass microspheres containing radioactive yttrium can be injected into the bloodstream to attack the tumor in a more localized way.

A newly toughened glass has recently been manufactured to make stronger glass cartridges for Epipen injectors – used to treat life-threatening allergic reactions. Another new project is evaluating bio-active borate glass for healing large wounds such as skin ulcers. The material has antimicrobial and fibrous qualities and releases bio-active ions. Antimicrobial glass also has the potential to kill bacteria and viruses including MRSA.

**Glass and communications**

But it is perhaps the fusion of new communications technologies with exciting developments from glass-manufacturing companies that will capture the imagination of everyday consumers. An obvious example is the increasing need for thin but highly durable glass for mobile communications devices such as mobile phones and tablets. When the late Steve Jobs was developing the iPhone, he wanted a touch-screen that wouldn’t scratch like plastic but feared glass was still too breakable. Enter Corning, the US-based glass manufacturing leader that produced what came to be known as Gorilla Glass and, in 2012, the 20 per cent thinner Gorilla Glass 2: the resilient but sensitive-to-touch material now used in more than a billion mobile devices worldwide.

**Vision of tomorrow**

Among others, Microsoft has been looking at the possibilities for transparent computer displays. In particular, low glass can be used to project a 3D image that a user can control from behind the image. Transparent or otherwise, glass is playing a pivotal role in ubiquitous computing – in which information processing is thoroughly integrated into everyday objects and activities.

**Multifunctional glass**

Still in the world of technology, Google has been working on ‘Project Glass’, a head-mounted display that resembles the frame of a pair of glasses. In place of lenses, the device uses glass and mirrors to project a computer display onto one eye. The technology adds a digital layer to what the wearer sees, and provides internet access using voice commands, GPS and a camera that takes pictures at the nod of a head. Fashion guru Diane von Furstenberg’s models wore the devices at New York Fashion Week in spring 2012 and they are expected to be on the consumer market later this year or early in 2014.

Meanwhile at the pioneering Massachusetts Institute of Technology (MIT), a team has been developing a new glass that eliminates some of the drawbacks we have hitherto accepted as inevitable. Their not yet patented ‘multifunctional glass’ will not produce glare, will be self-cleaning and will also repel water. The manufacturing process uses a surface pattern of nano-scale cones of glass that are approximately five times as tall as they are wide, resulting in glass which is very clear but has no reflection. This will benefit mobile phone and tablet users trying to read their screen in bright light. And since water will bounce off the surface, it will be ideal for car windscreen, swimming goggles and cameras. Its self-cleaning qualities mean it can be used as surface glass to protect photovoltaic cells which otherwise can lose up to 40 per cent of their efficiency in six months because of accumulated dirt. The glass of tomorrow can be non-reflective, weather resistant, self-cleaning and smart. Its quality, functionality and, crucially, its affordability are progressing fast, so what is indispensable is that glass in our daily lives is growing in importance.

Corning has released a series of visionary videos entitled ‘A Day Made of Glass’ which show interactive touch displays on kitchen work surfaces, car dashboards and wardrobe doors. Each is made of strong but thin glass that can carry complex electronic circuits and name functionality. Though these applications may not yet be affordable or scalable, it is clear that glass is the material that will make them a reality in the not too distant future.
Making flat glass

In 1952 Sir Alastair Pilkington invented the float process for making clear, tinted and coated flat glass for glazing. There are now around 260 float plants around the world with a combined weekly output of 800,000 tonnes of glass. A typical float plant makes around 6,000 kilometers of glass a year in thicknesses from 0.4 millimeters to 25 millimeters and up to three meters wide. This is how the process works.
India is often described as a country of contrasts – the haves and the have-nots, the new and the old. This dichotomy is equally applicable to the country’s milk industry. India may currently account for 17 per cent of global milk production but of that only a third passes through the organized sector – co-operatives and government and private sector dairies. The remainder comes from the unorganized sector, which effectively means millions of smallholder farmers in rural areas with small herds of cows or buffaloes. This unorganized sector accounts for approximately 70 per cent of the milk produced in India. For India to satisfy the demands of its population of 1.1 billion for milk and milk-related products, this needs to change.

Growing demand
India’s milk production is growing by four per cent per year but estimates suggest that customer demand is growing at twice that rate. In 2010 India’s Dairy Development Board drew up a National Dairy Plan aimed at doubling the country’s milk production by 2020. There are two key strands to this plan: improving the productivity of the milk animals; and increasing the amount of milk handled by the organized sector from 30 per cent to 65 per cent over the next 15 years. One of the keys to making this happen is to provide rural milk producers with greater access to the organized milk processing sector.

White revolution
Milk co-operatives are nothing new in India; they were central to the country’s so-called White Revolution which started in the 1960s and helped India become the world’s leading milk producer. The co-operatives set up in Gujarat after India’s independence in 1947 were among the pioneers in the dairy industry. The Gujarat model operated a structure that collected, processed and marketed dairy products at village, district and state levels. In addition the co-operative provided support to farmers in areas such as veterinary care and feed. When India’s Government set up the National Dairy Development Board in 1965 to facilitate growth in the dairy sector, one of its very first actions was to try to replicate the Gujarat model throughout the country. The Gujarat co-operatives subsequently grew to become the Gujarat Co-operative Milk Marketing Federation (GCMMF), India’s largest food product marketing company. Its Amul brand is one of India’s top milk products.

