



2.0 RECOMMENDATIONS

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2.1 INTRODUCTION

The *Framing the Future* project set out to uncover the reasons for Australia's relatively low use of steel framing in multi-storey buildings when compared with other developed nations. In Australia there is currently approximately 13 per cent of the multi-storey building construction framed in steel composite construction compared with 70 per cent in the UK, 50 per cent in the US and 40 per cent in NZ.

The Warren Centre's reason for undertaking the project was a grave concern that this low use of steel is leading to an erosion of capability in an area where the skill levels and technology associated with this industry are important for Australia's economy and international competitiveness. If the multi-storey building construction industry could be more efficient through greater use of more efficient steel-framing construction, the entire Australian economy would benefit.

Based on initial investigation the project proponents anticipated that much of the disparity could result from failings in the structural steel fabrication and construction value chain, as opposed to the popular view that steel is just more expensive than concrete.

After working for more than 2.5 years with some 50 industry participants from across the value chain and with experience in Australia and other countries that have much more robust steel-framing industries (see methodology section 5.0), the *Framing the Future* Steering Committee has concluded that, with infusion of technology and strong, entrepreneurial leadership, there is substantial scope for a resurgence in the steel multi-storey sector.

The committee has distilled three key recommendations.

The steel fabrication and construction value chain participants in Australia must:

1. **be able to put forward a compelling value proposition** for steel framing to their customers (developers and builders) to avoid the default concrete solution being adopted.

2. **improve their capability to deliver efficiently and effectively** to capture the advantages of steel framing in multi-storey buildings, thus enhancing the incentive for architects, engineers, builders/developers to promote/choose steel framing and take the associated risk.
3. **continue to support the Australian Steel Institute's current programs addressing key marketing, technical, sustainability and fire protection issues** to improve the relative value proposition of steel framing.

A number of entrepreneurial enterprises have already made changes along the lines recommended. Sebastian Engineering has participated with Lysaght Design & Construction in a number of significant projects using this model. Alfasi in Melbourne has been providing a prime contractor role for many years while Epic Steel in Queensland is setting up a business model to provide a more comprehensive service to the builder, and there are others joining the fray. However, it will require significant change by hundreds of value chain participants to have a major impact on steel framing's market share.

Some of this change must come from the commercial activities, and potential willingness to share insights, of the first mover entrepreneurs (Key Leaders), while other, more 'environmental' improvements are best suited to well-targeted industry association initiatives. The Australian Steel Institute, a major contributor to the *Framing the Future* project, has already instituted several initiatives that align well with many of the recommendations. Many of the implementation suggestions involve extensions of the ASI's activities, expected to be sponsored by their Steel in Buildings Marketing Committee and Steel in Buildings Fabricator Group. The implementation suggestions focus on the additional actions required, rather than describing things already underway.

Ultimately, those value chain participants with the most to gain or lose are expected to drive the focus and level of activity of any collaborative initiatives. Based on experience in other countries and other industry groups, this may result in the formation of new, independent associations over time.

The recommendations are described so that the intent of each action can be understood, but without presuming that the Steering Committee has the

ability or authority to define their scope and plan their execution, which in our view should be directed by those who take on the responsibility of delivering the results. Similarly, implementation *suggestions* are provided – ultimately it will be up to the individuals and organisations involved to decide if, by whom and how the recommendations are followed.

The recommendations and suggested implementation approaches are explained in more detail below.

2.2 RECOMMENDATIONS

2.2.1 BE ABLE TO PUT FORWARD A COMPELLING VALUE PROPOSITION

It is clear from the project that this failure is a fundamental barrier to increasing the market share of steel framing in multi-storey buildings. Unless the value chain participants have the capability to present compelling value propositions to their customers, steel framing will be chosen only for those relatively few building projects where it is a more obvious choice (due to architectural, construction timing, or other individual criteria). Currently there are few members of the value chain with the required experience and capability to present a convincing value proposition.

The Management Committee believes there are four actions required to overcome this failure:

a. Provide robust cost and time information

Collect and make available to decision makers on a regular basis, appropriately detailed data from a wide range of projects and present robust analysis of steel-frame construction projects to overcome traditional industry perceptions that steel costs more than concrete and involves higher risk. Greater price and time transparency in the market for multi-storey building construction will help to overcome traditional risk perceptions associated with steel framing.

This supporting information should address key builder and developer concerns including:

- The need to be more conservative when costing steel-frame solutions.
- Steel price variance during the project.
- The high cost of variations (often resulting from design development after tenders for fabrication have been let) compared with concrete which can be changed at short notice, provided the concrete has not yet been poured.

- The potential for delays due to fabrication errors and/or required design changes.

