Platform Evolution

Con-form® GROUP
Making it Easy

Contents

A Brief History	4
Limitations of Structural Steel	5
Longevity	5
Weight	6
Inflexibility	7
Safety	7
Cost	7
Enter Con-form Group	8
It was time for a change	9
Innovation & Development	10
Evolutionary Solutions	11
The Next Evolution	15
An Evolutionary Leap	16
Manufacturing Evolution	19
Continuous Improvement	21
EasyMech MR	23
EasyMech CR	23
Span+	23

Platform Evolution

Nigel Cro
Managing Director
Con-form Group Pty Ltd

A Brief History

Steel has been used in construction since the late 1700's. The first iron-framed building, the Ditherington Flax Mill, was built in England in 1797. It was one of several mills which started using steel instead of timber as a means of sustaining a fire. The cotton mills were susceptible to fire because the cotton was highly flammable, the machinery was hot and they were illuminated by gas lighting.

English engineer, Sir Henry Bessemer, is regarded as being the "Father of Steel" as he played a major role in ushering in the use of steel in the 1800's. He developed the Bessemer Process in 1855 which saw dramatic advancement in the efficiency of steel production.

The 1880's saw the introduction of mild steel for construction. Structural steel, with its higher tensile strength and hardness, due to its higher carbon content, would become the common go-to material.

The 12-storey Home Insurance Building, built in Chicago in 1885, was the first architectural structure to use a steel skeleton frame with iron columns embedded in the masonry walls. Five years later, in the same city, the Rand McNally Building became the first building in the United States to have a steel frame. Another five years later, the six-storey Royal Insurance Building in Liverpool was the first with a steel frame in England.

Today, the heaviest steel structure in the world is the Beijing National Stadium in China which was the centrepiece of the 2008 Olympic Games. It used 42,000 tonnes of structural steel.

Other achievements in steel include the world's tallest tower (Tokyo Sky Tree at 634 metres) and Chicago's Willis Tower – the former Sears Tower – with its 110th floor being 442 metres above the ground.

Limitations of Structural Steel

Our product development team began by identifying key limitations:

1. Longevity
2. Weight
3. Inflexibility
4. Safety
5. Cost

Longevity

Our harsh Australian climate attacks structural steel and it is not uncommon to see levels of corrosion (rust) on a building roof top.

The more corrosion there is the less strength and integrity it has.

At some point it has to be cut into pieces (via sawing or oxy-welding) and craned off the roof, then new components lifted in and assembled. A costly exercise.

Weight

Steel has a Constant Unit Weight of approx. 7,850kg per cubic metre which means in some cases it is literally too heavy for the roof structure of a building – the columns, rafters and purlins.

In the past, construction companies were sometimes forced to take drastic measures in order to increase roof load capacity. They have had to add extra internal strengthening to the building.

This resulted in a litany of negatives including:

- material and construction costs
- usable floor areas and rooms becoming restricted and less effective
- tenants having to vacate the building
- businesses being interrupted and deprived of revenue
- residents having to find alternative accommodation

In less severe cases builders were able to add extra bracing to the roof structure which still necessitated additional costs.

The weight of structural steel means that bigger (and more costly) cranes are required to lift it into place. And, it is difficult to move about on the roof which, in most cases, contributes to months of project work.

Inflexibility

Structural steel is formed as an I-beam and this is not always the right profile for components of a rooftop platform. Not having any other choices, platform manufacturers have to compromise their designs.

Safety

What can possibly go wrong on a structural steel project?

During construction of the platform a heavy beam might move or fall and injure a worker... or a worker might be injured by welding equipment which involves a naked flame and high temperatures.

Cost

As noted already there are a number of potential cost liabilities when using structural steel:

1. Replacing corroded steel materials
2. Reconfiguring a building with enhanced structural supports in order to cope with the weight of structural steel (platform) on the roof
3. Loss of revenue of tenants during #2
4. Cost of materials-labour in adding a structural support to a roof – less extreme than #2
5. The need for a bigger and heavier crane
6. Months of labour costs in constructing platform(s)

Add to this the fact that structural steel for fabrication of standard structures is approx. $AU1200-1800 per tonne; a figure which can climb to $2600 per tonne for complex structures.