Not surprisingly, the vast potential of the milk industry and associated milk products means overseas companies are vying to either partner up with the country’s key dairy players or build new milk processing centers. For the GEA Group, India’s milk industry is the country’s most important sector and equipment and technologies from GEA have been in use in the sector for 60 years. All GEA’s businesses are represented and the Group is increasingly marketing itself as a total solutions provider across the country.

Growth of co-operatives
GEA Process Engineering India was involved right at the start of India’s milk revolution as a supplier to liquid milk processing and milk powder co-operative plants in Gujarat. As the co-operatives grew in number and expanded their operations across India over the years, GEA Process Engineering successfully won repeat business from its customers. As a result, GEA Process Engineering India’s milk processing equipment is used in many of the country’s liquid milk dairies and milk powder plants, including the country’s biggest milk powder plant in operation at Mother Dairy, Gandhinagar, which can produce one hundred tonnes of milk powder a day.

As the Indian milk industry focuses on improving both the quality and quantity of milk produced by the organized sector, GCMMF’s Amul business became the first dairy company to order GEA Mechanical Equipment’s bacteria removing centrifuge, which improves product safety and shelf life. GEA Farm Technologies, GEA Heat Exchangers and GEA Mechanical Equipment are all active players in a sector that is becoming more industrialized. As well as a demand for more milk, the Indian dairy market is also seeing an increased demand for milk-related products like curd, butter milk, India’s drinking yoghurt lassi and cheese. These areas also represent opportunities for all the GEA companies operating in India.
HALF THE WORLD’S SEVEN BILLION PEOPLE ARE CITY DWELLERS WHO ACCOUNT FOR MORE THAN 70 PER CENT OF GLOBAL GREENHOUSE GAS EMISSIONS. NOW, AS URBANIZATION CONTINUES TO GROW RAPIDLY, THE CHALLENGE IS HOW TO ACHIEVE IT MORE SUSTAINABLY.
The number of people living in urban areas is forecast to reach 3.3 billion. What's remarkable about this figure is that it's roughly equal to the total world population for 2002. This means that, if the planet's human inhabitants reach the predicted nine billion mark, urban dwellers will make up two-thirds of the population, compared with around half today.

Yet, while the new and expanding cities may be good news for future economic prosperity and offer millions of people a better quality of life, the urbanization process changes the environmental wound until we get wider.

According to the UN, if we continue to consume resources at the current rate, we will need the equivalent of two planet Earths by 2020. In its “Living Planet Report 2012” the UN warns that the one-way traffic approach of taking what we need and when we need energy, housing, transport and other goods and services, is putting a severe strain on the ecosystem.

Alarming, the report states: “In 2008, the most recent year for which data are available, our Ecological Footprint exceeded the Earth’s bio-capacity – the area of land and productive ocean areas available to produce renewable resources and absorb CO2 emissions – by more than 50 per cent. It describes how each person’s Ecological Footprint depends on a number of factors, including where they live, the amount of goods, services and waste they use plus the way they generate. To put this in perspective, the report says if, for example, we all lived like the average Indonesian we would use up just two-thirds of the Earth’s bio-capacity.

But if everyone adopted the lifestyle of the average American, four Earths would be required to meet our annual demand on nature’s bounty.

Encouragingly, while the inescapable rise in urbanization is a given, the way it will develop and in the future is widely serious debate. The question isn’t whether to urbanize but how,” said Dr. Michael Fraknklaus of Arise for Earth.

Unfortunately, today’s ongoing pattern of urban sprawl puts humanity at severe risk due to environmental problems. Dr. Fraknklaus was among 3,000 scientists and environmental experts who took part in the “Planit Under Pressure” conference.

Held over four days in London during March 2012, the conference reviewed the latest research findings on the state of the planet and recommended a series of practical solutions. These included: a set of sustainability goals for all nations; creating a UN Sustainable Development Council to integrate social, economic and environmental policy globally; an international research program and providing global regular sustainability analyses.

“The last decade we have become a highly interconnected society and are beginning to see that the pollution and injustices of one should be harnessed for rapid innovation,” said conference co-chairman Dr. Graham Smith.

“But we need to provide more open access to knowledge, we need to move away from GDP as the only measure of progress, and we need a new way of working internationally that is fit for the 21st century.”

The proposals were incorporated into a “State of the Planet Declaration,” which set out how current international arrangements were failing to deal with long-term challenges such as climate change and loss of biodiversity in an interconnected way. UN Secretary General Ban Ki-Moon said the publication of the document was timely, coming just two months before the UN Conference on Sustainable Development.

Rio+20, held in Rio de Janeiro June 2012. There heads of state and high-level representatives renewed their commitment to sustainable development and to promoting “an economically, socially and environmentally sustainable future for our planet and for present and future generations.”

Then, in September, the UN launched the Sustainable Development Solutions Network which brings together scientists, technical experts and business leaders to tackle the most pressing environmental, social and economic problems. They set up 10 global expert groups to support problem-solving in numerous critical areas, including economic growth, reducing poverty, access to healthcare and transferring to low carbon energy.

