AS/NZS 5131 AND THE NEW NATIONAL STRUCTURAL STEELWORK SPECIFICATION TOOLS FOR RISK MINIMISED PROCUREMENT OUTCOMES

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Outline:

- Introduction
- ‘Setting the scene’ – why you need to mitigate risk
- Compliance and risk exposure
- Standards perspective
- The new AS/NZS 5131
- ASI implementation support
- NSSS – the National Structural Steelwork Specification
- NSSCS – National Structural Steelwork Compliance Scheme
- Update – new Non-conforming building product laws
• Our WTO obligations open the door to international trade

• But... who polices that door, and how and when?

• It worked for Australian sourced product because we have a legal system

• Legal measures are not easy internationally...

Construction product compliance is not trivial!
Non-compliance is across all construction products:

The replacement of sub-standard glass at the 150 Collins St building project is estimated to cost $18 million, the CFMEU said today. Grocon has revealed today it has to replace half the glass in the $180 million building. The glass came from Chinese supplier, China Southern Glass.”
Why you need to mitigate risk

**FRAUD:**
- 'Silastic' welds!
- Water-filled members!

**MATERIALS:**
- Pressure vessel cracking
- Bolt failures
- Material cracking
- Poor galvanising results
- Boron 'spiking'

**WORKMANSHIP:**
- Poor welding
- Poor workmanship
- Poor painting
- Weld cracking

Note revision to AS/NZS 1252!
Sixteen hundred tonnes of steel from China found too weak for four bridges

Contractors.....chose a very low bid for the steel tubes

But the test certificates for them have turned out to be wrong..

It was only after the 3rd set of steel tests that the contractors found out...

First tests done in China by steel mill and tube manufacturer

2nd test done in NZ on samples sent from China

3rd tests done in NZ on sample after steel tubes ‘ballooned’ during installation – 3rd tests failed

If you are asked anywhere in this process to ‘certify’ the steel, then your risk exposure has just ‘ballooned’!

http://www.radionz.co.nz/news/national/305313/bypass-bridge-steel-found-to-fail-tests
Why you need to mitigate risk

The pareto problems we see in the market:

1. Some overseas steel falsely represented as being produced to full compliance with Australian Standards.
2. Deliberate fraud.
3. Ignorance and substantial non compliance with Australian welding standards.
4. A lowering of standards and quality locally.
5. Lack of definition of responsibilities for critically evaluating compliance documentation and approving product.
6. Engineers infrequently contracted for site or product surveillance.
7. Use of non-prequalified fabricators by the contractor in defiance of the contract requirements.
8. Lack of transparency with NCP problems – most are hushed up.
The ‘cost’ dimensions of non-compliance

1. The cost of rework to repair or replace non-compliant product

2. The cost of a life due to faulty materials or products

3. The cost to enact increased maintenance regimes over the lifetime of the structure

4. A reduction in lifetime of the structure

5. Cost to your reputation
What is your risk exposure?

**WHS:**
- Regulatory – overarching; applies to all projects
- Your ‘duty of care’
- ‘Codes of Practice’ provide implementation guidance
- Peer accepted industry awareness is admissible in court
- ‘Ignorance is not a defence’

**NCC:**
- Regulatory – applies to commercial/residential construction
- Standards route is ‘deemed to satisfy’
- Alternative solutions are acceptable but must meet performance intent
- Performance intent is not always straightforward to apply properly

**CS:**
- A contractual/legal obligation
- Project specific

**AS:**
- Voluntary (made mandatory under regulation or contract specification)
- The ‘quality bar’ used to judge against community expectation
- The technical reference typically used by the above systems

Get it wrong => $$; PI insurance claims

Get it wrong ‘go to court’
How best to manage risk?

1. Ensure your steel materials are compliant – ACRS is an appropriate solution
2. Ensure your steelwork (fabricated steel) is compliant - the NSSCS is an appropriate solution (more on this later)
3. Ensure your specifications are current and consistent with Australian Standards
4. Ensure your client understands the importance of compliance and ‘duty of care’ under WHS (and new ‘Chain of Responsibility’ legislation)
5. Ensure the constructor understands the importance of specifically managing compliance – the ‘Compliance Management Plan’
6. Never assume – always question!
7. Most importantly – be a champion for what you believe is right!

