Courtesy of Guardian Glass, LLC, ©Gonzalo Botet2

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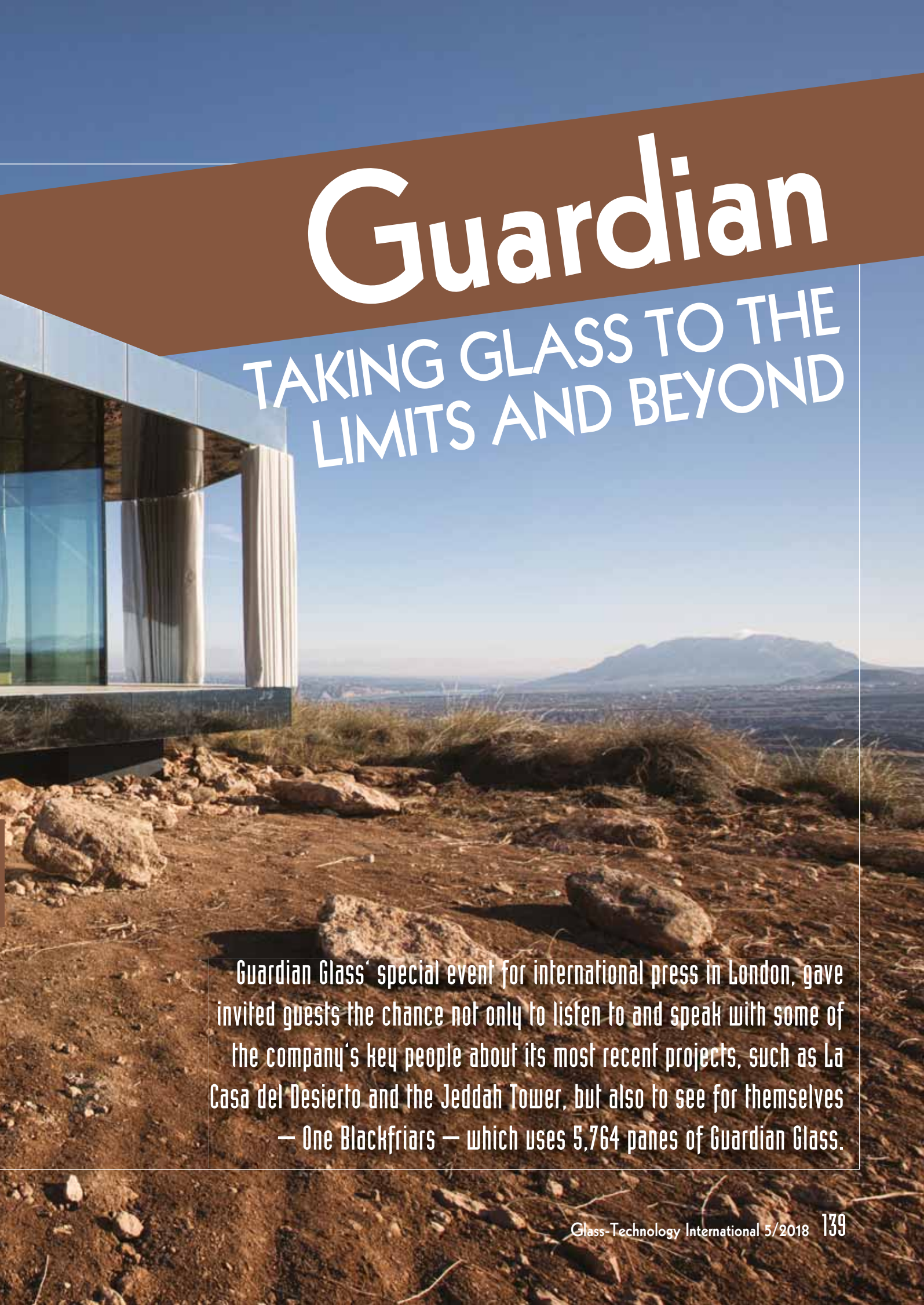
Left:
A rendering of
One Blackfriars, London

Background photo:
La casa del Desierto



Guardian

TAKING GLASS TO THE LIMITS AND BEYOND

Guardian Glass' special event for international press in London, gave invited guests the chance not only to listen to and speak with some of the company's key people about its most recent projects, such as La Casa del Desierto and the Jeddah Tower, but also to see for themselves — One Blackfriars — which uses 5,764 panes of Guardian Glass.