Permanent settlements
New technology has always been an essential part of the urbanization story. The first towns were the direct result of improvements in agriculture and transport. Previous settlements tended to be temporary, lasting only as long as the soil produced good crops. The community would then up and move to a new site.

As farming methods became more sophisticated, farmers were able to produce surplus food. This, together with the invention of the wheel, made it practical to transport the surplus from the countryside to the towns.

Because early cities and towns were often under threat of attack they were usually surrounded by walls and towers. The rich and powerful lived in the center, while the poor lived elsewhere. Sometimes even beyond the city walls. Many of the ancient cities, such as those in Egypt, Mesopotamia and the Indus Valley, are said to have been built to a plan. However, the credit for inventing urban planning goes with the Greek Hippodamus. In around 607 BC he designed the city of Miletus, in what is now Turkey, using a grid layout. The style was copied for other Greek and also Roman cities.

As cities developed and grew into mercantile hubs people flocked to them, attracted by the presence of jobs and a better quality of life. Urban centers drew people from a wide area and from all walks of life, creating a diverse population.

But the biggest upswing in urbanization was sparked by Industrial Revolution as people migrated from the countryside on an unprecedented scale to work in the new factories. Unfortunately, employment opportunities were not necessarily matched by better living standards. By the 19th century many of these new industrial workers found themselves living in crowded slums, breathing air polluted by the smoke from their employment activities.

Gradually, governments and city authorities recognized that urban growth and development needed to be better controlled and healthier environments provided for the workers. An early example of modern urban planning is Baron Georges-Eugène Haussmann’s remodeling of Paris in the 1850s. His solution was to demolish parts of the old city and build wide boulevards. He also set regulations for all building facades, public parks, monuments, sewerage systems and water works. Meanwhile, in Barcelona, engineer Iñigo Cerda devised an extension to the city consisting of a series of 550 uniform blocks built around central gardens.

Early in the 20th century the UK tried to improve urban life by building so called garden cities. These were specially designed towns that incorporated green spaces.

As urbanization continued to increase rapidly during the 20th century, it gave rise to a new phenomenon – suburbia. The new suburbis tended to provide homes for the poorest while the wealthy enjoyed all the advantages of living in the vibrant cities centers. However, this demographic was reversed in the US in the 1950s and 60s as the mended classes sought to move out of the city and expand into the suburbs. By the 1970s, and of course they could afford the travel. This trend has since been repeated in other countries.

Farm of the Future

Feeding the world where it reaches the expected nine billion in 2050 will require the land size of Brazil to grow enough crops. And, with most of the population living in cities, experts have recognized the need to change current farming practices. A potential solution is the vertical farm where food is grown is on top of buildings in cities.

One considered science fiction, vertical farms are becoming a reality, such as the one in a converted meat packing plant in Chicago. So far it has five tenants whose products are sold to local markets and restaurants.

But this won’t solve the problem of how to accommodate dairy farms and other large livestock. GEA Farm Technologies, a leading provider of solutions and systems for milk production and livestock farming, could have the answer to making dairy farming more sustainable.

The company has developed a holistic vision of the ‘Farm of the Future’ that encompasses all the key components of a dairy farm from animal feeding, milk production, automation and waste collection to training, maintenance and consumption of energy and water.

Norm Schurig at GEA Farm Technologies in the US is on for the Farm of the Future concept. He says the big challenge for farmers is producing enough high-quality milk profitably against a background of rising animal feed, energy and land costs.

“Farmers are looking for system solutions that will improve their profitability and sustainability,” Schurig explains. “Reducing the use of fossil fuels and greenhouse gas emissions and achieving higher milk yields through better animal nutrition and milk handling practices is only possible with sophisticated systems. GEA Farm Technologies’ focus is to research and develop new and currently feasible systems and processes, adding revenues to the operation. Energy production, fertilizer value from waste and manure, water recycling and more processes that can add revenues while reducing costs.”

GEA Farm Technologies can provide the expertise and technologies that will enable farmers to adopt to meet the increasing demand for dairy products in a sustainable and future-oriented way. Farm of the Future was launched at EuroTier 2012, the global agricultural show.

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One of the most significant landmarks in the urban landscape is the megacity, defined as having a population of 10 million and above. In 1970 just two cities met the criteria – New York and Tokyo. Now there are 23: Asia has 13, Latin America four and two each in Africa, Europe and North America. By 2050 the number of megacities is expected to grow to 37 – accounting for 13.4 per cent of the world urban population.

The most populous megacity is Tokyo, with 37.3 million, followed by Delhi at 22.7 million and Mexico City, 20.4 million. In fact, in Tokyo was a country it would be the 35th largest in population terms. That’s bigger than Uganda, Canada or Algeria.

A unique feature of the GEA Niro technology is the Niro spray-drying absorption (SDA) process. Since the 1970s, it has been removing acidic pollutants, heavy metal particles and dust from flue gases at fossil-fuelled power stations, waste incinerators and steel plants worldwide. The SDA process also doesn’t generate any waste water.

GEA Heat Exchangers also plays a key role in helping chemical plants to comply with emissions regulations. For example, it supplied two mini desublimators to a chemical plant in Belgium to reduce emissions from naphthalene tanks.

ESSENTIAL TO URBAN LIFE

Technology from GEA is at the heart of many industrial and processing activities – from power generation to food supply – that are the lifeline of urban living.