Enter Con-form Group

Con-form Group, a privately owned Australian company launched over two decades ago, was originally involved in the height safety sector.

Our team was very aware of the use of structural steel for rooftop platforms. They saw the challenges of having to crane, move, cut and assemble these heavy beams. As well as the excessive costs and extended time frames for installation.

Another eye-opener for them was the corrosion of existing steel on rooftops, knowing that its integrity as a support structure was being compromised and at some stage it would have to be replaced. At great expense.

It was time for a change

We had attracted a multi-talented team of highly experienced industrial designers, engineers and production technicians to our base in Bathurst NSW. They set to work to revolutionise the industry by finding an alternative to structural steel.

We also invested in specialised computer-controlled and automated equipment as we established what would become the Manufacturing Centre of Excellence.

MCE
Manufacturing
Centre of Excellence

DDC
Digital Design
Centre

PDC
Product
Development Centre

CEP
Custom
Engineered Product

ACP
Architectural
Creative Partner

D2I
Design
To Install

ATL
Acoustic
Testing Lab


Australian
Owned/Operated

Innovation & Development

"Con-form Group has a culture of innovation", said Managing Director Nigel Cro.

"We were familiar with using steel and aluminium and we backed ourselves to 'have a go'. The first thing we did was to ask ourselves what do our customers want?"

Our team started off by identifying 5 key priorities:

1. Fit for purpose
2. For all roof types (metal, concrete, flat, pitched)
3. Durable, long lasting (long-term investment)
4. Quickly installed
5. Cost-effective

This led to a bigger list of goals. The first new-look platform had to be:

1. Lightweight
2. Durable
3. Modular
4. Systematised
5. Scalable
6. Safe to install
7. Quick to install
8. Require less labour
9. Cost-effective
10. Aesthetically good to look at

We looked around the world for a type of steel which could tick those boxes. We wanted the same strength without the weight, and longevity without corrosion.

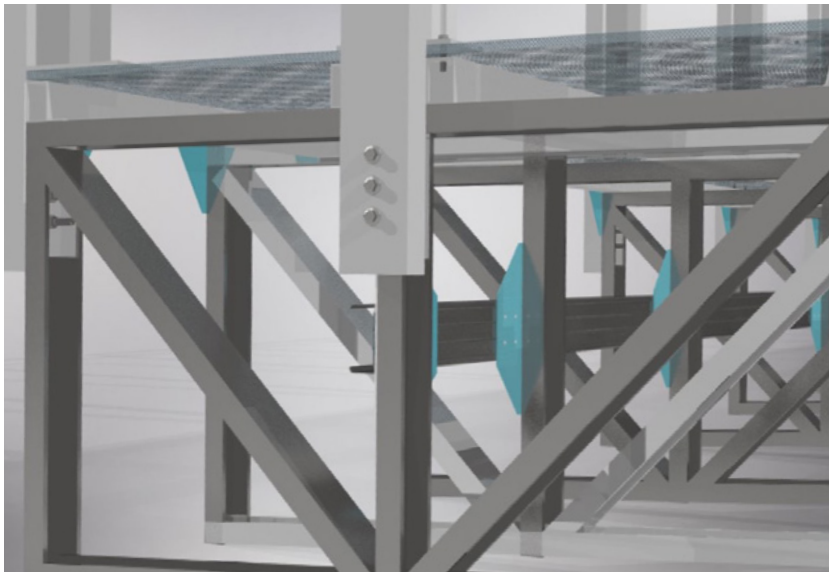
The outcome was ZINCALUME G550 light gauge steel. It had a hot dipped aluminium-zinc-magnesium alloy coating and tensile strength of 550 megapascals. It was easy to bend, cut and shape. And, it was very affordable.

Having found our raw material, we began working on platform prototypes.

Evolutionary Solutions

The first radically new design to emerge had roll formed Light Gauge Steel trusses and beams topped with aluminium mesh. Aluminium was also used for the braces and guardrails.

Gone were the solid, heavy beams.