Suggested implementation

The ASI is already active in developing case studies of successful steel-framed building projects, disseminating them to members and using them to support marketing activities with members. The ASI is also undertaking a project to widely disseminate this information, and the conclusions and recommendations of the Framing the Future project, via a series of seminars. ICIP Project #3 (funded partly by a Federal Government ICIP grant, in conjunction with Rider Hunt) is tasked with producing a representative comparative cost estimate of a standard building framed in concrete and in steel. It is suggested the cost estimate and models should be updated every two years.

However, there is a need for more regular and rigorous reporting of: a) actual prices paid for steel sections and plate, fabrication and erected steel frames (including the cost of variations and delays); b) the availability of steel sections and actual time to deliver data; and c) the actual time taken to fabricate and erect steel-framed structures. The ASI has indicated it would be willing to sponsor and arrange funding for an independent provider to collect and report this information publicly. Based on experience during the Steel – Framing the Future project, builders, engineers and quantity surveyors appear willing to provide actual project data on a confidential basis provided resulting reports don't allow the individual projects and companies to be identified. Dissemination of current in-situ cost information for various framing elements could be by way of the ASI website and selected publications.

b. Introduce new collaboration models

Adopt new collaboration models that overcome the up-front cost and difficulty involved in estimating the cost of a reasonable steel-frame solution.

If a steel-frame option is to be considered, the current accepted practice is for an engineer to prepare preliminary designs for both concrete and steel-framing systems and to rely on a quantity surveyor or building estimator to prepare framing prices for comparison. Experience has shown that, unless the engineer, quantity surveyor/estimator and project manager are experienced in steel-frame construction and an experienced fabricator is involved to confirm the practicality of the design and provide estimating data, experience has shown the design, construction programming and estimating is conservative, resulting more times than not in the steel option being discarded.

Suggested implementation

The ASI is already active in developing case studies of successful steel-framed building projects, disseminating the publicly available information to members and using them to support marketing activities with members. Unfortunately these case studies do not provide any costing information.

However, much of the innovation in collaboration models for efficient steel-frame estimation is considered confidential by the entrepreneurial organisations leading this innovation. It will be up to these Key Leaders whether they share confidential information such as the roles of each collaboration participant and how they interact, the cost and risk they each carry, and the reward terms for each of them. Many Key Leaders will choose to keep the information confidential for their own commercial benefit, so that dissemination occurs slowly through the future commercial activities of the individuals and enterprises that collaborate with them. Other Key Leaders may see a benefit in enlightening others, so that there is wider adoption of new collaboration models. This in turn will lead to greater acceptance among builders and developers and increased capability to deliver among engineers, detailers, fabricators and erectors, thereby facilitating the attraction of newcomers to the industry and enhancing builders’ and developers’ confidence in steel framing.

- c. **Form new ‘solution provider’ contracting models**
Adopt new contracting models that address builders’ and developers’ desire to avoid the responsibility and risk of managing the less familiar steel-frame value chain during design, fabrication and construction.

Steel-frame solution suppliers have not been active in the Australian multi-storey sector – in stark contrast to the UK where ‘steelwork contractors’ offer total steel-frame solutions, including metal decking and concreting with a single point of responsibility. Also, this situation contrasts with the very successful post-tensioned concrete solution providers in Australia.

Since the commencement of the project there has been some change in the situation with Lysaght Design & Construct adopting the role of ‘steelwork contractor’ for Multiplex Constructions (the builder) on the Latitude East project in Sydney.

Suggested implementation

The implementation issues are virtually the same as for action b. The ASI’s activities spread the word about such contracting models, but are limited to non-confidential information.

However, much of the innovation in contracting models for delivery of steel-frame structures is considered confidential by the entrepreneurial organisations leading this innovation. Again, the choice to share confidential information will be up to Key Leaders (refer to suggested implementation in action b). Where available, the information on innovation and contracting models should appear not only in *Steel Australia* but selected business media.

- d. **Encourage new entrants to build ‘critical mass’**
In general builders and developers are not comfortable with the limited range and small scale of potential steel-frame fabricators underpinning steel-framing solution offerings. Therefore, the Management Committee considers it important that new entrants be encouraged into the steelwork contractor sector.

Suggested implementation

The ASI has indicated it will encourage new entrants to the steel contractor model through its Steel in Buildings Fabricator Group. Again, however the ASI is limited to using non-confidential information to inform and entice potential new entrants.

The most influential recruiters of new entrants would be those Key Leaders who have gained real project experience through their own entrepreneurial activities. These Key Leaders may decide the advantages of greater credibility and capability to deliver on the steel contractor value proposition outweigh the competitive advantage of restricting such capability to themselves and their commercial partners. A robust and competitive steel contractor sector will unquestionably attract more business and even position some players for export.