Many of these processes involve transferring heat from one medium to another during cooling, heating, condensing and evaporating. GEA Heat Exchangers and GEA Process Engineering also supplies 102 processes that are used to make many well-known products, including soups, ice cream and bakery items.

Finally, GEA Refrigeration Technologies provides innovative freezing and chilling technology throughout the production, transport and storage of food.

CLEAN AIR

Urbanization is often linked to air pollution, mainly from power plants, factories and vehicle exhausts. GEA Process Engineering is a major player in environmental protection with its Bioflash and Niro technology.

As a full system supplier for the industrial gas cleaning including planning, commissioning and maintenance, GEA Process Engineering is the market leader in the key industries; iron and steel, nonferrous-metallics, chemistry and fluid catalytic cracking (FCC), cement and glass with more than 15,000 Bioflash installations worldwide. The Bioflash range also includes energy recovery systems to produce energy from the available heat gasses.

With this method, products keep their shape, taste and nutritional content, and are light and easy to transport. With this method, products keep their shape, taste and nutritional content, and are light and easy to transport. Fast food

Today’s urban lifestyles demand a range of processed foods that are easy and quick to prepare yet still nutritious.

GEA companies specialise in equipment and processes to enable manufacturers to improve the quality and prolong the shelf life of their products. From a single machine to complete production lines, GEA has the know-how and the capability to be a major supplier of machinery for preparing, marinating, processing, slicing and packaging meat, poultry, fish, cheese and other foods.

The company’s test centre at Bavel in the Netherlands gives customers the opportunity to try out new processes – for example, a cooker with a high-velocity air flow which ‘fries’ foods without oil so that they are healthier.

High-pressure homogenization is an important part of processing beverages, sauces and other fluid products. By reducing and standardizing the particle size, homogenization makes for a more stable product and improves both texture and taste. New Sioux homogeneators from GEA-Mechanical Equipment are used in processing many foods and drinks that are part of consumers’ daily lives including fruit juices, ketchup, salad dressings, baby foods and home-brew paste.

The Westfalia’s Separator® straining system, adapted from a method used to manufacture cheese, has been successfully applied to the production of GEA’s extended shelf life (ESL) milk. The system reduces the bacteria count by 90 per cent before pasteurization, has a low energy consumption and provides a product with the same vitamin content as traditional fresh milk and a shelf life of at least 21 days.

GEA Process Engineering helps prolong the shelf life of foods with its GEA Niro Equipment. Homogenizing the particles by drying deep-frozen food in a vacuum to increase its life. With this method, products keep their shape, taste and nutritional content, and are light and easy to transport. From disposable can be applied to fruit, vegetables, meat, seafood, milk and beverages. GEA Process Engineering also supplies 102 processes that are used to make many well-known products, including soups, ice cream and bakery items.

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GEA Heat Exchangers plays an important role in producing and storing food and beverages, for instance. Eastcoast plate heat exchangers are used in manufacturing cheese and beer, whereas GEA Heat Exchangers and condensers and condensers are necessary for storing and transporting fresh produce. GEA Heat Exchangers equipment, including treatment systems and filter dessifiers, maintains the correct climate in offices, data centers, hospitals, airports, museums, schools, shopping malls and many other public buildings.

By 2050 the world will be 77 per cent urban of which developing regions will account for 62 per cent.
Sustainable solutions
But it’s not all doom and gloom. The week’s climate change ‘carbon footprint’, ‘environmentally-friendly’ and ‘energy-saving’ have crept into common parlance as part of the campaign to get us to think and act in ways that help reduce our carbon emissions and conserve natural resources, crime, violence, overcrowding, severe traffic congestion, vulnerability to natural disasters and pollution. It’s estimated that city residents are responsible for over 70 per cent of fossil fuel-related CO2 emissions.

In July 2012, Beijing experienced its worst storm in more than 60 years, with 218 millimeters of rain falling in 14 hours. Chinese meteorologists suggested that the effects were made worse because the city acted as an urban heat island. In other words it was hotter in temperature than the surrounding areas. Heat from the city pushed up the clouds, which produced more rain as they gained altitude so that the downpour was more locally concentrated.

Worldwide, traffic congestion costs economies an estimated one to three per cent of GDP—a problem that not only wastes fuel and causes pollution, but also time. For example, New York City’s congestion costs an estimated USD 4 billion a year in lost productivity. Meanwhile in São Paulo, Brazil, traffic jams in and out of the city extend on average 180 kilometers at peak times. On a really bad day the jams can be as long as 271 kilometers. The Thai government’s policy of refunding tax for first-time car buyers has brought five million vehicles to the streets of Bangkok—over three million more than the city can comfortably handle and in the Indonesian capital, Jakarta, citizens plan their lives around traffic jams.

Many urban problems are partly due to taking a one-size-fits-all approach. Professor Karen Seto of Yale University, one of the delegates at the Planet Under Pressure conference explained: “People everywhere have increasingly embraced Western styles of architecture and urbanization, which are resource-intensive and often not adapted to local climates. The North American suburb has gone global, and can-dependent urban developments are more and more the norm.”

