

Construction Modellers: Key Members of the Value Engineering Team

Increasingly, steel detailers are being recognised by builders, engineers and fabricators as key members of the value engineering team. This recognition is due, in part, to rapid advancements in processes, technology and software that are enabling steel detailers to bring a wealth of knowledge and myriad benefits to structural steelwork projects. As such, the Australian Institute of Steel Detailers (AISD) recently re-branded to become the Australian Construction Modellers Association (ACMA). This change better reflects its members' use of advanced, innovative processes, such as 3D modelling and BIM, to produce intrinsically valuable electronic data for building projects.

Steel Detailers in the Project Execution Chain

Steel detailers have traditionally been employed by fabricators to translate engineering drawings into final shop drawings that are ready for fabrication and erection. In this role, the fabricator and steel detailer worked together to value engineer the solution most appropriate for the project.

The continual reinvention of contractual relationships, combined with the ever-present need for better, more cost-effective client solutions, has seen the value engineering process shift further up the execution chain. There is growing recognition that early engagement and resolution minimises potentially costly revisions, re-work and variations later in the fabrication process.

Increasingly, steel detailers are being recognised by builders, engineers and fabricators as key members of the value engineering team, able to bring a wealth of knowledge and value to structural steelwork projects. Builders and design consultants are directly engaging with steel detailers to harness these advantages and work collaboratively to extract the full potential that their technology and knowledge offers.

Innovation and Advancement in the Detailing Process

Traditionally, steel detailing was accomplished via manual drafting methods, using pencils, paper, and drafting tools such as a parallel bar or drafting machine, triangles, templates of circles and other useful shapes, and mathematical tables, such as logarithms and other useful calculational aids. Eventually, hand held calculators were incorporated into the traditional practice.

Today, manual drafting has been largely replaced by computer-aided drafting (CAD). A steel detailer using computer-aided methods creates his drawings on a computer, using software specifically designed for the purpose, and prints out his drawings on paper only when they are complete.



Rapid advancements in processes, technology and software (such as Building information modelling, 3D laser scanning, and augmented and virtual reality) are enabling steel detailers to deliver even greater value to the supply chain.

Steel detailing has well and truly embraced 3D digital documentation, with the majority of medium-to-large projects now drafted in 3D detailing software, with the outputs potentially sent directly to CNC machines for cutting, holing and welding. Gone are the blueprints, drawing boards, pencils and set squares. Today, the drawing office is a place of world-leading, high-end technology for developing millimetre-accurate and data-rich 3D models.

There are a number of technologies directly or indirectly either related to, or that affect, the steel detailing process and add value to the production cycle. These include: Building Information Modelling (BIM), 3D laser scanning, augmented reality and virtual reality.

These innovative technologies all feed into the process that results in a fully detailed steel structure ready to be fabricated and assembled on-site. With the accuracy, completeness and interoperability of the digital information now being shared between project stakeholders, both simple and complicated expressive steel structures can be built right the first time, with integration into existing site constraints assured. This translates to reduced construction costs, improvements in construction schedule, and minimisation or elimination of costly variations and rework.

The technologies enable teams to work across multiple locations in the same models, interface and clash check against other disciplines, 'clone' repetitious portions of the model, and create, append, store and extract vast amounts of useful metadata. Engineering and shop detailing

companies have sought more efficient workflows through earlier commencement of detailed modelling activities, in collaborative and integrated environments, providing earlier and more constructible deliverables to fabrication.

Beyond the realms of engineering and shop detailing, fabricators can utilise the electronic data, created by the 3D modelling process, to automate significant amounts of the fabrication process. In addition to reducing the fabrication schedule, fabrication is safer and more competitive when compared with similar quality offshore fabrication.

Earlier Project Engagement

It is little wonder that steel detailers have become engaged in earlier phases of the project, resulting in better-resolved design outcomes flowing through to fabricators. In turn, fabricators have more surety, and all parties avoid or minimise costly project variations or legal proceedings.

With the move towards early engagement, steel detailers are no longer just producing detailed drawings of steelwork. Steel detailers are becoming involved in the steps of design development, coordination and documentation, schedule control, and even procurement. Embracing digital construction, detailers are also involved on-site with 3D laser scanning and point cloud surveys and 3D models on hand-held devices.

By integrating the detailer early in the project, significant efficiencies are being delivered throughout the supply chain. This helps lower the perceived risks for steel construction and, ultimately, helps make steel the construction material of choice.

The Australian Construction Modellers Association

Given their expanded role and change in function, steel detailers might be described more aptly as 'Construction Modellers'. As such, the Australian Institute of Steel Detailers (AISD) recently re-branded to become the Australian Construction Modellers Association (ACMA). This name change better reflects ACMA members' use of advanced, innovative processes, such as 3D modelling and BIM to produce intrinsically valuable electronic data for building projects.

Steel Detailers' Handbook and Other Resources

The ACMA and the Australian Steel Institute (ASI) are

About the Australian Construction Modellers Association (ACMA)

The Australian Construction Modellers Association (ACMA) has an experienced, professional and technologically sophisticated membership made up of firms ranging in size from sole traders to multi-national corporations.

The ACMA actively promotes best practice techniques for the preparation of workshop detail drawings of structural steelwork, and reviews the performance and professional conduct of its members. This means that by contracting an ACMA member, your project will have the full attention of a bona-fide construction modeller, with links to the latest industry standards and the best on-going professional development available to detailers in Australia.

For further details, visit: <https://www.austcma.org.au>

collaborating on an updated and reformatted version of the *Steel Detailers' Handbook*. Many sections of the handbook have been amended to better align with modern construction modelling practices. In addition, the sample model included in the original version of the handbook has been modelled in 3D. Further information will be made available as soon as the revised *Steel Detailer's Handbook* is published.

The ASI is also working on a revised version of *Standardised Structural Connections*. This publication has been unavailable for some years, replaced by a suite of documents developed with engineers in mind. However, with the changing nature of the role of steel detailers, the ASI is keen to make this resource available once more.

Finally, the ASI is also investigating the possibility of creating 'industry endorsed' training for steel detailers. This training would draw heavily from the *Steel Detailers' Handbook* and leverage the ASI's new eLearning module. There may also be scope to roll this training out via the TAFE system nationally, with online training modules augmented via project-based modules delivered by TAFE or an employer.



Optus Stadium in Perth. ASI member PDC provided BIM management, and shop detailing for the 15,000 tonnes of steel used in the stadium's construction.



New construction superimposed on an existing 3D scanned structure. Image courtesy of Watkins Steel.