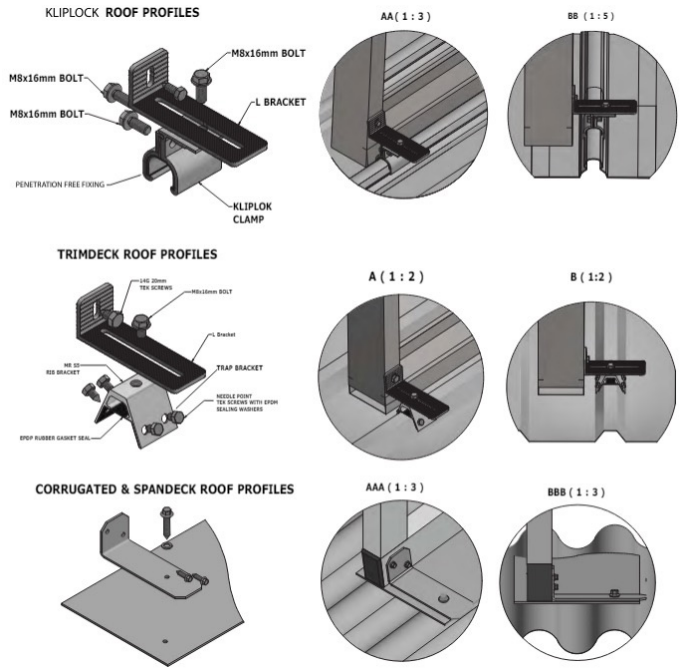
The triangulated frames were prefabricated in the factory and could be flat packed to transport to site. They were incredibly light and it only took a couple of people to pick up a completed section and move it about.

(Note: a number of years later when we designed and manufactured light gauge steel visibility screens, acoustic barriers and louvre walls it became possible to crane a complete deck with screens attached straight on to the roof and negate the assembly process)

Despite the incredible lightness – the assembled frames weighed in at a mere 14kg per square metre – they came with a live load rating of 2.5 kPa... which could be increased to 5.0 kPa and even more if need be.

The frame cleverly distributed its load evenly over the purlins which reduced the structural requirements of the roof. Not only that, it was penetration-free. It could be placed on top of a metal roof with no need for stub columns.

We developed custom fastening systems to attach the frames to the most common roof profiles – Kliplok, Trimdeck, Spandeck and Corrugated.



(Note: *EasyMech MR has been utilised on roof pitches up to 20-degrees)

One big advantage here was that occupants no longer needed to vacate the building during installation.

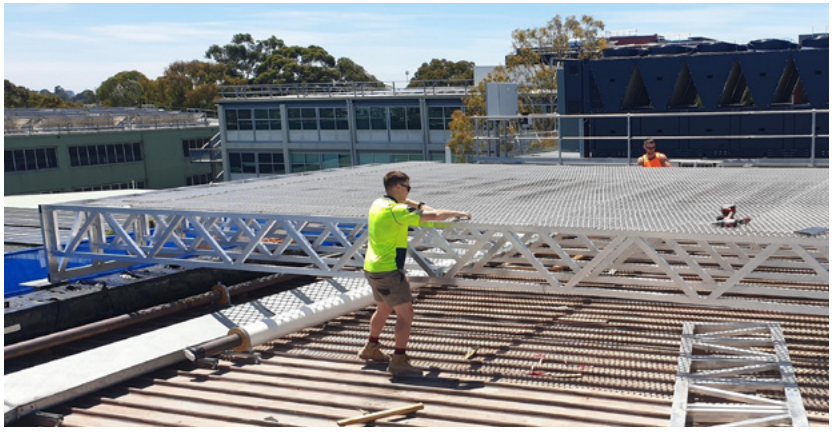
"We wanted it to be modular and prefabricated to reduce the amount of work required on the roof", said Nigel Cro, *"The design we came up with was simple and it connected with bolts. Not only that, our installation teams only had to take basic tools like a battery powered drill, tape measure and spirit level up on to the roof."*

The design was tested and it met all of the necessary standards (AS/NZS1170.1, AS/NZS1170.2, AS/NZS1170.4, AS1657) and relevant clauses of the Building Code of Australia.

