Safety Considerations for the Design of Mobile Elevating Gangways and Passenger Boarding Bridges for Cruise Ships

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It Used to Be So Easy...
Half a Century Ago
Port of New Orleans, LA 2000
Gangway Safety and Design

- FMT of Trelleborg, Sweden is one of the world’s leading designers and manufacturers of safe Mobile Elevating Gangways and Passenger Boarding Bridges
Safety

I will discuss the parameters for the design of safe Mobile Elevating Gangways and Passenger Boarding Bridges including the all important aspect of avoiding passenger and crew injuries.
Design

A number of factors have to be considered for the proper design:

- Environmental impact
- Wind – loads
- Local Geometric and fender line
- Tidal Fluctuations and passing ship traffic
- Present and future Cruise Ships to be served
Parameters for Safe Design

- Structural design and codes
- Gangway control systems
- Correct Calculations of the interaction of the movement between Cruise Ship-Gangway/Bridge
Codes, Regulations & Legislation

- ADA (Americans with Disabilities Act)
- NFPA 415/417 (National Fire Protection Agency)
- UL (Underwriters’ Laboratory)
- SAE & ASME
- ASCE
- AISC
- EN 25817
- EN 287
Structural Calculations

- Once the safety parameters of the design have been met, the structural calculations are made in compliance with relevant standards.
- To make sure that the structural design is correct, all calculations are checked by an independent party.
Operation

The Mobile Gangways/Boarding Bridges controls are designed for safe operation either by an operator’s panel, conveniently located at the Transition Ramp (ship side) – or alternatively by wireless control from the Ships Bridge.
Automatic Systems

- A UPS system will automatically engage in the event of loss of mains power.
- A Back-up drive system will ensure safe operation of the Gangway in the event of loss of the main system.
Automatic Functions

- A modern Gangway/Bridge is computer controlled and does not require any human action for adjustments due to Ship movements caused by tidal variations.
- When the movements of the ship exceed preset ranges an alarm will sound and the Gangway/Bridge will be disengaged or disabled for further passenger movements.
Sensors

- Modern Gangways/Bridges are fitted with an array of sensors of various kinds, such as: absolute encoders, lasers, infrared and ultrasonic sensors, angle decoders, analogue length sensors and digital limit sensors, all to ensure safety.
On-line Monitoring

- Mobile Elevating Gangways and Passenger Boarding Bridges are connected via modem for trouble shooting, diagnostics, and software changes all to ensure safety.

- Automatic, system generated e-mail notification of operational deviations.
If the service envelope of the Gangway requires multiple service positions, a continuous and seamless opening in the Terminal can be provided by the installation of a three-rail sliding door system.
Interface Gangway/Bridge – Cruise Ship

- Detailed design work is necessary to arrive at an optimal solution of the Transition Ramp
- Key considerations include design of fenders/camels – location and size of ship doors – size and position of lifeboats/life rafts or emergency escape slides as well as all other obstructing elements
Structural Integrity of Quay (Apron)

- It is of great importance for the safe operation that the quay (apron) can take the calculated live load of the Gangway/Bridge.
- In some instances special concrete tracks can be used to secure the foundation for the Gangway/Bridge.
Slope of Gangway/Bridge Tunnels and Walkways

The maximum allowable slopes and lengths of Gangway/Bridge Tunnels and Walkways are regulated by ADA (Americans with Disability Act)

All FMT designs are in strict compliance with ADA
Main Drive Systems

- The main drive system shall be electro-hydraulic to be able to instantly react to movements.
- The hydraulic cylinders shall be fed by several hydraulic pumps to guarantee 100% operation.
- Hydraulic lift cylinders shall be designed in compliance with Det Norske Veritas (DNV) standards.
Modern Gangways/Bridges are to a great extent designed with Glass Walls to create a more passenger friendly environment. Glass Walls, typically 6 mm (1/4”) hardened float glass (BS 6206 Class A) shall be used. Glass Walls must be able to withstand wind loads of hurricane level winds (146 mph)
Maintenance

All machinery requires periodic maintenance to ensure safe operation. By using only the best materials and components, together with intelligent design and maintenance training, the level of maintenance is reduced.
Implications

Safe and intelligent design, operational reliability together with low cost for maintenance are vital guidelines for the procurement of Gangways/Passenger Boarding Bridges.
Port of New Orleans, LA
Julia I – The Largest FMT Installation in the USA
FMT Mobile Passenger Gangways

“Falcon I” at Black Falcon Cruise Terminal, South Boston, MA – March 2002

Gangway to serve Mezzanine and Balcony levels – ADA compliant handrails throughout
FMT Mobile Passenger Gangways

“Falcon I” at Black Falcon Cruise Terminal, South Boston, MA – March 2002

Gangway to serve Mezzanine and Balcony levels – ADA compliant handrails throughout
FMT Mobile Passenger Gangways

“Cabrillo” at Port of San Diego, CA
B Pier Cruise Ship Terminal – October 2002

ADA compliant handrails throughout and in Transition Ramp
FMT Mobile Passenger Gangways

“Cabrillo” at Port of San Diego, CA
B Pier Cruise Ship Terminal – October 2002

ADA compliant handrails throughout
FMT Mobile Passenger Gangways

“Eagle I” at Channelside Terminal 3, Tampa
Port Authority, Tampa, FL – March 2002

Gangway to serve Mezzanine and Balcony
levels – ADA compliant handrails throughout
FMT Mobile Passenger Gangways

“Eagle I” at Channelside Terminal 3, Tampa Port Authority, Tampa, FL – March 2002

ADA compliant handrails throughout
FMT Passenger Loading Bridge

“Notus” at Port Everglades, FL – December 2003

FMT Mobile Telescopic Passenger Bridge
ADA compliant handrails throughout
Thank you for your attention

- **FMT** has a proven history of consistently meeting and exceeding the discussed minimum requirements for safe Gangways/ Passenger Boarding Bridges

- **FMT** has all the expertise and an unblemished safety record