Lots of information and tools are now available
‘Ignorance is not a defence’
What do we know?

- APCC report (http://steel.org.au/key-issues/compliance)
- Construction Products Alliance (http://productalliance.com.au/)
- ACRS (http://www.steelcertification.com/)
- Australian Welder Certification Register (http://awcr.org.au/)

All this information and available tools means industry does not have an excuse for ignorance.

‘Ignorance is not a defence’
What is ASI doing about this?

• Address compliance/value issues with structural steelwork

• Provide stakeholders cost effective solutions – **AS/NZS 5131**


• Develop implementation tools – **the NSSS**

• Work with industry – NATSPEC, Roads authorities etc
• Based on ASI ‘Structural Steelwork Fabrication and Erection Code of Practice’

• Represents international ‘good practice’

• Overlays a risk-based fit-for-purpose approach

• Overlays project specific choices

Let’s look at the overall structure...

‘Three layer model’
## AS/NZS 5131 Structure

<table>
<thead>
<tr>
<th>Section</th>
<th>1</th>
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<th>12</th>
<th>13</th>
<th>14</th>
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</thead>
<tbody>
<tr>
<td><strong>Title</strong></td>
<td>Scope</td>
<td>Referenced Standards</td>
<td>Terms &amp; Definitions</td>
<td>Specification, documentation and traceability</td>
<td>Materials</td>
<td>Preparation, assembly &amp; fabrication</td>
<td>Welding</td>
<td>Mechanical Fastening</td>
<td>Surface treatment &amp; corrosion protection</td>
<td>AESS</td>
<td>Erection</td>
<td>Geometric Tolerances</td>
<td>Inspection, testing &amp; correction</td>
<td>Site modification</td>
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<td><strong>Risk-based aspects</strong></td>
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<td></td>
<td>• Nomination of CC</td>
<td>• Extent of documentation</td>
<td>• Levels of traceability</td>
<td>• QMS scope</td>
<td>• Grade designation</td>
<td>• Level of traceability</td>
<td>• QMS scope</td>
<td>• Tracking system to support traceability</td>
<td>• Cutting, holing</td>
<td>• QMS scope</td>
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<tr>
<td><strong>Project specific aspects</strong></td>
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### ‘Good Practice’

### ‘Business as usual’
## Appendix A: AS/NZS 5131 Structure

<table>
<thead>
<tr>
<th>Appendix</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
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<tr>
<td></td>
<td>Bibliography</td>
<td>Construction Specification</td>
<td>Determination of Construction Category</td>
<td>QMS Elements</td>
<td>Content of Quality Plan</td>
<td>Geometrical tolerances</td>
<td>Slip factor test</td>
<td>Inspection of bolt tension</td>
<td>Inspection of welding &amp; bolting (NZ only)</td>
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<td>Risk-based aspects</td>
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</table>
What is the Construction Category (CC)?

A risk-based fit-for-purpose classification:

- The engineer assigns a ‘Construction Category’ (CC) – Simple!
- The engineer adjusts his specification – easy!
- The fabricator works to the processes required by the CC – good practice!

For everybody, this de-risks the process and makes life easier!
Importance Level
From NCC or AS/NZS 1170.0

Service Category
Table C1 of AS/NZS 5131

Fabrication Category
Table C2 of AS/NZS 5131

Construction Category
Table C3 of AS/NZS 5131

- From NCC for domestic/residential/commercial structures in Australia
- From AS/NZS 1170.0 for structures outside scope of NCC
- From AS/NZS 1170.0 for New Zealand

### Table C1: Suggested Criteria for Service Categories

<table>
<thead>
<tr>
<th>Categories</th>
<th>Criteria (Simplified)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC1</td>
<td>• Quasi-static actions</td>
</tr>
<tr>
<td></td>
<td>• Low seismic activity</td>
</tr>
<tr>
<td>SC2</td>
<td>• Where fatigue assessment influences design outcomes</td>
</tr>
<tr>
<td></td>
<td>• Regions of medium to high seismic activity</td>
</tr>
</tbody>
</table>

