BUILDING A DOWNTOWN LINE TRAIN

THE STRAITS TIMES visits Bombardier's manufacturing facility in Changchun, China for an inside look at how the Downtown Line trains are put together.

FACTS & FIGURES

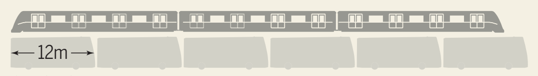
4 to 5 years
Time needed for a new train to be ready for service after the contract is awarded

This includes:
- **18-month** design phase
- **12 months** to procure key components
- **18-month** testing phase

Series production of the train cars will begin after designs are finalised and key tests are completed.

6 months
Approximate time needed to build a single train car

70.1m Total train length across three carriages



Six SBS double-decker buses lined up end to end

Design life
(with 130,000km per year)
30 years

CAR BODY PRODUCTION (2 MONTHS)

The train's body (side walls, roof, flooring, front and rear walls) is put together in several stages.

- First, robotic arms are used to weld aluminium panels for the flooring and roof together (below).

- High-tech cutters are used to remove excess material, cut windows and doors on the aluminium panels.
- After the side walls and flooring are welded together, a crane is used to drop the train's roof in position (below).

- After the car body is welded together, staff take optical measurements to ensure the train's dimensions are accurate.
- The completed car body will be painted before it is sent to another facility for assembly.

Source: LTA

TRAIN ASSEMBLY (2 MONTHS)

Stage zero (Pre-assembly)

- Staff put together various components such as high-voltage cables, battery boxes, wiring ducts and bogies (below and inset).
- These components will be installed on the train during the assembly.

Stage 1

- Insulation that prevents warm air in the tunnels from heating up the train is installed.
- Windows are set in the window frames (above), while a machine is used to seal gaps in the flooring.
- Air ducts and cable ducts are also installed (right).

Stage 2

- Passenger doors are fixed in place, as well as a detrainment door (below) that passengers can use to evacuate the train.

- Pneumatic systems, that aid in the braking of the train, are also installed.

Stage 3

The interior walls are installed, along with the air-conditioning unit above the train.

Stage 4

The ceiling and lighting are installed. The coupler to link trains up and the gangway between train carriages are also fixed (below).

Stage 5

Passenger seats, glass partitions and grab poles are installed.

Stage 6

Bogies, or frames carrying wheels, are installed beneath the carriage (below). Various labels like reserved seating are put up.

TRAIN TESTING (2 MONTHS)

- A completed train car will undergo static tests for its lighting, air-conditioning and other functions. Later on, one entire train (comprising three cars) will be tested on a 3km test track (below).
- Other contractors providing signalling, communications and platform screen doors for the Downtown Line are brought in for integrated tests. The new train has to run smoothly with these different systems as well.

TEXT: ROYSTON SIM PHOTOS: LIANHE ZAOBAO GRAPHICS: LIM YONG

Stage 1 is almost ready to roll

SBS Transit stepping up its systems tests, staff training ahead of Dec 22 launch day

By ROYSTON SIM

IT IS almost all systems go for the first stage of the new Downtown Line (DTL), which opens next month, as operator SBS Transit ramps up last-minute tests and training.

It is conducting several exercises to test its emergency plans and responses, as well as putting its staff through the paces in engineering, traffic control, train and station operations.

More than 400 people have been recruited for Downtown Line Stage One (DTL1), which has six stations: Chinatown, Telok Ayer, Downtown, Bayfront, Promenade and Bugis.

"Intensive preparations to get the line ready for passenger service are ongoing," said SBS Transit spokesman Tammy Tan of the Dec 22 opening.

The operator received eight new trains from the Land Transport Authority (LTA) in September for the 4.3km DTL1. Another 80 have been ordered for the entire Downtown Line project at a cost of $690.2 million.

Built in China by the Changchun Bombardier Railway Vehicles Company (CBRC) – a joint venture between Bombardier and CNR Changchun Railway Vehicle Co – the three-car trains feature standing "perch seats" and rubber strips at doors to reduce the platform gap from 75mm to 40mm.

LTA senior group director for rail Sim Wee Meng said the DTL trains are designed with the commuter in mind. For instance, the propulsion and brakes are designed to prevent sudden jerks so commuters have a more comfortable ride.

As with previous trains, the DTL trains also come with a host of safety features such as detrainment doors, underfloor fire barriers and back-up batteries that provide emergency ventilation and lighting for one hour. Said Mr Sim: "The safety of the trains is of highest priority to LTA."

The Downtown Line will not be the first to use China-made trains. Some 22 trains built by Japan's Kawasaki and China's CSR Qingdao Sifang Co are already running on the North-South and East-West lines, while new trains for the North-East and Circle lines are being built in Shanghai by French firm Alstom.

Stringent checks are done at each stage by quality assurance teams. Building a new train is a complex, lengthy process. Design work for the DTL trains at Bombardier's engineering centre in Hennigsdorf, Germany, lasted 18 months.

Key components like brake systems are procured from European countries, a process that takes up to 12 months. The first two trains that were assembled underwent an 18-month test phase – three months longer than North-East and Circle Line trains. A 3km track was built at the CBRC site for the tests.

Mr Sim said the additional three months allow more comprehensive tests so major issues can be resolved before the trains reach Singapore.

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