World's First Barrier-Free Passenger Boarding Bridge

YASUAKI SHIMIZU
KATSUMI TOTTORI
TOSHIRO FUSHIYA
KENJI IWAMOTO
AKIRA TAKARADA
YUKIO OKAHIRA

1. Introduction

The passenger boarding bridge (PBB) connecting an airport building to an aircraft extends using the telescopic movement of its inner and outer tunnels to allow passengers to board or deplane. The difference in level between the inner and outer tunnels presents a barrier to passenger mobility that has heretofore not been resolved. We have developed the world's first PBB that permits safe boarding and deplaning of all passengers by completely eliminating the difference in the tunnel levels. The new PBB will be used in the new international passenger terminal at Haneda Airport, with delivery scheduled for July 2010.

2. Structure comparison of conventional and barrier-free PBBs

The PBBs currently used all over the world have an inner and outer tunnel corridor that slide together like a telescope. A ramp is used for a smooth transition between the levels of the two sections, but the slope of this ramp poses a mobility obstacle for some passengers and cannot be eliminated. The world's first commercial barrier-free PBB avoids this obstacle by using a completely new structure to make the inner and outer corridor floors at the same level, an accomplishment that has been considered impossible up to now. In addition, the side grooves for rainwater on the both sides of the outer tunnel, always a hindrance to passengers, have been completely removed. This completely barrier-free PBB has greatly improved the safety of passengers deplaning from or boarding an aircraft.

(1) The PBB uses a skid conveyer structure to provide a moving walkway that eliminates the difference in levels between the inner and outer tunnels (**Figure 1**).

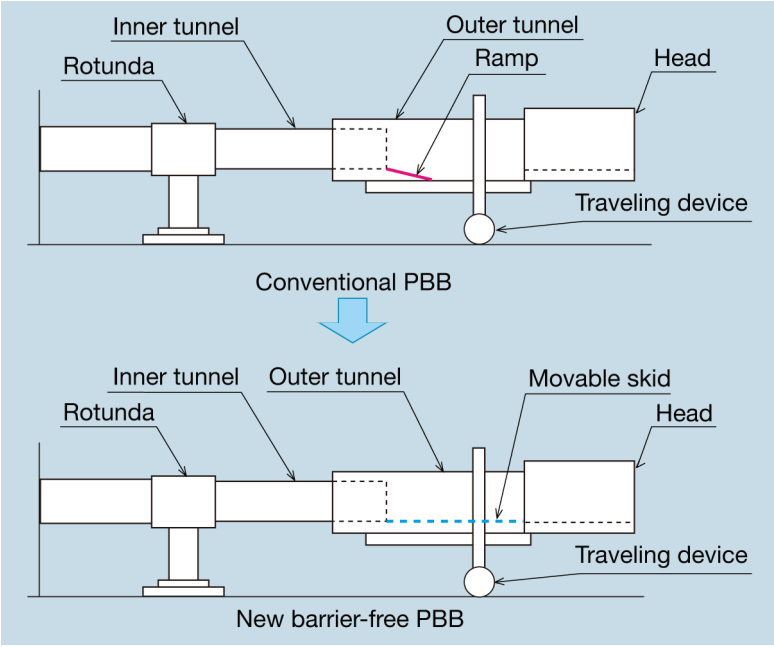

Figure 1
Overall configuration of the barrier-free PBB, its device names and its construction drawing

(2) The side grooves for rainwater on both sides have been removed to provide a larger interior space (**Figure 2**).

Figure 2 Tunnels and floor plate connection
A neat barrier-free space results from the elimination of the ramp and the side grooves for rainwater.

3. Development approach

3.1 Test unit verification

We manufactured a skid floor surface of the size of an actual PBB, and conducted verification tests for the major performance criteria (**Figure 3**), which included skid rigidity, vibration/noise, walking sensation, and maintainability.