The conference revealed that, unless development patterns change, by 2030 humanity’s urban footprint will occupy an additional 15.5 million hectares—an area the size of France, Germany and Spain combined.
British classical singer Sarah Brightman, who had a hit in the 1990s with ‘I Lost My Heart to a Starship Trooper’, is reaching for the stars - literally. She wants to be the first professional singer to try out her vocal chords in space.

An impossible dream? Far from it. Sarah Brightman is set to blast off to the International Space Station aboard a Russian Soyuz rocket in 2015. She will be the ninth non-paying visitor to the station since US astronaut Duncan Walker took one giant leap for space tourism in 2001.

The American company Space Adventures arranges the trips with the Russian Government and the fees - around EUR 35 million a head - help to support Russia’s space program. Taking off into space is, of those with a hefty bank balance, the ultimate wild ride.

Other companies have now joined the space tourism race. While developing spacecraft capable of taking passengers to the moon and beyond is the ultimate aim, in the short term, the focus is on sub-orbital flights. Virgin Galactic, one of four companies offering the sub-orbital route, has already taken reservations from more than 500 people. Among them will be Alan Watts from London. He is cashing in the two million air miles he'd planned to use travelling the world when he retired. His sub-orbital trip will make him the first frequent flyer in space.

Space attractions

Meanwhile, earth-bound tourists need not miss out on space-related activities. The Kennedy Space Center at Cape Canaveral, where the Apollo missions and space shuttles were launched, attracts millions of visitors every year. For fans of the TV series, the Star Trek attraction being built in Jordan promises to ‘boldly go’ where no other theme park has gone before. King Abdullah himself, who gave the green light for the park, is a big fan, having once appeared as an extra on the show.

Indeed, modern technology has brought to life many ideas, such as artificial climates, that were once restricted to the imaginations of science fiction writers. The Tropical Islands resort in Brandenburg, Germany is a perfect example of this. Built in an old airship hangar, it boasts the world’s largest indoor rainforest with a constant temperature of 26 degrees Celsius. The resort enables people in Germany and nearby countries to experience a tropical holiday without the long-haul travel.

Tourist trips to space are nearing the launch pad. Soon the sky will no longer be the limit for travelers.

Rise in tourism

If wherever in the world people choose to vacation, tourism is big business. The UN World Tourism Organization (UNWTO), which measures travel movements in terms of international tourist arrivals, said numbers were up from 991 million in 2011 to one billion in 2013. The top ten destinations are France, US, China, Spain, Italy, Turkey, UK, Germany, Malaysia and Mexico.

Over the past 60 years, according to the UNWTO, tourism has developed into one of the world’s largest and fastest growing economic sectors. As an airport category it ranks fourth after fuels, chemicals and food.

For many developing countries tourism is one of the main sources of foreign exchange income and the premier export. As well as attracting visitor dollars, the tourist industry creates jobs and businesses and encourages development of a infrastructure.

Historically, tourism in emerging economies has grown faster than in the more economically advanced countries and the trend shows no signs of slowing. The UNWTO predicts that, between 2010 and 2030, arrivals to emerging economies will increase at double the rate of that for more mature economies.

Since the 1950s when package holidays made foreign travel affordable for more people, the number of destinations has increased, as has the type of vacation. While the traditional beach holiday is still high in the popularity stakes, as are the trips to theme parks like Disneyland for those with children, the choices for the intrepid flyer are almost limitless: walking the Inca Trail in Peru, white water rafting, climbing and cycling holidays, to name but a few.

Budget airlines have enabled people to travel more often – and further – for less, while the Internet has made booking transport and hotels, as well as finding the best deals, easier. Also, through social websites and blogs, travelers have been able to share their experiences and flag up the best – and worst – places to visit.

How soon lifting off from earth into space becomes affordable for those with modest incomes remains to be seen. When asked what was the biggest obstacle to space tourism, John Spencer, President of the Space Tourism Society, said: “It’s not the money or the regulations, it’s just doing it.” Should off-world travel become a reality, space will truly be, as they say in ‘Star Trek’, the final frontier.
German mechanical engineering know-how has long been recognized and sought after the world over. Now, as Dr. Thomas Schröder explains, it could hold the key to a sustainable future.
Launched in 2011, Blue Competence links all mechanical engineering sectors, from waste and recycling technology to cutting tools. It aims to provide a ‘green’ platform for developing and implementing environmentally-friendly, energy-efficient or resource-efficient products and processes.

Dr. Thomas Schräder is Managing Director for Air Handling Technology at VDMA and responsible for the day-to-day running and all promotional activities is Judith Herzog-Kuballa from Technical and Environmental Affairs who contributed to the answers below.

Q. Why was Blue Competence established?
A. Today there are seven billion people on earth and their quality of life depends on which part of the world they live in. By 2050 the number is predicted to increase to nine billion and most of the additional people will expect a high standard of living which will require more resources. Estimates from the United Nations and other institutions have shown that we would need the equivalent of two and a half Earths to provide resources for a lifestyle comparable with 2000 levels in the western world. Production of oil, metals and other essential resources is due to peak and then decline so there is no way of continuing business as usual.

We believe that the mechanical engineering sector is an ‘enabler’ for meeting these global challenges by providing the pioneering technology that will support a sustainable future. However, the industry is not very homogenous and has 38 different specialized branches, offering numerous solutions. The VDMA decided that, in order for the industry to be recognized as an enabler by policy makers and the public, it would need one campaign and one color. We chose blue because it is generally associated with technology and efficiency.