### Table C2: Suggested Criteria for Fabrication Categories

<table>
<thead>
<tr>
<th>Categories</th>
<th>Criteria (Simplified)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FC1</td>
<td>• Non welded components</td>
</tr>
<tr>
<td></td>
<td>• Welded components less than or equal to Grade 450</td>
</tr>
<tr>
<td>FC2</td>
<td>• Welded components above Grade 450</td>
</tr>
<tr>
<td></td>
<td>• Site welded safety critical components</td>
</tr>
<tr>
<td></td>
<td>• Components receiving thermic treatment during manufacturing</td>
</tr>
<tr>
<td></td>
<td>• CHS end profile cut components</td>
</tr>
</tbody>
</table>
### Assessing the Construction Category:

#### Table C3 of AS/NZS 5131:

<table>
<thead>
<tr>
<th>Importance Level</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Service Category</strong></td>
<td>SC1</td>
<td>SC2</td>
<td>SC1</td>
<td>SC2</td>
</tr>
<tr>
<td><strong>Fabrication Category</strong></td>
<td>FC1</td>
<td>CC1</td>
<td>CC2</td>
<td>CC2</td>
</tr>
<tr>
<td>FC2</td>
<td>CC2</td>
<td>CC2</td>
<td>CC2</td>
<td>CC3</td>
</tr>
</tbody>
</table>

- **Agricultural buildings, gates, handrails**
- **Commercial, residential, educational buildings not exceeding 15 storeys; small hospitals; warehouses; industrial buildings**
- **Structures with extreme consequences of structural failure; special structures (long span bridges, power stations etc)**
- **Bridges; commercial, residential, educational buildings exceeding 15 storeys; larger hospitals**

#### Potential classification of typical roads infrastructure:

<table>
<thead>
<tr>
<th>Construction Category</th>
<th>Typical roads infrastructure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>• No structures applicable</td>
</tr>
</tbody>
</table>
| 2                     | • Vehicle restraint components – low and regular performance barriers  
                         • Bus station structures – on ground  
                         • General road furniture  |
| 3                     | • Bridges conforming to AS/NZS 5100.6  
                         • Over road hardware – cantilever and overhead gantries, high mast lighting poles  
                         • Vehicle restraint components – medium, high or special purpose barriers  
                         • Bus station structures - elevated  |
| 4                     | • Project specific based on high risk and/or extreme consequences of structural failure  |

**Message:** The final categorisation will become industry accepted and only out-of-the-ordinary projects will require detailed consideration.
Stakeholder requirements:

Designers:

• Select the appropriate ‘Construction Category’ for the structure as a whole and individual assemblies where appropriate, based on the Standard and industry guidance and accepted practice.

• Ensure Specifications for the project correctly implement the AS/NZS 5131 requirements.

• Where contracted, provide support to builder/client in reviewing project compliance documentation consistent with the requirements of the Construction Category.

Distributors:

• Provide test certificates with steel supplied. Where not ACRS Certified and requested by the fabricator, provide ‘Declaration of Compliance’.

• Maintain traceability through necessary documentation (Note traceability on ancillary steel for CC3).

• If a distributor is a ‘steel processor’, then they are required to undertake some of the requirements of the certified fabricator (to maintain integrity).

An ecosystem connected by information and knowledge.
Stakeholder requirements:

Fabricator:

- Ensure processes and documentation are consistent with the Construction Category for the project or the component being fabricated/erected
- Provide necessary project specific documentation as and when needed
- Provide the Declaration of Compliance (DoC) for the products covered

Main Contractor / Builder:

- Establish clear responsibilities for meeting the requirements of the Construction Category as part of the ‘Compliance Management Plan’ for the project
- Ensure subcontractors are capable of execution to the Construction Category (check SCA website listing)
- Ensure the required compliance documentation is assembled, packaged and submitted to regulatory authorities (usually building certifier)
- Manage duty of care to WHS Act and ‘chain of responsibility’
Standards committee BD-01 created the draft AS/NZS 5131 ‘Structural Steelwork - Fabrication and erection’ based on the COP.

AS/NZS 5131 was published late 2016.

AS/NZS 5131 has been sewn into the revised AS/NZS 5100.6.

Fabricator certifications commenced 4th quarter, 2014 and are ongoing (more on this later).

Projects are now being specified with construction categories.

Fabricator certifications are continuing.

Stakeholders need to review their processes and prepare (the Standard IS OUT THERE!)

