



Aircraft Signature Turntable

Initial Contract Sum: \$1,575,933

Date for Completion: 31 August 2005

End Contract Sum: \$1,575,933

Date of Actual Completion: 9 September 2005

Description: The project involved the design and construction of a 14m diameter turntable to support and rotate aircraft and military vehicles to facilitate the capture of the unique radar "signature" of the subject.

Key performance criteria specified in the Functional Design Brief include:-

- o The turntable shall achieve any nominated position with an accuracy of 0.5 degrees.
- o The position of the turntable shall be indicated with an accuracy of 0.1 degrees

Number of Variations and Extensions of Time:

VO's - 1
EOT's -1

Details of Claims Over \$50,000.00 (made by either party):

Nil

Value Added:

Bardavcol initiatives provided the following value-added features to the project for the client:-

- i. The turntable can accommodate aircraft loadings up to over three times the specified maximum mass.
- ii. This provided future capacity to accommodate the Boeing 737 Wedgetail platform without a separate jockey-wheel, providing greater safety and ease of use for operators.
- iii. The turntable can accommodate aircraft and other test subjects some 50% larger than the maximum specified wheelbase.
- iv. The turntable position can be located and measured to an accuracy up to 10 times greater than that specified in the Functional Design Brief

Problem Solving

Wind load design validation

- i. The turntable had to be able to accommodate testing integrity in winds up to 20kph, and structural integrity in winds up to 60kph. Because wind load depends on the side elevation of the test subject, the critical load does not necessarily coincide with the heaviest test subject.
- ii. To validate that structural and mechanical design was appropriate for the design wind loadings, Bardavcol undertook proof load testing after installation:-
- iii. This involved design of temporary fittings and test apparatus to apply a load to simulate wind load applied from test subject aircraft. The critical condition was identified to be the stability of the motor brake under load equivalent to an ambient wind of 60kph.
- iv. During the proof test a load was applied in excess of the critical load, and the motor support assembly failed. During the subsequent investigation it was found that the test load had been miscalculated.



- v. The positive consequences of this test were that an inherent design weakness in the drive train was discovered, leading to an improved design involving the incorporation of a simple shear key so that any in-service overloading would not result in catastrophic failure. Several other refinements were incorporated, together with associated procedural measures, to ensure that the facility would remain safe even if overloaded in service.

Entry stairs

A further technical challenge involved the accommodation of an alternative stair design which, to fit within the available geometric constraints, which did not satisfy the Defence Manual of Fire Protection Engineering, insofar as it did not comply with all aspects of AS1657-1992 clause 4.3.1. This required a special application for dispensation from Building Code of Australia requirements pursuant to Chapter 26 of the MFPE, which was approved.

Turntable edge seal:

A key requirement was to prevent the ingress of water and vermin to the sub-floor levels of the turntable, yet allow free rotation of the turntable. A variety of solutions were considered and assessed by Bardavcol and their design consultants. Rubber seals were considered to be a risk due to wear, exposure and dimensional stability with rotation of the turntable. Bardavcol adapted a solution from the trucking industry, using a continuous brush system under the edge of the turntable. This is sufficiently solid to prevent ingress of dust and vermin, but still provide unrestrained movement of the turntable. A separate gutter system was installed under the turntable to collect and remove any water penetrating the brush barrier.

Innovations:

Alternative Slew Ring

- i. The key innovation which led to the value-adding was the identification, assessment and procurement of an alternative slew ring by Bardavcol.
- ii. The concept design did not cater efficiently for the Boeing 737 Wedgetail which has a much longer wheelbase. A separate flying bridge and jockey wheel was required to accommodate the 737. Bardavcol's innovation involved identification and procurement of a larger slew ring, allowing a larger diameter turntable and greater load capacity, which was able to accommodate the 737 entirely on the turntable without any need for the jockey wheel assembly.
- iii. In consequence of this innovation
- iv. The alternative slew ring provided enhanced load capacity
- v. The alternative slew ring provided enhanced geometric capacity
- vi. The alternative slew ring provided enhanced value for money for the client
- vii. The alternative slew ring enabled a much shorter construction duration than would otherwise have been possible if a specific slew ring had to be manufactured

Turntable Positioning Monitoring and Control

- i. The combination of the alternative slew ring, together with clever design of the drive train and control system achieved outcomes exceeding the Functional Design Brief.
- ii. Following construction and installation of the turntable, drive train and control system, Bardavcol undertook commissioning of the turntable and associated systems. This involved, inter alia, conducting a series of measurements to reconcile the actual turntable position with the position indicated by the control system. The facility was found to exceed the specified performance criteria by a factor of about 10 times.

Relevant Roles:

Peter Miller, our General Manager had extensive involvement in this project.

Referee:

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