



MEDIA RELEASE

A Close-up Look at Jewel Changi Airport's Façade Installation

Iconic glass and steel façade in the final stage of completion

SINGAPORE, 18 April 2018 – Visitors travelling along Airport Boulevard will notice the gradual formation of Jewel Changi Airport's (Jewel) iconic infrastructure as work on its distinctive glass and steel façade enters the last lap towards completion.

The entire Jewel facade is made up of more than 9,000 pieces of specially manufactured glass, close to 18,000 pieces of steel beams and over 6,000 steel nodes. The complexity of the façade installation is due in part to the sheer number of components, as well as the custom-made glass panels and steel nodes, with no single piece having the same dimensions and specifications. The entire façade will weigh more than 6,000 tonnes.

Given the unique measurements of each glass panel, the installation process warrants precise coordination to ensure that each panel is fitted into the correct 'grid' placement that it is planned for. Meticulous execution is also required as the glass panels are transported from the ground level to the top of the façade for the roof installation. Please refer to the Annex for more information about the façade installation.

To date, 75% of the overall construction has been completed and Jewel is on-track to open in 2019.

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About Jewel Changi Airport Trustee (www.jewelchangiairport.com)

Jewel Changi Airport (Jewel) is a joint venture between Changi Airport Group (CAG), manager of Singapore Changi Airport, and CapitaLand, one of Asia's largest real estate companies. The Jewel complex is currently being constructed and is expected to open in 2019. Located in front of Changi Airport's Terminal 1, Jewel will be a world-class lifestyle destination in Singapore, enhancing Changi's appeal as a premier air hub.

Designed by world renowned architect Moshe Safdie, Jewel will feature a distinctive dome-shaped facade made of glass and steel, making it an iconic landmark in the airport's landscape. At approximately 134,000 sqm in size, it will offer a range of facilities including airport services, indoor gardens and leisure attractions, retail and dining offerings as well as a hotel, all under one roof.

Jewel Changi Airport is owned by Jewel Changi Airport Trust (Trust). Jewel Changi Airport Trustee Pte. Ltd. is the trustee-manager of the Trust, while Jewel Changi Airport Devt Pte. Ltd. is the development and property manager of Jewel. CAG is the majority 51% unitholder and shareholder of the Trust and the two joint venture companies, while CapitaLand owns the remaining 49%.

Backgrounder: About Jewel Changi Airport's façade

A. Facts and Figures

Total area	23,410 square metres (sqm) (Approximately the size of six football fields)
Weight	More than 6,000 tonnes (Equivalent to the weight of 10 Airbus A380 planes)
Façade components	The façade is made up of: <ul style="list-style-type: none"> • More than 9,000 pieces of specially-manufactured glass panels; • About 18,000 pieces of steel beams; • Over 6,000 steel nodes (pieces that encase the junction of the steels beams and glass panels)
No. of supporting structures	The façade is supported by a ring of 14 x 12metre (m) tall tree-like columns and a ring beam at the edge of the roof. This allows the 5-storey high Forest Valley and the Canopy Park, a 14,000sqm park at the building's top floor, to be column free, offering a truly memorable experience.

B. About the glass panels

- Each piece of glass is unique in size to create the necessary shape and structural support of Jewel's iconic façade. In addition, each piece of glass is custom-made to fit into a specific grid based on the functional design of the façade.

Material	The glass panels are made of high-performance, triple Low-E architectural glass with the dual ability to: <ul style="list-style-type: none"> • Transmit light to enable the vast landscaping in Jewel to thrive; • Reduce heat to ensure sustainable cooling of the complex's interior.
Weight	Between 250 kilograms (kg) and 300kg (per piece of glass)

- The specifications of the glass panels are carefully considered given Jewel's unique location within the Changi Airport aerodrome.
- To ensure that noise levels of the aircraft are kept to a minimum in the building, the glass panels are designed to have an air gap of 16 millimetres (mm) to serve as insulation against the noise emitted.
- A series of tests and research was also conducted to ascertain that the glare emitted off Jewel's surface will not interfere with the daily operations of the air traffic controllers (since Changi Airport's air traffic control tower is situated right next to Jewel).

- The entire study, engineering and shortlisting of the glass material, took two years to complete.