So, the Report Card read:

Longevity? The steel was corrosion and heat resistant.

Weight? Only 14kg/m2.



Inflexibility? The light gauge steel could easily be bent and cut to any configuration with ease in the factory. Also, because of the platform's low weight there was a lot more usable space on the roof to place it, meaning it could be positioned directly above internal HVACR units and do away with metres and metres of ducting.

Safety? There was little chance of an injury during installation because the frames were so light plus there was no need for hot works on the roof. Say goodbye to welding.

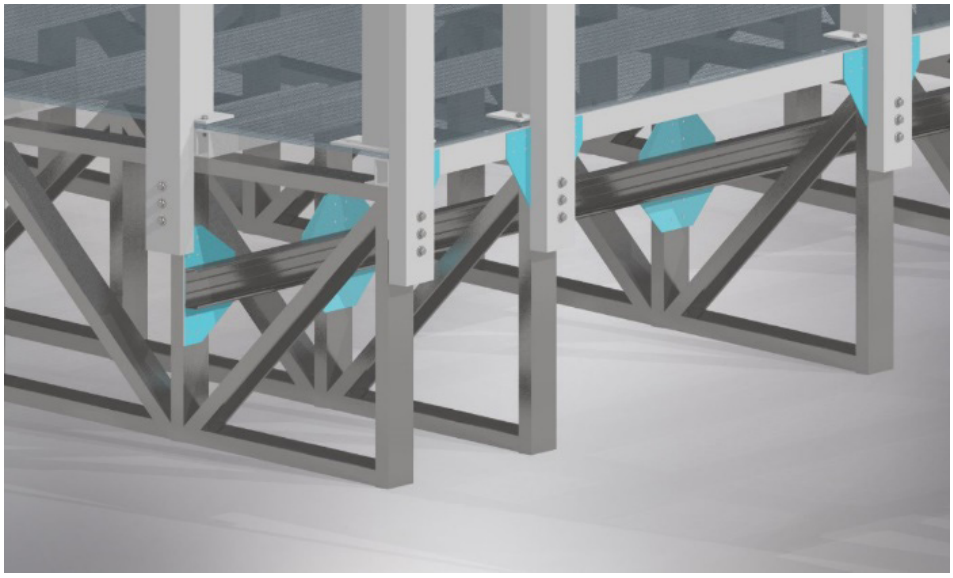
Cost? The light gauge steel was a fraction of the cost of structural steel... a smaller crane could be used to lift it to the roof... and the installation could be completed in days or weeks instead of months.

Score: A+.

The final exercise was to come up with a name. It entered the market as EasyMech MR... MR for metal roof.

Con-form Group had made structural steel obsolete... and in the process it had become the first company in Australia to focus itself solely on HVACR roof top platforms.

"We are aware that engineers are very familiar with structural steel after all they are taught it in their degrees, but now we had challenged it and come up with a revolutionary idea which gave our clients a much more cost-effective alternative. As expected, it became very popular. EasyMech MR started to turn up everywhere… on shopping centres, hospitals, medical centres, government buildings, sporting facilities, car dealerships, factories and data centres."



The Next Evolution

Con-form Group had worked on a lot of concrete roofs as well as metal ones and so our design team went back to their CAD software and engineering formulations to come up with a light gauge steel platform for concrete.

The design team dialled in similar specifications to the EasyMech MR:

- Super-lightweight (a mere 12kg/m2)
- modular
- prefabricated in the factory
- penetration-free
- engineered to take a live load rating of 2.5kPa, 5.0 and greater

As such, it became known as EasyMech CR.

The big difference was in how it mounted itself on the roof.

This deck sat on an adjustable “foot”. The foot was designed to isolate any transfer of vibrations from the HVACR plant above it, thus preventing them from continuing down to the roof. Its performance was described by the acronym, “AVANT”, or Anti-Vibration & Anti-Noise Transfer. In effect, a shock absorber.

Despite its light weight each foot was capable of carrying a load of up to 1000kg.