2.2.2 IMPROVE THE CAPABILITY TO DELIVER EFFICIENTLY AND EFFECTIVELY

The steel fabrication and construction value chain in Australia is not well positioned to deliver efficiently and effectively capture the advantages of steel framing in multi-storey buildings. This reduces the incentive for architects, engineers, builders/developers to promote/choose steel framing and take the associated risks.

Each step along the path to more efficient and effective delivery of steel-framing solutions will improve the value proposition to customers, setting up a virtuous cycle of raising margins, reducing costs and increasing market share, thus attracting more investment to improve the value chain efficiency and effectiveness.

The Management Committee believes there are four actions required to improve the efficiency and effectiveness of steel-framing delivery:

a. Adopt more collaborative contractual arrangements

The traditional “hard money” contracts used in the industry lead to each participant attempting to optimise his/her financial outcome in the common event of a need for a design change or opportunity to make a design improvement. This behaviour often creates barriers to optimising the whole project and best meeting the needs of the ultimate customer (developer or tenant). In addition the resulting commercial tension does not enhance relationships, does little to foster collaboration and often leads to protracted expensive court battles. More collaborative contractual arrangements between builder, engineer, detailer, fabricator, erector and others could reduce these barriers, resulting in lower total cost and faster total construction time, while best meeting the ultimate customer’s needs.

Suggested implementation

The ASI is already active in developing case studies of successful steel-framed building projects, disseminating them to members and using them to support marketing activities with members. The ASI is also undertaking a project to widely disseminate this information, and the conclusions and recommendations of the *Framing the Future* project, via a series of seminars. These ASI activities are likely to encourage some value chain participants to experiment with more collaborative contractual arrangements.

The most effective change agents for collaborative contractual arrangements, however, would be the Key

Leaders who have gained practical experience through their own entrepreneurial activities. These Key Leaders may decide the advantages of greater credibility and familiarity with such contracts throughout the industry outweigh the competitive advantage of restricting such confidential information to themselves and their commercial partners.

b. Adopt cross value chain documentation technology and processes

There is limited use of proven 3D modelling and document publication/sharing technology and processes along the value chain from concept design through to structural design, detailing, fabrication, delivery and erection (there are ‘point solutions’ in use by individual value chain players, but few cases where more than two participants work on a common or integrated platform). Full Building Information Modelling (BIM) is not known to have been used in Australia but is a system that will ultimately benefit the steel solution, particularly on large complex projects.

A study by Engineers Australia (2005) estimated that poor documentation, in particular, professional responsibility for dimensioning, typically adds 5–10 per cent to the cost of a project.

Value chain participants need to work together to establish standards and protocols for advanced documentation technology and processes to build shared understanding and avoid fragmentation as individual enterprises invest in these initiatives.

Suggested implementation

This action would affect how all multi-storey building design and construction is delivered, no matter what framing material is used. Therefore to gain agreement on standards will require the involvement and commitment of a majority of participants throughout the building design and construction value chain. While the ASI has stated it will support this recommended action, and is encouraging greater use of ICT in steel design and construction via its ICIP Project #2 it is not well placed to lead participants who are not involved in steel construction (the majority).

The CRC for Construction Innovation is conducting research in this area through its Program C – Delivery and Management of Built Assets.

Again, however, it is likely the Key Leaders will have a significant impact on the success of initiatives to establish common processes and protocols. They are the ones who are best able to recognise the potential

benefits of such initiatives and to influence others to adopt them on their projects and through outsourcing, as well as their involvement in the ASI's Steel in Buildings Fabricators Group.

c. Invest in key fabrication process and technology improvements

Although there is some evidence of recent investment, Australia's steel fabricators have typically not invested in the automated equipment and business process optimisation to the degree that has enabled UK fabricators to reduce their shop labour costs by up to 80 per cent, levels well below the best in Australia.

Suggested implementation

The ASI currently conducts a range of activities to increase awareness of process and technology options for its members including international visits to best practice fabricators, presentations by leading fabricators, and providing contacts to relevant consultants and advisors.

A key element in convincing a fabricator to invest in process and technology improvements is gaining confidence in the commercial return they will generate (amount and timing). The ASI has indicated it would support the development of appropriate template 'business case' methodologies, informing and educating fabricators, publishing data on application of automation with cost information and identifying methods of obtaining robust cost and benefit estimating tools and data.

d. Provide information to encourage change

Many industry participants are not confident to make investments to improve delivery capability or take the risk to challenge traditional industry practices, often because they do not recognise the potential rewards.

By providing robust information about the potential cost and time available across the building value chain, individual enterprises will be better placed to match the rewards with the risks.