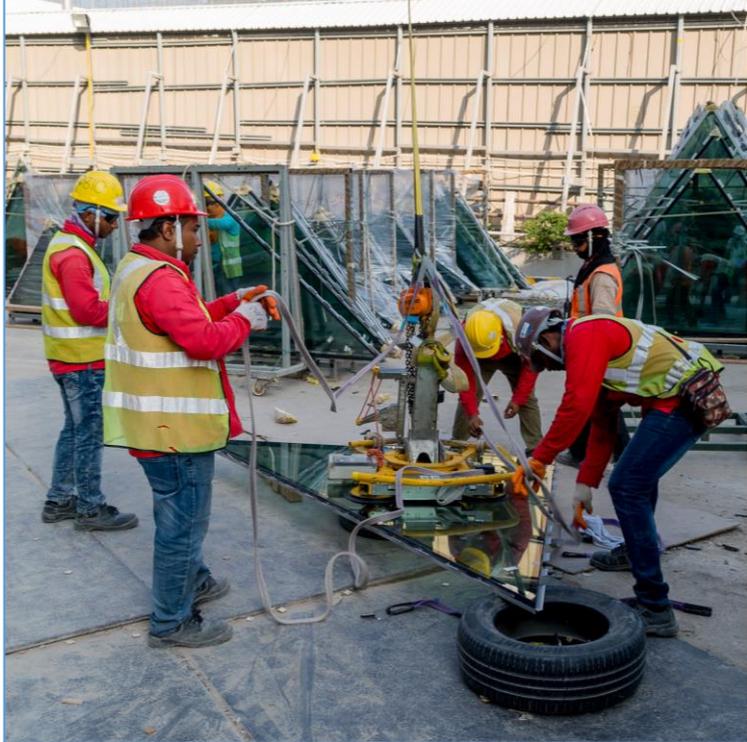
C. About the steel nodes & steel beams

- Every piece of steel node is unique and they are custom-made in Germany.
- The nodes are manufactured using the Computer-Aided Design and Manufacturing (CAD/CAM) applications from steel bars to achieve the highest level of accuracy and prevent distortion caused by welding during installation.
- This customised and computerised production method in turn enables a simplified fabrication of the steel beams such that they collectively come together to attain an overall geometry of the grid shell dome.

D. Glass installation process of Jewel's roof

- The complexity of the roof installation is a feat of its own. Given the unique dimensions of each glass panel, the façade installation warrants precise coordination to ensure that each panel is fitted into the 'grid' that it is designed for.
- It also requires meticulous execution as the panels are transferred from the ground level to the top of Jewel's facade.
- The process started from the oculus (opening of the Rain Vortex in the roof) outwards, towards the edge of the Gateway Gardens and the installation is done in parts.
- The complex installation will require more than a year to complete. It started in end 2016 and is estimated to be completed by mid 2018.

E. A pictorial depiction of the glass installation process

Step	Details	
1	 A photograph showing several construction workers in safety gear (hard hats, high-visibility vests, and gloves) working on a construction site. They are gathered around a large glass panel that is being prepared on a metal frame. One worker in the foreground is wearing a red shirt and a yellow high-visibility vest, looking towards the glass panel. Another worker in a yellow vest and red shirt is leaning over the frame, possibly adjusting something. The background shows a concrete structure under construction with green safety netting.	The glass panel is inspected at the ground level of the construction site, and prepped prior to the actual hoisting.
2	 A photograph showing construction workers in safety gear using a hydraulic pump to lift a large glass panel. The pump is mounted on a metal frame, and a yellow hose is connected to it. The workers are gathered around the pump and the glass panel, which is being lifted from the ground. One worker in the foreground is wearing a red shirt and a yellow high-visibility vest, looking towards the pump. Another worker in a yellow vest and red shirt is leaning over the frame, possibly adjusting something. The background shows a concrete structure under construction with green safety netting.	A hydraulic pump (with a capacity of approximately 800kg), is installed to lift one piece of glass panel (average weight of around 250kg – 300kg). Belts are also fastened around the glass panel as an additional safety measure.

Step	Details	
3		<p>Right before the lifting, a supervisor scans the QR code on the glass panel to verify the exact installation spot on the façade.</p>
4		<p>The glass panel is lifted to a high of 45m for the installation of the roof.</p>

Step	Details	
5		<p>A group of three to four abseillers (or 'spidermen') stationed on the roof will receive the glass panel and fix it on the exact spot for installation.</p>
6		<p>Once the glass is in position, the abseillers will secure the panel by drilling it into the grid before applying sealant around the edges of the glass to complete the installation process.</p>