Q. How is it organized?
A. Blue Competence has a three-level structure comprising the VDMA, the different trade associations and individual companies or alliance members. The VDMA is the sponsor and governing body and is also responsible for advertising and promotion. The trade associations are also supporting these activities and can define additional technology requirements that are specific to their sector and the alliance members must provide evidence that their components and machines are sustainable.

Q. How many companies have signed up to Blue Competence and how do you ensure that they meet its aims?
A. We launched in 2011 and planned to have 300 alliance members by the end of 2012. We achieved that figure by October 2012 – it’s drawn the biggest response of any initiative we’ve had so far.

On joining Blue Competence, alliance members are asked to sign a contract committing them to a set of sustainability goals and standards. For example, they must provide at least one case study that demonstrates the environmental effectiveness of their products and maintain a management system where sustainability goals are monitored in the same way as quality targets. We can seek proof that members are meeting the requirements through on-site inspections. But we have found that members are generally very serious about fulfilling their commitments and success is based on mutual trust.

Q. What are the main challenges for achieving sustainability in the mechanical engineering sector?
A. We are able to offer very efficient products with a long-term payback but they require a high initial investment. Generally, customers buy according to price and don’t take into account the costs of using the products over their life cycle. This is a particular dilemma in the building industry where you have an investor and an end user. There is a lot of mechanical engineering technology in a building – heating, air conditioning, cooling, ventilation, pumps, valves, elevators and building automation systems – and the investor will try to save money on the purchase; but the bulk of the life-cycle costs, the cost during use, will be paid by the building’s user. And these costs are highly dependent on the efficiency of the building technology installed.

Q. What’s being done to change the situation?
A. The VDMA established a building sector group that brings together all the different trade branches. Our aim is to improve communication with architects and all industries involved in constructing a building. The EU policy on environmental protection has recognized this building sector accounts for 60 per cent of total energy use in Europe. Accordingly, any new legal requirements should be balanced by what is technically possible. Through Blue Competence we are accepted by policy makers at European and national level as competent partners in defining the technology best practice to be included in legal requirements. Those requirements help support our arguments about optimizing – lowering – life-cycle costs.

The EU Ecodesign Directive includes requirements on future energy use which covers most of the engineering products supplied to the building sector.

Q. How are the achievements of Blue Competence being measured and can you give some examples of success?
A. The case studies provided by alliance members represent success stories. They show how the companies act sustainably through their products or manufacture of their products. For example, GEA Refrigeration Technologies has developed a heat pump that converts heat emitted by refrigeration equipment into usable energy and reduces CO2 emissions. Kressel has invented a cellular wheel sluice that reduces the environmental impact of cement production and Harcher has developed a vacuum cleaner that runs on just 750 watts, is less noisy than standard cleaners and is more than 90 per cent recyclable.

Q. Is Blue Competence promoted?
A. Through a comprehensive series of communications involving all three levels. As the sponsor, the VDMA promotes Blue Competence via advertising campaigns, brochures, mail shots, social media, fairs and exhibitions and on our website. The site, available in English and German, includes all the success stories from our members. The branch organizations and alliance members can promote their successes in their own marketing activities.

We speak to politicians in Germany and at EU level and the fact that the export rate for German mechanical engineering is about 75-80 per cent helps to support the message that we are enablers.

Q. Does that mean that Blue Competence applies outside Germany?
A. Yes. Membership is available to companies at European level and, if those companies are operating globally, they are allowed to use the Blue Competence logo internationally.
Technological advances mean that sports professionals are looking for — and increasingly finding — the extra edge that helps improve their levels of performance. Many elite athletes across a host of sports have their clothes and accessories such as helmets individually designed after a full body scan, which contour gives them the most aerodynamic shape. Runners’ footwear is custom-moulded to their feet and there have been advances in the grip, comfort and strength of their shoes. Swimmers’ outfits are lighter, stronger and reduce the drag caused by clothing in the water. Some people believe the technological ‘arms race’ leaves athletes from poorer countries with no chance of getting near their technologically enhanced competitors. However, once athletes step onto the track in the new stadia, swimming pools and velodromes built for big events, they can all benefit from performance-boosting technology.

London’s stunning Olympic Stadium featured a £1 million state-of-the-art running track with a cushion backing for track and field Hurrican, which made it one of the fastest cycle tracks for the 2012 Olympic Gears. The track was designed to be as fast as possible, and the timekeeping and loudspeaker systems. The technology is helping to achieve the same standards of high performance at lower costs and greater flexibility. For example, in F1 teams’ workshops and kitchens, on-track hospital where the players from German clubs, including Borussia Dortmund, cool and ready to play. GEA provides the Procomac cold aseptic filling lines to the stadia, GEA Refrigeration Technologies is at work on the team buses by supplying GEA Bock vehicle compressors for air conditioning systems to keep the players from German clubs, including Borussia Dortmund, cool and ready to play. GEA Heat Exchangers’ cooling technology helps football fans enjoy food and drink at stadia including Bayern Munich’s famous Allianz Arena.

