



MONKEYTOE EBOOK 9

PORTAL VS PURLIN: THE MOUNTING SHOWDOWN

Monkeytoe

EVERYTHING BETTER

A NOTE FROM OUR DIRECTOR

If you need to mount an equipment platform, you really have two options.

The first is building a plant room for your HVAC or other sensitive equipment. This is a great solution – if you’ve got the real estate to spare. But if you’re wanting to utilise the untapped square metres on your roof, then you need the second option: purlin- and portal/rafter-mounted roof platforms.

Which option is better for you will depend, naturally, on your circumstances. Both portal/rafter and purlin mounts are popular for new buildings; we’ve designed our options here at Monkeytoe to be light, flexible in design, durable, and fast to install.

Our work in engineering, design, and construction has reminded us that providing unbiased information and reliable resources is just as important as industry-leading products and the best service possible. So if you’re a building owner, then you need to know the smartest, most cost-effective and most reliable option for you.

So why portal or rafter mount? Why purlin? What’s going to come out on top for your needs – now and into the future?

That’s what this eBook is about: understanding not just the what, but the why of your mounting options.

Read on to find out more about portal/rafter and purlin mounts – and which is the smartest choice for you and your next mounting project.



Tim Prestidge
DIRECTOR OF MONKEYTOE

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INTRODUCTION

Why mounts

Portals/rafters and purlins are the basis of virtually every structure you'll see today. If it's got upright, straight walls and a roof, then you can guarantee that both elements will make an appearance.

In the simplest terms, when we use 'portal' or 'rafter', we mean the primary structural element of the building. They're designed to take significant weight, so they make a reliable basis for equipment mounting. Reliably spanning the portals or rafters has long been the technical challenge, however.

Purlins, meanwhile, are designed to carry the roof cladding loads as well as wind, solar panels, occasional foot traffic and snow. While not as strong as portals/rafters, purlins run across the entire roof - and can be added where extra loads are expected - to provide support anywhere.

Mounts are a reality of any building. Whether you need an access solution or a platform for a roof-mounted air conditioning unit, having secure, reliable mounts is as important as solid walls and structural stability.



But not all mounting solutions are the same. Let's take a look at where and why you might use portal/rafter or purlin mounts - especially for your platforms and equipment.



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The portal is the most widely used frame for commercial/industrial buildings like warehouses, workshops and garages – and it's little wonder. The structure is lightweight, highly rigid and strong, flexible in design, and easily constructed en masse for long buildings with a repetitive design. **Monkeytoe combines integration and application of new technologies to provide seamless control over quality and consistency.**

It's all about structural stability

To mount to the portal/rafter structure is to take advantage of a building's inherent stability – without adding additional weight to the roof itself, or additional rigid support structures taking up precious floor space.

It's a fast fix for existing buildings

Mounting directly to the building portals/rafters is often relatively fast, and optimal when purlin platforms aren't suitable. It's ideal for existing roofs where the established purlins simply don't have the capacity to safely support equipment on a purlin-mounted platform.

Portal/rafter mounting can be

Side-by-side, a portal/rafter mount will be more expensive than a purlin mount product. However, retrofitting an already-built roof with additional purlins will be considerably more expensive and cause a lot of tenant disruption – which means a portal/rafter mount soon comes out on top. Plus, there's the additional design and fitting time that needs to be considered.

When comparing options, always assess the entire project's costs to be sure you've made the right choice.

No leaks – no hassles

Yes, mounting feet are cut through the roof flashings. If done poorly, there's a risk of leaks. Not the case for us – our boots and back flashings mean that we've greatly reduced the chance of ingress.

And since we cut through the roof to mount the feet on the portal/rafter, not the roofing metal, there are no hassles for roof maintenance.

Wide mounts are a new innovation

Portal mounting has only become a viable option for some applications in recent years thanks to technological innovations. Because portal/rafter mounting typically relies on long spans – that is, across a considerable stretch of a building – this can limit which materials can be used. In the past, the only viable option was heavy structural steel, but the sheer weight of this material can be detrimental to the building structure limiting the amount of weight you can put on the platform.

Aluminium has proven to be the most popular material in recent years. It has incredible span capacity, without imposing the same load as steel, without the risk of rot like wood, and without the regular maintenance of iron-based materials.