AS 4100 is currently being revised to incorporate AS/NZS 5131 – will sew AS/NZS 5131 in as a secondary reference under the NCC.

Implementation and training.

Alignment with existing schemes (Austroads prequal, NATSPEC etc).

JAS ANZ Accreditation of SCA.

Where are we up to?

Where to from here?
Implementation support

- Tech Note TN011
- ‘National Structural Steelwork Specification’
- Standard drawing notes
- Alignment with NATSPEC
- ‘Practical guide to planning the safe erection of steel structures’
- The NSSCS
- Visit our compliance website
  http://steel.org.au/key-issues/compliance
Why a National Structural Steelwork Specification?

• Helps to ensure compliant outcomes

• Standardisation and efficiency

• An opportunity to develop a rational national technical prequalification scheme
The National Structural Steelwork Specification (NSSS)

Context:

• Developed by ASI using AS/NZS 5131 as the technical foundation

• Peer reviewed

• Incorporates the ‘three layer model’ from AS/NZS 5131

• Includes separate ‘Standard drawing notes’

The NSSS is available for free download in Word and PDF format off our website:

The National Structural Steelwork Specification (NSSS)

Structure of sections:

1. Definitions and abbreviations
2. General
3. Referenced documents
4. Design, documentation and quality control / management
5. Materials and components
6. Preparation, assembly and fabrication
7. Welding
8. Mechanical fastening
9. Surface treatment and corrosion protection
10. Architecturally exposed structural steelwork (AESS)
11. Structural steelwork erection
12. Geometrical tolerances
13. Inspection, testing and correction
14. Site modifications and repair
A. Appendix A – Contractual aspects

The usual stuff!

Paperwork / management; Construction category

Quality inputs to fabrication

Similarly named sections in AS/NZS 5131
Refer typical structure on next slide

Keep typical ‘contractual’ style aspects separate and optional
Typical section structure (sections 6 to 14):

Covers general conformity to appropriate section of AS/NZS 5131 – SIMPLE!

Important/fundamental ‘default’ design related details, which might often be made specific on the design drawings

‘Particular details’ correspond exactly to the options presented in AS/NZS 5131 that are stated as needing to be defined in the ‘Construction specification’.

These details may be:
1. Mandatory
2. Optional

The engineer selects which of these details to include, to, in effect, make the specification specific to the current project.
Third party certification of steel (via ACRS) and steelwork (via SCA) is specified – you can take it out, but why would you?

The new ‘Erection Sequence Methodology’ (ESM) is recommended based on risk assessment – see ASI ‘Practical Guide to Planning the Safe Erection of Steel Structures’

ASI strongly recommends that high strength bolts to AS/NZS 1252.1 are also called up with Verification Testing to AS/NZS 1252.2.

In many cases for simpler structures, the default requirements will suffice and no ‘Particular requirements’ will be necessary.
Using the NSSS:

- **Option 1**: Use essentially ‘as is’, including ‘particular requirements’ to suit the project (default wording configured to be retained)
- **Option 2**: Edit to suit your particular house style, keeping the structure similar
- **Option 3**: Use as a basis for modification of your own specifications

Please **DO NOT** simply add words like “Fabrication and erection of structural steelwork shall be to AS 4100 and AS/NZS 5131”. It is incorrect on so many levels! It will likely cause contractual disputes etc 😞
Standard Drawing Notes (SDN)

Details:

- Consistent with the NSSS
- For small projects, may be used stand-alone without the NSSS
- ‘Particular requirements’ need to be assessed and specifically added if needed
Benefits:

• Familiarity for users => productivity & quality gains
• Reduction in risk (both construction and litigation)
• Increase competition (clear uniform basis for tendering)
• Requirements maintained up to date
• Increased safety (due to quality specification)
• Increased asset life (due to quality specification)
• Cost effective (not cheap!) outcomes
• Facilitates ready adoption of the National Structural Steelwork Compliance Scheme (NSSCS)

These benefits are also applicable, of course, to the NATSPEC suite of documents!
Four pillars:

- Fabrication Standard (AS/NZS 5131)
- Risk identification (engineers)
- Conformity assessment (SCA)
- Auditing & certification (SCA)
Certification is staged, involving:

- For CC1 need to successfully complete the Stage 1 (Desktop) Audit. This provides the opportunity for a gap analysis before proceeding to the site audit.