Informing value chain participants widely about the actual successes (and hurdles) resulting from innovative approaches will encourage them to be receptive to investing in such approaches. The Lysaght Design & Construct approach on the Latitude East project is a candidate to report on.

Suggested implementation

As noted previously, the ASI currently conducts a range of activities to increase awareness of innovative process, technology, collaboration and contractual options for its members. However, due to a lack of transparency of actual costs and prices throughout the value chain and limited use of relevant supply chain measures in the industry, it is often very difficult for individual enterprises to understand the potential value of such options, and even more difficult to demonstrate a business case to potential partners that would be required to achieve the identified gains.

There is an opportunity to collect and report regular, robust supply chain measures from across the value chain, including drivers and their impact on prices, timing and margins achieved at different stages of the value chain. The ASI has indicated it would be willing to sponsor and arrange funding for an appropriately skilled independent provider to collect and report this information publicly. Based on experience during the *Steel – Framing the Future* project, builders appear willing to provide actual project data on a confidential basis provided resulting reports don't allow the individual projects and companies to be identified. The ability to collect information from other value chain participants is yet to be tested.

2.2.3 CONTINUE SUPPORT FOR THE ASI'S PROGRAMS ADDRESSING KEY MARKETING, TECHNICAL AND SUSTAINABILITY ISSUES

Steel framing suffers a number of disadvantages resulting from lack of information and its credible dissemination to key parties in the value chain.

The Management Committee believes there are a number of actions required to improve this situation:

a. Communicate sustainability advantages

- improve the understanding and communication of steel's environmental sustainability benefits, including:
- steel's adaptability, and high order of recyclability
- versatility for refurbishment resulting in longer life buildings, with asset preservation, resale value and low carbon footprints.

Suggested implementation

The ASI has recently established a Sustainability Committee to pursue this action. Andrew Marjoribanks, a key contributor to the *Framing the Future* project, has been appointed as chair.

b. Reduce perceived fire-engineering hurdles

Improve the understanding of fire-engineering implications (options and costs) for steel framing across the value chain, and seek improvements in regulations to reduce uncertainty.

Suggested implementation

The ASI has recently formed a task team to pursue this action.

Input from fabricated steel supply chain participants is expected to greatly assist in identifying and promoting the most commercially attractive approaches to fire protection methods.

c. Upgrade steel design capability

Many engineering consulting firms have limited experience and skill in designing efficient steel-frame structures (particularly smaller firms that are often engaged for low- to mid-rise commercial structures, where a significant market exists). Furthermore as Peter Thompson, a project Visiting Fellow says, “These engineers are more comfortable with concrete as are their clients”.

Recommended focus areas include:

- Short-term measures to improve engineers’ design capabilities including design aids and information services.
- Longer-term initiatives to attract young people into the profession and to maintain and progress the teaching and advancement in steel design at the tertiary education level.

Suggested implementation

The ASI has been pursuing this action for many years. Further refinement and a greater focus on the short-term measures via the ASI is suggested.

d. Continue marketing activities

Promoting the use of structural steel in building will continue to be critical to market success and all parts of the value chain should continue to support ASI’s promotional work. Publication of case studies, holding of seminars, organising international

conferences and study tours, bringing together interest groups and representing the industry in a variety of forums are all activities that strongly support steel’s value proposition.

Suggested implementation

The ASI has been pursuing this action for many years – ongoing support for and enhancement of these activities is suggested.

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An Australian Government Initiative



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ABOUT THE WARREN CENTRE FOR ADVANCED ENGINEERING

The Warren Centre for Advanced Engineering is the leading Australian forum for advanced engineering issues, recognised for its inclusive, forward-looking approach and the wide impact of its many achievements.

The Centre is a self-funding, independent, not-for-profit institute operating within the Faculty of Engineering at the University of Sydney, controlled by representatives from industry and elected by the University's Senate.

It has three principal objectives:

- to stimulate the application and further development of new engineering technology.
- to encourage the integration of innovation and engineering technology into the development of Australia's public policy and wealth creation.
- to provide independent comment and advice to government and industry on these and related issues.

The Warren Centre:

- identifies and supports major projects that bring together people at the leading edge in selected fields of engineering technology to develop new technical insights and knowledge in those technologies and accelerate their application in Australian industry.
- holds industry forums for companies in specific industry segments to explore opportunities of common or joint interest that will accelerate the development and/or exploitation of technology.
- organises events such as seminars, lectures and conferences that explore contemporary technology issues and disseminates the results of the Centre's activities.
- produces electronic and printed material to promote discussion and build awareness of contemporary, advanced engineering issues.
- recognises people and projects that make a unique contribution to encouraging excellence and innovation in all fields of advanced engineering.

Since opening in 1983, the Centre has gained wide recognition for its unique approach and its achievements in diverse fields of engineering technology and industry development.

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