The foot was threaded so that it could be adjusted to allow for variations in the roof slab - such as slopes and drainage falls. It provided 100mm of “travel”.

We decided to call it: EasyFoot CR.

An Evolutionary Leap

When purlins are not capable of carrying the load of a platform, we have to attach them to the steel rafters. This requires a unique type of platform and mounting system.

Once again, the Con-form Group designers and engineers started with a blank sheet of paper and a new set of rules. They were given the freedom to think outside the box and come up with a breakthrough solution.

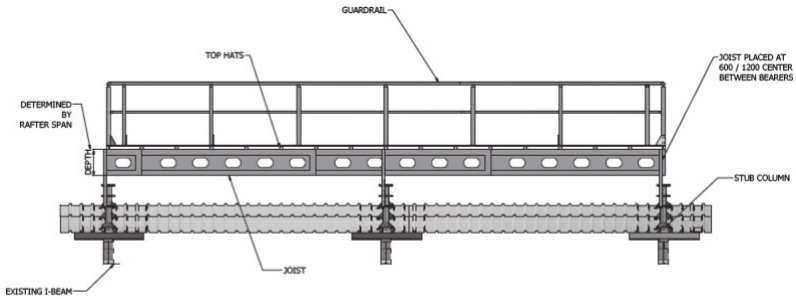
This would be a penetrative platform – however we aimed to minimise that penetration as much as possible.

A suitable project arrived at that time: a hospital requiring a rafter-mount platform. We manufactured the components.

This exercise made us realise that a traditional triangulated truss was not ideal. It was difficult to get the load path to line up from the load point – i.e. the position of the HVACR plant equipment – to the rafter fix point.

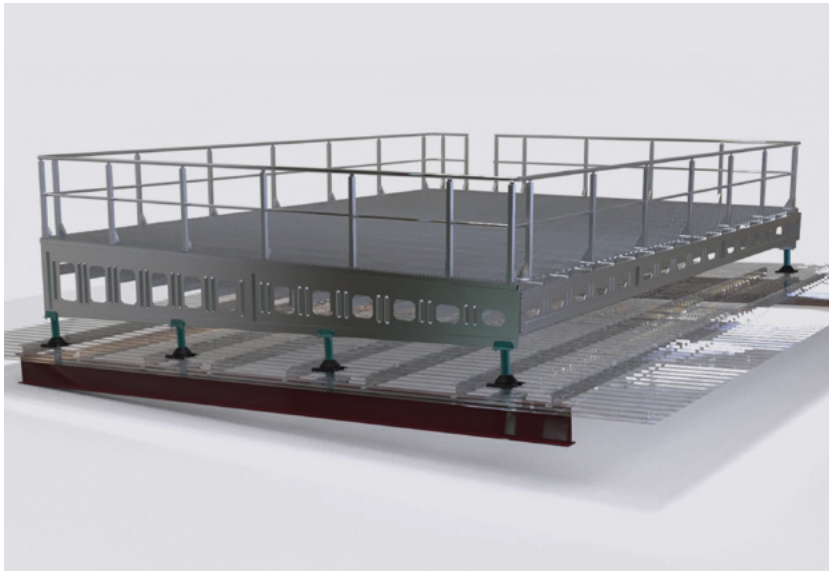
Back to the drawing board. We had to find a way to disperse the equipment load between the rafter anchor points. The solution we arrived at was a castellated beam.

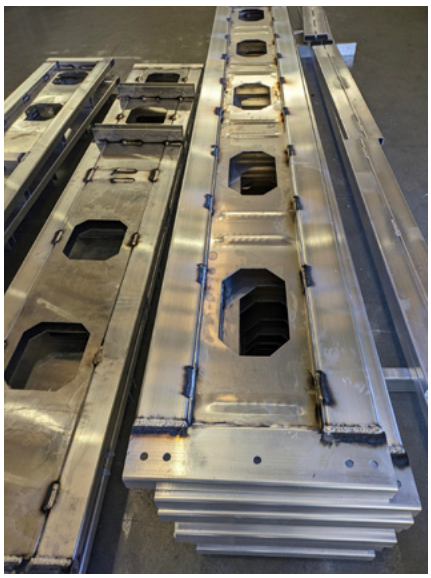
Castellated beams have been in use for over 70 years. Apparently, due to the worldwide shortage of steel after World War Two, engineers searched for a cheaper type of beam which also had an excellent strength to weight ratio. They came up with the perforated beam with a repeating series of rectangular-hexagonal holes. The sacrificial removal of material resulted in additional strength.