During Guardian Glass' special event held in London, members of the press were invited to see for themselves how the use of the company's special glass is changing our lives. Attendees were given a preview of one of the most recent projects of Guardian Glass – One Blackfriars – with its 170 metres height and 50 floors, which uses 5,764 panes of Guardian Glass.

Those present also got a 'teaser' of what we can expect to see at this year's glasstec, with important new technology and, of course, Guardian Glass' focus on vacuum insulated glass.

MEETING THE KEY PEOPLE

The business day with Guardian Glass gave an overview of the company, its business activities and investments, explained to us by Kevin Baird, President and CEO of Guardian Glass, Guus Boekhoudt, Vice President of Guardian Glass and General Manager of Guardian Glass in Europe, as well as Sheldon Davis, Vice President of Science, Technology & Innovation.

Guardian Glass' 'Glass Experts' took us through the high performance that glass needs to have, with Javier Unquera, Guardian Glass' Science and Technology Europe Director, who also spoke about how this high performance always needs to be balanced with aesthetics – consider colour for example.

Jasmin Hodzic, Commercial Project Director Africa and Middle East at Guardian Glass, gave us an overview on the technical challenges of megatall buildings, such as wind loads, temperature and altitude differences, and condensation.

GUEST SPEAKERS AT THE EVENT

Guests at the special press day also got the chance to meet some of the architects involved in the projects, with Ian Simpson, founding partner at SimpsonHaugh, speaking about tall buildings in London, and Christian Male, partner, who has led the development of One Blackfriars in London during construction through to the building's imminent completion.

Špela Videcˇnik, Founding Partner at OFIS arhitekti, spoke about her collaboration with Guardian Glass in terms of thermal and structural challenging, while Edoardo Tibuzzi, Associate Director at AKTII, architect and structural engineer of La Casa del Desierto gave us an idea of his daily research, which involve structures and multi-disciplinary design optimization.

DEVELOPMENTS AND EXPANSION IN GUARDIAN GLASS' BUSINESS

Speaking about Guardian Glass, it's important to know that the company has always – and is continuing to – make important investments. Its most recent investment in Europe, for example, involves a 1,000-tonne tank for Poland, expected to create 150 new jobs, thanks to the 'healthy' demand coming from Eastern Europe and the company's aim to increase its footprint in that area. Another investment regards a new laminating line for Hungary, while production is continuously on the increase in Spain. And this type of demand is expected to undergo important growth in the next three to five years, doubling or tripling. Demand for value-added glass types is also increasing in Eastern Europe and other regions.

RECENT PROJECTS

Before taking us on to its most recent and spectacular projects, such as One Blackfriars of course, but also the Burj Khalifa and the Jeddah Tower, presently under construction, while another recent project from Guardian Glass was La Casa del Desierto, where performance and aesthetics really come into the scene.

Covering only 20 square metres, the layout consists of three areas: bedroom, bathroom and living room. A large space directly overlooking the landscape, La Casa also has a water filtration system, an energy generation system and a set of photovoltaic panels. Positioned in the Gorafe Desert (Granada, Spain), considered one of the most adverse and extreme environments in Europe, La Casa del Desierto stands on a wooden structure and is fully glazed with high performance, energy-efficient Guardian Glass.

MEGATALL BUILDINGS – CHALLENGES

Wind loads

Megatall buildings are skyscrapers over 600 metres high, which generally use a lot of glass, which often tends to be taken for granted in terms of its technical functions. When it comes to megatall structures, the main challenges are wind loads, temperature and altitude differences, and condensation. In fact, for the Burj Khalifa, the glass façade was designed to withstand wind loads of up to 250 km/hour, while the glass system for the Jeddah Tower is designed to withstand a 2.5 metre radius sway without breakage or leakage.