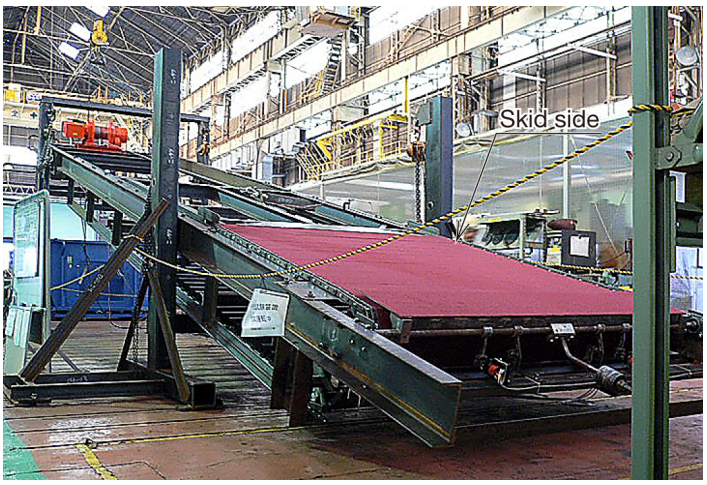

Figure 3
Manufacturing and testing of full-sized PBB prototype after determining the basic configuration

3.2 Prototype testing

The new product (**Figure 4**) was rolled out after a long evaluation of the following criteria: walking sensation on the skid, operability/maneuverability, wear of various parts, behavior in emergency situations such as loss of electrical power, and maintainability.

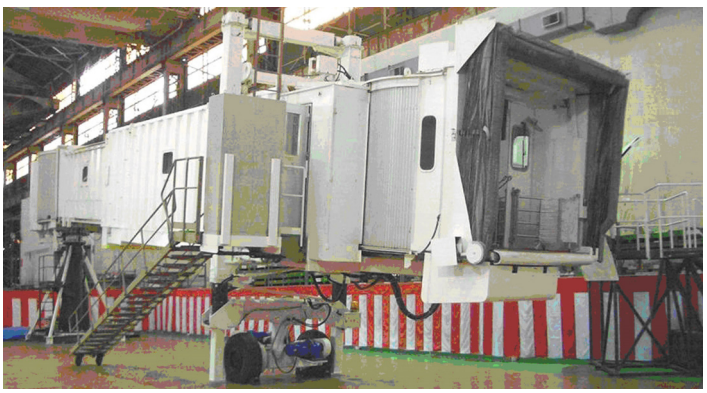

Figure 4
Prototype testing

4. Future business promotion

(1) The reason why we were able to accept the first order less than a year after the start of development is because the product was developed without requiring any redesign since our customers were involved in reviewing the preliminary concepts as they emerged.

(2) While the main business of our company is the after-sales service of transportation systems of Mitsubishi Heavy Industries, Ltd. in domestic and overseas markets, we have formed an organization for transportation devices such as the PBB to address the complete range of activities from design and manufacturing to sales and after-sales service to deal rapidly with market needs.

(3) We will promote further sales of the barrier-free PBB to the domestic and overseas markets based on our experience with the initial order. We are also responsible for the operation and maintenance activities of other transportation systems that Mitsubishi Heavy Industries has already delivered to major airports worldwide, and will actively pursue overseas markets building on our experience with this new barrier-free PBB.

Authors

Yasuaki Shimizu
Chief Engineer
Mitsubishi Heavy Industries
Transportation Equipment
Engineering & Service Co., Ltd.

Katsumi Tottori
President
Mitsubishi Heavy Industries
Transportation Equipment
Engineering & Service Co., Ltd.

Toshiro Fushiya
Member of the Board
Mitsubishi Heavy Industries
Transportation Equipment
Engineering & Service Co., Ltd.

Kenji Iwamoto
Deputy General Manager,
Engineering Department,
Mitsubishi Heavy Industries
Transportation Equipment
Engineering & Service Co., Ltd.

Akira Takarada
Manager,
Engineering Department,
Mitsubishi Heavy Industries
Transportation Equipment
Engineering & Service Co., Ltd.

Yukio Okahira
Manager,
Engineering Department,
Mitsubishi Heavy Industries
Transportation Equipment
Engineering & Service Co., Ltd.