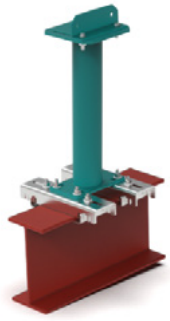
Instead of steel we opted for solid aluminium joists and bearers and machined the holes in them. The various components were then welded together. The completed structure was incredibly light - a massive 75% lighter than structural steel!

With the beams being so light we found that could easily make extended lengths to span between rafters without compromising on the overall weight of the platform. The optimal distance between rafters was 10-12 metres. And, it was possible to span even further.





The castellated beams distributed the weight of the platform load outwards to the rafters. It was this feature which led to the naming of the platform system: Span+.



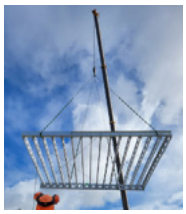
This was the first platform of its kind in Australia and to this day it has remained unique to Con-form Group.

In order to secure the beams to the rafters our designers and engineers came up with a new type of stub column which could be clamped to the I-beam of the roof structure.

There was no need to weld a connection or drill into the rafter. This negated the need for hot works and sped up the installation. It also meant that there was no need to vacate the building space below – a business or residents could continue its activity as per normal while the platform was being installed.

The stub column could be manufactured to a height of one metre – or more – to suit the pitch of the roof. It only required a small hole to be cut in the roof with tin snips… and this was covered with a sealed boot. The roof top equivalent of keyhole surgery (!).

The combination of our prefabricated design (produced and pre-assembled in the factory) and its incredible lightness contributed to our installation teams completing their projects five times quicker than an equivalent sized structural steel platform!



The cost benefits to our customers were obvious – from hiring smaller cranes for a few hours and not days… to a massive reduction in man days for the installation team… to businesses being given access to the building months earlier and generating more revenue. All because we dared to challenge the norms.

Managing Director, Nigel Cro, said that this exploration and development of revolutionary designs (EasyMech MR, EasyMech CR, Span+) exposed an interesting engineering challenge.

"When you venture outside engineering norms you find that some Australian Standards are outdated. They don't apply any more. They are tuned to somewhat outdated technology only."

"We therefore had to do our own empirical testing in our Product Development Centre – identifying and calculating the difference between expectations and observations. We conducted finite element analysis (FEA) and confirmed our findings with physical destructive testing under a variety of loads. We were able to witness material deformation – that is, the lack of it – and confirm the theoretical data."

It was from this battery of tests that we were able to determine that Span+ could achieve – and exceed – a live load rating of 2.5kPa, 5.0 and even greater.

Manufacturing Evolution

None of this development would have been possible had we not made crucial long-term decisions in the first place.

We handpicked a team of specialists with the right expertise: degree-qualified industrial designers, structural engineers, engineers and manufacturing technicians. And, we equipped them with the right tools such as best-of-breed 3D CAD/CAM and simulation software.

We invested in our Manufacturing Centre of Excellence by adding the right equipment including computer-controlled roll formers, turret punch and press brake.

Our production processes were based on lean manufacturing principles. To meet this standard, if the technology we required was not available anywhere in the world, we designed and built our own bespoke equipment. This increased our production throughput and optimised Quality Control.

It also allowed for quick and precise prototyping of conceptual products through to the rapid production of completed components for actual projects.

We knew that we had plenty of capacity for the biggest projects in the land on rooftops the size of multiple football fields.

Finally, we didn't just rely on our own expertise. We also looked outside Australia for inspiration. We sent teams to major global manufacturing events such as Euroblech in Germany and the AHR Expo in the United States. The intel' we gathered was eye-opening. We soon realised that we were pioneers on a journey that few if any other companies overseas had explored.