It is, however, more flexible, which is why it hasn't historically been a great option when spanning long distances between portals/rafters.

But if we want to look into truly 21st century solutions, then we've got to talk about carbon fibre composites and the XBEAM which is lighter and stronger than anything else we've seen. XBEAM utilises aluminium's structural integrity and carbon fibre's stiffness to deliver exceptional spans and strength.

Portal/rafter mounts are easy-access

Because the platform is installed on the portals/rafters, there's a relatively clear space underneath the structure, eliminating the risk of debris build-up – and providing a clearance to get under the platform for any roof maintenance.

By contrast, purlin-mounted platforms have to be totally removed before any major roof work is undertaken. Not impossible, but worth considering for long-term work.

The XBEAM portal/rafter mount

We've designed the XBEAM portal/rafter mount to make things easier throughout the entire process

Essential for any roof mounting situation, great or small, new or existing, XBEAM is ideal for situations when clients would like to realise instant savings over costly traditional structural mounting systems.

Firstly, an XBEAM portal/rafter mount is substantially lighter than a steel equivalent. How much so? If a traditional 10m x 10m platform might weigh up to 10,000kg, the XBEAM is a mere 3,500kg. Not only does that mean less structural stress (and so less high load bearing), but it also allows a greater loading capacity for equipment.

We've also developed our XBEAM to be fully isolated with a sealed construction and pre-engineered portal/rafter frame connections. Add to that the fact that there's no risky or time-consuming hot works at height required, and the XBEAM's modular, easy-fit design makes for a simple and fast fit.

The assembly of a purlin-mounted platform takes around 25 minutes per square metre, and all must be performed at height. We've designed our XBEAM platforms to be assembled on the ground and lifted onto the roof in complete modules, requiring just seven minutes of roof-level assembly per square metre of platform. XBEAM means safer working environments, and a massive reduction in risk to you and your team.

PORTAL/RAFTER MOUNTS IN ACTION:
COLES MOUNT GAMBIER, SOUTH
AUSTRALIA

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Coles Mount Gambier mounts began as an aluminium platform project, but soon became an opportunity to showcase the span and strength of the XBeam solution.

The challenge was that the roof structure had been designed almost to its practical loading limits, and it wouldn't be possible to load up the portal/rafter with the additional weight of the aluminium solutions that we originally quoted for. So, what should they do? Invest in further costly steel work to improve the roof's load bearing capacity, or go for a lighter platform solution with broader span capabilities?

The XBeam portal/rafter mount was the answer they needed. We were able to custom design a mount system to span over the at capacity roof structure and be directly supported by the building portal frame.. Where purlin mounting simply wouldn't have been practical, mounting with XBeam meant we could achieve a span of over 9m x 9m by loading the relatively light weight of the XBeam platform safely over the strongest points.



“Monkeytoe were engaged to supply us with an alternative to our traditional structural steel rooftop mechanical plant platform.

The design utilising strong and lightweight materials is a great advantage. The seamless interface of their supports with our traditional structural steel roof beams works perfectly.

An all-in-one package complete with deck structure, mesh, and sound wall had a positive effect on the program that was a great bonus for the construction team. Monkeytoe did it all with great efficiency and speed, saving construction costs and time to our overall program. All components arrived on time and in good condition (even with the added complications of Covid-19!). Initial assembly was done in the carpark of the site and then easily craned into position on the roof.

The Monkeytoe team in New Zealand and here in Australia were efficient, easy to work with, and a pleasure to deal with. We are more than proud to have the first of your systems in Australia on our site”

- Paul Baird, Lanskey Constructions

“Originally the HVAC for Target Road was designed across four platforms with numerous walkways for serviceability. However after a rethink and redesign a single platform was proposed. Following discussions with Monkeytoe, Xbeam was suggested as a solution.

The advantages for our client have been the reduction of walkways, the ability to add an additional Air Con unit for future proofing and the reduction in structural upgrade with Xbeam supported from portal/rafter frames.”

