Adelaide Oval Western Grandstand Redevelopment, 13 October 2011

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LSAA 2011 Conference

The Collaborative Design of the Adelaide Oval Diagrid Roof

Garth Rowland - Aurecon

Agenda

Client Requirements and the Project

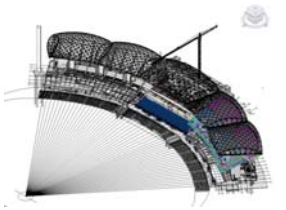
Engineering Design Features

- Diagrid roof

The Collaborative Process for the Diagrid Roof

- Concept Design and Project Brief
- Schematic Design
- Subcontractor Procurement
- Design Development
- Fabrication, Erection and Transportation
- Construction
- Summary and Lessons Learned

Q&A



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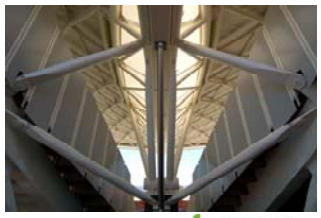
Project Credits

Project Client	South Australian Cricket Association (SACA)
Project Manager	Mortimer Project Management (now Mott MacDonald MPM)
Project Architect	HASSELL + Cox
Structural Engineer	Aurecon (including roof temporary works)
Other Consultants	Aurecon (Structural, Civil, Electrical, Mechanical, Hydraulics, Fire Protection, Egress, Wind, Sports Lighting, Security, Acoustics and Audiovisual)
Building Contractor	Built Environs
Cost Consultant	Rider Levett Bucknall
Steel Subcontractor	Samaras



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Client requirements and the project

- An iconic grandstand
- 14,000 seats (ground capacity up to 35,000)
- Retention of heritage
- Improved amenity
- Safe facilities
- Cost effective design
- Improved lighting
- Ground operational throughout the construction
- Complete for the 2010-11 Ashes test match

…and for the roof particularly

- Iconic world class roof design.
- Improving patron amenity by improving the roof coverage
- Pavilion style treatment for Giffen Stand
- Column free unobstructed views
- Minimum material usage

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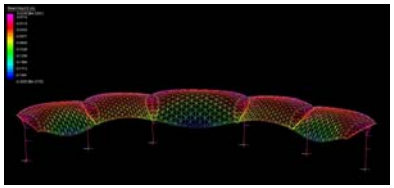
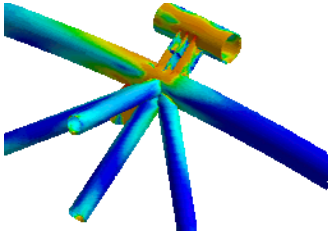
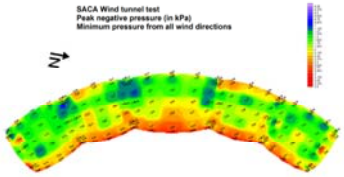
Engineering Design Features – Diagrid Roof

- 219CHS diagrid spanning up to 55m between 355CHS trusses cantilever 30m
- Iconic Form – Engineering as Architecture
- An efficient structural system
- Finite Element Design and Buckling Analyses
- 3D modelling
- Wind tunnel testing
- Staging, Temporary Works and Early Contractor Involvement
- 480t steel at 55kg/m^2
- An innovative iconic solution







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Concept Design and Project Brief

- Iconic Form – Engineering as Architecture
- Design evolution with engineering as a focus
- Understand the brief – know your client and the architect

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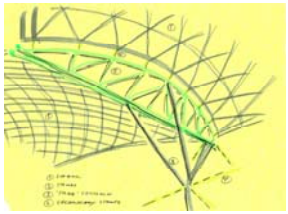
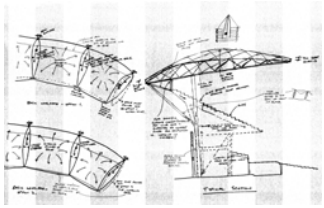
Schematic Design

- Option studies
  - Factors for consideration:
    - Cost
    - Programme
    - Aesthetic appeal
    - Material use
    - Iconic status
    - Constructability
    - Fabrication and transportation
    - Procurement





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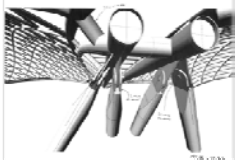
Subcontractor Procurement

- Early Contractor Involvement – Procurement Process
  - Select suitable steelwork subcontractors
  - Seek expressions of interest outlining capability, experience, approach
  - Receive EoI and interview
  - Subcontractors shortlisted for tender submission based on the 50% design documents
  - Subcontractor tender presentation
  - Select preferred subcontractor and appoint based on
    - Contract
    - 50% schematic drawings and specifications
    - Schedule of Rates
  - Commence work



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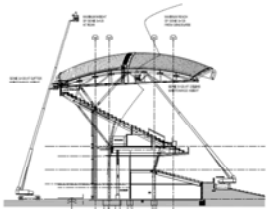
Design Development

- ECI in the collaborative project team
  - Safety in Design
  - 3D modelling and shop detailing – master project model for interface with other trades
  - Temporary works, fabrication, tolerance, transportation and erection advice
  - …..all concurrent with design completion – time savings and design efficiency



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Fabrication, Erection and Transportation

- ECI advice for transportation, erection, erection etc
- Fabrication commenced before design complete
- Trial assemblies undertaken
- Close liaison of design team with contractors
- Coordinated approach
- Liaison and coordination with other subcontract trades – PTFE, services, cladding

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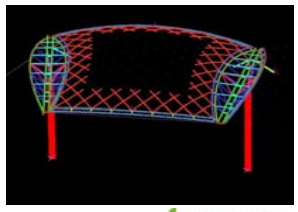
Construction

- Regular attendance at site
- Witness points for primary lifts
- Flexibility in construction sequence
- Involvement in temporary works a platform to facilitate construction and design interfaces



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Summary and Lessons Learned

- Collaboration is becoming more and more a part of every project
- Collaboration and ECI is an essential part of lightweight structure designs
- Western Grandstand success due in part to collaborative approach

- What have we learned
  - ECI even earlier would be beneficial – more time
  - Streamline process for preferred subcontractor
  - 3D modeling / Revit / BIM support collaboration
  - Need to break ‘traditional’ us versus them approaches and work outside comfort zones
  - Stronger pre-tender assessment against Schedule of Rates
  - Contract and Schedule of Rates needed to be clearer and more mechanisms to support philosophy
  - Consider additional subcontracts for similar ECI process

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