We had successfully replaced structural steel. We had come up with a proven solution which was:

- ultra-lightweight
- strong
- durable
- fit-for-purpose (each deck would be custom-designed to suit individual project requirements)
- quick and simple to install
- and incredibly cost-effective.

Continuous Improvement

Innovation and product testing is a constant at Con-form Group.

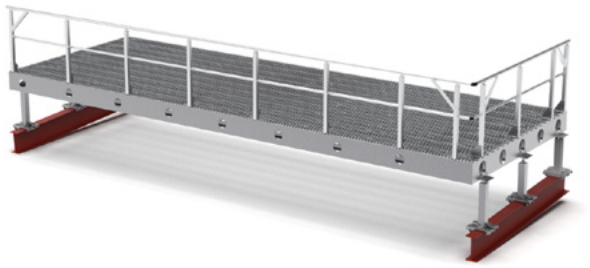
After this episode we turned our attention to developing new types of light gauge steel visual barriers, acoustic walls and louvre walls. Which could easily be attached to our platforms. The perfect combination for unsightly and noisy HVACR machinery.

Then, we revisited Span+.

The cost of aluminium is higher than steel and we asked ourselves could we come up with a replacement for the aluminium-framed Span+ which would save our customers even more?

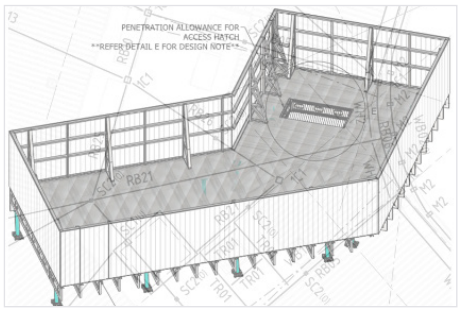
Our designers and engineers returned to their 3D CAD/CAM and FEA software... production technicians worked on physical models. Highly specialised roll-forming equipment was custom made for us and installed into the factory.

And so it was, at the close of 2024, that an all-steel Span+ became reality.
It maintains the load bearing qualities of its predecessor but it is quicker to manufacture and install and it is even more affordable.



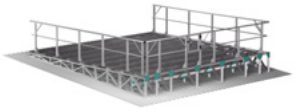
History has shown that EasyMech MR, EasyMech CR and Span+ were instantly popular across Australia. Construction companies, architects and engineers had a viable alternative to the traditional steel method.

Today, you will find these platforms working on the roofs of data centres, manufacturing facilities, multi-purpose warehouses, hospitals, medical centres, universities, schools, aged care homes, day care centres, vet' clinics, government buildings, car dealerships, and more.


PENETRATION ALLOWANCE FOR
ACCESS HATCH
REFER DETAIL E FOR DESIGN NOTE


coles

EasyMech MR



Type	Surface mount (penetration-free) for metal roofs
Material	ZINCALUME G550 light gauge steel
Prefabricated	Yes
Live load rating	2.5kPa, 5.0kPa, and greater
Weight per m^2	14kg
Attachment	EasyFix compatible with Kliplok, Trimdek, Spandeck, corrugated profiles
Warranty	25 years

EasyMech CR

Type	Surface mount for concrete roofs
Material	G550 light gauge steel
Prefabricated	Yes
Live load rating	2.5kPa, 5.0kPa, and greater
Weight per m^2	12kg
Attachment	EasyFoot CR
Warranty	25 years

Span+

Type	Rafter mount for metal roofs
Material	G550 light gauge steel
Prefabricated	Yes
Live load rating	2.5kPa, 5.0kPa, and greater
Weight per m^2	19kg
Attachment	Custom stub column
Warranty	25 years

Con-form® GROUP

Making it Easy

19 Corporation Avenue, Bathurst NSW 2975
1300 882 490 / con-formgroup.com.au

MCE Manufacturing Centre of Excellence

DDC Digital Design Centre

PDC Product Development Centre

CEP Custom Engineered Product

ACP Architectural Creative Partner

D2I Design To Install

ATL Acoustic Testing Lab

Australian Owned/Operated