When India hosted its first ever Grand Prix in October 2013, the specifications of the track were designed to meet the highest standards for F1 tracks. GEA Refrigeration Technologies is at work on the team buses by supplying GEA Bock vehicle compressors for air conditioning systems to keep the players from German clubs, including Borussia Dortmund, cool and ready to play. GEA Heat Exchangers’ cooling technology helps football fans enjoy food and drink at stadia including Bayern Munich’s famous Allianz Arena.

GEA Refrigeration Technologies is a long-time supplier of ice skating rinks through its GEA Grasso refrigeration technology. For example in the Netherlands, it built six of the 17 major skating rinks and is now responsible for maintenance at nine of them. GEA Refrigeration Technologies is also used at a bobsled track in Russia, where it gained special approval to use ammonia as a refrigerant for the first time in a Russian sports facility. Advances in technology have also made it possible to build an indoor ski slope in Dubai, where GEA Refrigeration Technologies maintains the world’s famous Ski Dubai at a temperature of just below freezing. In addition, when the temperature outside can be as high as 40 degrees Celsius. And GEA Refrigeration Technologies even supplies the snow to indoor and outdoor ski slopes through its range of GEA Geneglace snow cannons.
In 2012 a US confectionery company enjoyed the sweet taste of success by breaking the Guinness World Record for the largest ever lollipop. Weighing in at 3,175 kilogrammes and standing 1.8 metres high, it was displayed in San Francisco’s Justin Herman Plaza.

See’s Candies made the huge confection, based on its popular chocolate-covered Gourmet Lollipop, to coincide with National Lollipop Day on July 20. As these events demonstrate, there is something about the lollipop that captures the imagination. Around the world people have dreamed up an almost limitless choice of flavors, shapes and sizes for this treat on a stick.

The Japanese, for example, make a lollipop from ground-up pearls – they are believed to act as an aphrodisiac. Meanwhile George Smith from New Haven, Connecticut, laid claim to inventing the modern lollipop and trademarked the name in 1911. He reportedly got the name from a popular race horse of the time, Lolly Pop. However the term lollipop actually dates back to the 16th century English term meaning ‘loopy lapp’. Whatever the origins, the name has stuck and is often shortened to lolly. Sucker and stickypop are also popular terms for lollipop. The Dum Dum Lollipops brand is also called because it was thought the name would be easy for children to say.

The main ingredients for candy lollipops are flavored sugar, water, corn syrup and flavorings. Ice lollipops are frozen water-based, sometimes with ice cream fillings. Sticks for the candy versions are usually made from tightly rolled paper coated with wax, while ice lollipops have had wooden ones. Finally the whole thing is wrapped in cellophane or printed wax paper.

Surrounding And, when it comes to wrappings, they don’t come much better than the one for the Spanish brand Chupa Chups. The distinctive icy logo was designed by the famous surrealist artist Salvador Dalí. And, at his suggestion, the logo was positioned on top of the wrapping rather than the side so that it would always be seen intact.

With more than 50 years’ experience in providing lollipop manufacturing equipment, GEA Food Solutions knows more than most about creating eye-catching packaging and exciting candy shapes. Its Aquarius portfolio sets the standard for forming, cooling, wrapping and packaging lollipops. The equipment is available as individual machines, or a complete production line, and in different sizes to suit capacity.

The GEA Aquarius FlexFormer forming machines can produce between 300 and 2,100 lollipops per minute. They enable customers to manufacture different lollipop formats in one machine, including novelty three-dimensional (3D) versions. For example, GEA Food Solutions engineers worked with Turkish confectionery company Sayabek to produce a 3D football lollipop in four flavor-color combinations to match the top Turkish soccer teams. The GEA team used advanced CAD/CAM software to produce the 3D die set for shaping the lollipops. After forming, the lollipops need to be cooled. The GEA Aquarius PopCoder models cool the lollipops while ensuring that they retain their shape and quality. Finally the GEA Aquarius packaging machines offer different wrapping options to ensure optimized product protection and shelf life.

Developments like the 3D lollipop continue to add excitement to the market for this ever-popular sweet treat.

NO ONE KNOWS WHO FIRST CAME UP WITH THE IDEA OF A SWEET ON A STICK BUT THE LOLLIPOP IS A FAVORITE AROUND THE WORLD. IT EVEN INSPIRED SALVADOR DALÍ TO DESIGN A BRAND LOGO.

TREATS ON A STICK

The lollipop really came to prominence during the 20th century, as a result of new manufacturing technology. For example, the Rancho Confectionary Machine Company in Wisconsin marketed the first automated machine capable of making 10 lollipops a minute, while Samuel Born, a Russian immigrant to the US, invented a machine for inverting the sticks automatically.

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IN A GLOBALIZED BUSINESS WORLD, DIVERSITY IS BECOMING INCREASINGLY SIGNIFICANT. GEA GROUP APPOINTED NOBUE BEATE VON WURZBACH TO PROMOTE DIVERSITY AND VALUES THROUGHOUT THE ORGANIZATION AND, AS SHE DISCOVERED, PEOPLE ARE BEGINNING TO RESPOND.

Nobue Beate von Wurzbach loves hearing colleagues talking about diversity and the company’s values, even controversially, because it means that people are starting to deal with the issue. “I see this as an early success because it’s a sign that the topic is slowly taking hold within GEA. But there is still a way to go,” she says with the smile of someone who relishes a challenge.