Close to the ground, wind is disrupted by trees and other buildings, but as a building rises to supertall heights, these obstacles disappear. The tower then faces the full, unobstructed force of the wind, which can be extremely high. Even though the dynamic shape of the building is designed to reduce structural loading due to wind vortex

shedding, the glass thickness is very important too. The thickness of the glass used depends on the height of the building where it is installed. The heat treatment is also crucial (fully tempering or heat strengthening) as it will make the glass up to five times stronger to resist extreme wind loads and temperature differences.

Light and heat

Other major factors are light and heat. Tall buildings, because of their enormous internal heat mass, tend to need constant air conditioning, even in the colder months of the year. Air conditioning is a skyscraper's single biggest energy cost. Megatall buildings present a unique challenge: not only do they have high internal heat mass, but a very large proportion of their overall size is high above their neighbours, so there's nothing to block the sun. Also, most of them tend to be in desert regions of the Middle East, Africa and South East Asia. To complicate matters further, the skin of megatall buildings is now almost entirely glass, with a premium placed on tall and wide glass panes to offer maximum unobstructed views. The challenge is, these larger glass panes must be extremely strong to withstand the high wind forces, and must be designed in such a way to compensate for the huge amount of light they let in to the building in order to enhance the wellbeing and comfort of the building's occupants.

The surroundings of a building – and, in the case of the Burj Khalifa and the Jeddah Tower, the local desert climate – are important factors to consider. The surrounding areas of megatall buildings such as the hills and other buildings, actually absorb much of the intense heat during the day but continue to radiate or emit this heat to their surroundings through the night. Low-emissivity (low-E) glass helps to reflect this long wave radiation and minimise its transmission.

Condensation

The local climate in these hot, humid, desert regions – with daytime temperatures reaching as high as 50°C – pose real challenges for the glass in terms of both stress and deflection, but also potential condensation issues.

With megatall buildings, there is always a risk that condensation may appear on the external glass pane (outside). This is due to the temperature difference between the outside of the building (which is very hot and humid during the summer) and the inside temperature (air conditioning). Using a low-emissivity glass as the internal pane may help to prevent the cold transferring from the inside of the building to the outside glass pane, while heat treatment (fully tempering or heat strengthening) will make the glass up to five times stronger to resist extreme wind loads and temperature differences.

Altitude difference

The altitude difference between the top and the bottom of a megatall building – and the temperature difference linked to this – can cause glass deflection issues on the insulating glass unit due to the pressure difference.

On the Burj Khalifa project, there was even the challenge of the temperature difference between the production and installation temperatures of the IGUs,

GUARDIAN GLASS

Guardian Glass, a major business unit of Guardian Industries, is one of the world's largest manufacturers of float, coated and fabricated glass products. At its 25 float plants around the globe, Guardian Glass produces high performance glass for use in exterior (both commercial and residential) and interior architectural applications, as well as transportation and technical products. Guardian glass can be found in homes, offices, cars and some of the world's most iconic architectural landmarks. The Guardian Glass Science & Technology Center continuously works to create new glass products and solutions using the most advanced technology to help customers *SEE WHAT'S POSSIBLE®*.

Guardian Industries, a global company headquartered in Auburn Hills, Michigan, employs around 18,000 people and operates facilities throughout North America, Europe, South America, Africa, the Middle East and Asia. Guardian companies manufacture high-performance float, coated and fabricated glass products for architectural, residential, interior, transportation and technical glass application and high-quality chrome-plated and painted plastic components for the automotive and commercial truck industries. Guardian Glass' vision is to create value for its customers and society through constant innovation using fewer resources. Guardian is a wholly owned subsidiary of Koch Industries, Inc.

La Casa del Desierto_courtesy of Guardian Glass, LLC, ©Gonzalo Botet (3)

La Casa del Desierto_courtesy of Guardian Glass, LLC, ©Gonzalo Botet (2)

La Casa del Desierto_ courtesy of Guardian Glass, LLC, ©Gonzalo Botet

which were manufactured in January with a temperature of 26°C, and then installed on site in Dubai in August when the temperature was 48°C. The calculations of stress and deflection of the IGUs enabled technical experts at Guardian Glass to help define the right glass thicknesses to suit different glass installation heights up and down the building.

THE NEXT STEP

"today, tomorrow and beyond", is Guardian Glass' slogan for this year's glasstec, and the company will be present in Hall 10, Stand 24, to show visitors just what this means.

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