- For CC2/CC3 need to successfully complete the above and the Stage 2 (site) audit.
  - Increasing levels of control, documentation and management systems

- Annual Surveillance Audits

- Special Audits (where we have market feedback)

Also an opportunity for responsive contract wording!

How do I find a certified fabricator?

NSSCS and SCA Progress:

• Commenced in late 2014

• Currently (Aug, 2018) have 53 fabricators certified or being finalised

• 20 in system; many more interested

• Recent strong interest with various State Governments supporting the Scheme

NSW Procurement has mandated AS/NZS 5131 and is developing an approach to 3rd party certification – supporting SCA becoming JAS ANZ accredited

SCA certification is cost effective!
SA Government (DPTI) support:

Mandating steel and steelwork 3rd party certification:
- ACRS for steel
- NSSCS for steelwork (SCA certification of fabricators)

Steel surveillance program (administered by ASI):
- **Project documentation:**
  - confirm ACRS certification specified for reinforcing and structural steel in contract documentation
  - check for correct Construction Category
  - check project documentation for SCA Certification for fabricators
- **Project implementation:**
  - Check contractors employed are SCA Certified to correct CC
  - Check certified material is being ordered
  - Check correct documentation is being collected
Benefits for builders:

- Avoids the cost of setting up an in-house fabriicator quality capability assessment team
- Provides an assessor with intimate knowledge of steelwork fabrication
- Gives the ability to nominate a fabricator for which the builder can request assessment
- Is fit-for-purpose based on risk assessment – therefore cost effective
- Provides a mechanism to feedback project outcomes and request special fabricator assessment
- Reduces the cost of rectification and rework, utilising fabricators proven to meet the minimum requirements of Australian Standards
- Frees up your valuable personnel to focus on project issues they are actually trained for

Certification to the Construction Categories is a ‘National technical prequalification scheme’ that should over time result in enormous efficiencies in the tendering process for builders and fabricators.
• Visit our compliance website  http://steel.org.au/key-issues/compliance
• New eLearning modules! (coming soon)
• Support – training, publications
• Email me: peterk@steel.org.au
• Join our mailing list
• Talk to SCA!
In conclusion:

• Risks associated with construction product non-compliance are real

• **Assessing compliance is not trivial** and most stakeholders are not equipped to check it properly to meet duty of care

• Appropriate third party certification can provide a **robust cost effective solution**

• The ASI **National Structural Steelwork Compliance Scheme** is set up to service the market of approximately 1.6M tonnes of structural steel annually in Australia.

• Certifying fabricators to a Construction Category is, in effect, a **National Technical Prequalification Scheme**

• For national interest and efficiency, we should be looking to **adopt standardised specifications**

• The NSSCS and NATSPEC specifications provide tailored standardised solutions

  “Without adequate evidence of product conformity, the product should not be used in construction”

APCC Guide
Update: New non-conforming building products laws

• The QBCC Act has been amended in order to **prevent and detect non-conforming building products** and **hold to account** all those people in the supply chain **responsible** for the **design, manufacture, importation, supply and installation** of these building products.

• The new laws apply to anyone in the “chain of responsibility” for a “building product”.

• A chain of responsibility is legislated to make sure that everyone involved in the supply chain can be **held accountable** where a building product is found to be non-conforming.

This Regulation, whilst initiated in Queensland, is expected to be adopted in some form in other States.
How do I comply with the new laws?

- The QBCC Act specifies an overarching, primary duty for all people in the chain of responsibility, as well as **individual responsibilities** for each class of person e.g. building product suppliers.

- The Act requires that each person **takes actions** to meet their duties ‘so far as is reasonably practicable’ to ensure that the product is not a **non-conforming building product** for an intended use.

- The Act requires that each person in the chain of responsibility has a duty to provide ‘**required information**’ to accompany a building product. Each person also needs to conduct **due diligence** on the ‘required information’.

- Any person in the chain of responsibility has a **duty to report** a non-conforming building product.

A ‘Supplier Declaration of Conformity’, as recommended in AS/NZS 5131, would appear to be part of this ‘required information’.
Thank you

Questions?

Email me: peterk@steel.org.au