As GEA’s Head of Corporate Organizational Development, based at the headquarters in Düsseldorf, she is responsible for driving the diversity and values agenda throughout the business. She is the first to admit that introducing what may be considered “abstract” areas in the technology-driven world of mechanical engineering is not straightforward. “Even though there is a strong business case for diversity, there is still a lot of promotion that needs to be done and you can always try to do things better,” she says. “It’s her job to systematically manage this part in order to serve the company’s goals. And speaking to her leaves you in no doubt about her commitment to that.

After working for another mechanical engineering company she joined GEA in 2006. “I’d been working in business development and marketing and wanted to make a career switch,” she explains. “But when I was offered the position of Head of Strategic Marketing within GEA Mechanical Equipment, I rediscovered my interest in the sector”.

The move to her current role began in 2010 with an invitation to join a working group of colleagues from around the GEA Group to look into the issue of diversity and recommend appropriate strategies. One of the proposals was to set up a diversity management function and von Wurzbach was offered the job. “As I am half German, half Japanese, grew up in Italy, studied and worked in the US, as well as in Spain I fulfil a lot of diversity criteria,” she says with a smile. “We live in an interconnected world and diversity is a global issue, although the focal points vary.”

A few months after assuming the position as Head of Corporate Diversity Management in 2011 her remit was expanded to include promoting the newly-established GEA Group values of excellence, passion, integrity, responsibility and GEA-versity. With the addition of the ideas and improvement management function (this in May 2012, the department was renamed Corporate Organizational Development). Besides managing each topic separately her long-term aim is to make them more interconnected.

The values were launched to staff at a series of cascading workshops. A key part of von Wurzbach’s role now is “making the values come to life”, which, she says is “the most difficult and trying part of the exercise: it means to manage the values message across all segments and to get it into the heads and hearts of staff”. A steering committee, involving representatives from all segments of the GEA Group meets regularly to agree strategies and actions.

For diversity she initially began by examining the status quo, developing a diversity concept for GEA and is now specifying measures and control objectives to be achieved at the various levels within the Group.

She admits that it won’t all happen overnight. “Corporate cultures and organizational structures are man-made and man-driven and changing them requires commitment. This is a long-term project and I find the topics relevant and the challenges positive. Our management is committed to values and diversity and is driving them from the top.”

“Some people are acting as champions and some managers are saying that diversity is a good thing for them and their staff. These are signs that we are heading in the right direction. Diversity can definitely be a success factor.”

Having lived in different countries von Wurzbach has developed an international circle of friends who she keeps in contact with in her spare time. She also enjoys travelling with her family, mountain hiking, literature and “having fun with my almost four-year old son”.
At first glance this looks like a close-up of the inner workings of a locking mechanism. But it is actually a bending tool of a bending machine used in manufacturing various types of milking equipment. Its primary application is for bending flat steel of varying thicknesses through a 90 degree angle. But it can also be used to shape plates and wires into a number of semi-finished products.
GEA has increased its expertise in pastoral-based dairy farming with the acquisition of the Milfos International Group.

Based in Hamilton, New Zealand, the company is a leading designer and manufacturer of innovative dairy technologies. It provides a complete range of milking, cooling, stalling and automation equipment, along with service programs focused on grazing farm applications.

Milfos, formed in 1987, has more than 100 employees and exports to more than 50 countries. It will be integrated into GEA Farm Technologies.

GEA Heat Exchangers has launched new air-cooled chillers that enable customers to save on energy costs. The GLAC-CD range, which replaces the GLAC 0150-1204-BD models, is available in various sizes and is ideally suited to small and medium-sized HVAC systems, facilities with low-volume water systems and refrigeration ratings of 40-350 kilowatts. Micro-channel heat exchangers, which offer superior performance to classical Cu-Al heat exchangers, are used as condensers.

These heat exchangers transfer heat more effectively, are more energy efficient and are more resistant to corrosion.

GEA Process Engineering has been awarded the contract to supply two GEA Niro SWIRL FLUIDIZER™ dryers to Qinghai Salt Lake Haina Chemical in Aning, China. The GEA Niro SWIRL FLUIDIZER™ is a vortex type dryer for production of free powders from viscous slurries, pastes and other products that are difficult to disintegrate in a single step. The design for Qinghai Salt Lake Haina-Chemical will each have a capacity to produce more than nine tons per hour. Due to be in operation in July 2013, they will not only be the largest GEA-Niro SWIRL FLUIDIZER™ dryers supplied but also the world’s largest of this type of dryer.

Qinghai Salt Lake Haina-Chemical, a subsidiary of the state-owned Qinghai Salt Lake Industry Group, is exploiting the Qinghai provinces’ extensive magnesium-based mineral and energy resources. The company’s integrated industrial complex includes several other GEA-Niro plants.

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The EuroTier exhibition in Hannover — the global showcase for domestic livestock management — was a major success for GEA Farm Technologies.

Exhibition host Deutsche Landwirtschafts-Gesellschaft (DLG) awarded the company’s DairyProQ a gold medal and the Deutsche Landwirtschaftsverlag (dlv) named it ‘Innovation of the year 2013’. DairyProQ is the world’s first milking cluster module. It provides a continuous and efficient process and can be fitted to various types of milking parlors.

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