- Brian Johns, RCG



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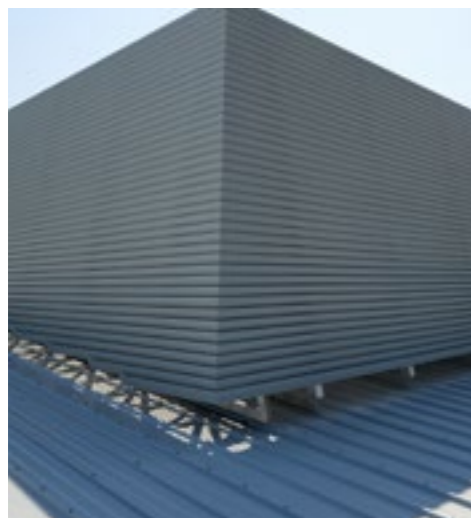
Purlins are a common enough sight in timber- or modern steel-framed roofs, stretching parallel to the eaves and providing a combination of support to the structure and to the roof above. Sometimes called “roof battens”, when you load directly onto the roof, it’s the purlins that do the heavy lifting.

Purlin mounting relies on structural support

This will be no surprise. When architects and engineers come together to discuss the loading on a roof and the placement of a platform or mount, there is often the need to boost the number of purlins in specific places. Purlins mounts are ideal for new buildings, since extra support purlins can be indeed during the design and engineering phase.

Fast installation and flexible design

As long as you’ve got the purlins, installing a mount is typically a matter of lifting a completed platform to place and fixing it down. And we’ve made things even better by the exceptional flexibility in design with our modular purlin mounts, ready for any situation. That flexibility also means that, almost regardless of the size, you can relocate a purlin mount in five years or a decade with minimal roof work required. It’s easy future proofing.



Fixing options – the good and the bad

You’ve got to remember that your roof is a weather shield, not a work surface or a structural interface – so you’ve got to treat it with care if you want to utilise it over its 50-year design life.

Mounting off your purlins means tampering with your roof, so it stands to reason that every connection point with your roof is a risk. These connection points can cause long term corrosion and damage, or immediate water ingress issues. That’s why it’s important to minimise the number of connection points a purlin mount platform has with the roof

The option we recommend for purlin mounts is our RC01 fixing detail mount, a secure system that penetrates the roof (with ingress protection in place). It’s fast, reliable, and provides excellent long-term performance. Its load bearing capacity is high, meaning fewer roof connections to support any given platform.

The second option is an industrial adhesive tape applied to the trusses. While this method is faster, and perfectly safe long-term, the removal or relocation of a purlin mount secured this way can be more challenging.

Where you mount matters, however, and here’s where it’s easy to get caught out. We always mount our RC01 through the rib (i.e. the peaks of a textured roofing) rather than the pans (i.e. the troughs). Some companies out there like to mount through the flutes – after all, this will transfer the load directly to the purlin. But here’s the catch: they create a spectacular debris trap in the flute, increase the potential for water ingress – and if your purlin mount is only a few inches off your roof, that’s a long-term hassle that’s better to avoid.

Let’s consider another aspect. You can purchase platforms that space the trusses at 600mm centres or closer – but additional, closer trusses might be hiding the fact that their trusses are of weaker, lower-quality materials and designs. The risk of roof damage is high, and the ability to maintain the roof is severely reduced.

Our purlin mounts are exceptionally strong, made of T6 marine-grade high tensile aluminium, and have trusses spaced at up to 2400mm. That means a cleaner profile, less risk of debris, and less long-term hassle.

Need to know: adhesive solutions and roof raisers

The roof raiser is a non-structural part of the roofing. In essence, it creates a space between the purlins and the roof sheet. They're becoming more and more popular in New Zealand and Australia- and they're also something that you need to be aware of if you're looking to load up your roof.

If roof raisers are installed and you want to fit a purlin mount using the adhesive tape method, well, you're out of luck. Yes, the roof raisers can be strengthened to take the additional load, but certainly not after they're already fitted. You've got to know beforehand - which is why you should involve your mounting specialists at the design stage.

We recommend avoiding the use of adhesive tape on principle, as the risk of becoming involved in a non-compliant building assembly is high.



Under pressure

When a platform is designed by engineers, it'll just be a platform situated on the roof to support equipment. The HVAC specialists and engineers will know the kinds of loading - and vibration, as we discussed in our ebook *Anti-Vibration Understanding and Isolation* - to expect and therefore design for. This tells them how to design the purlins in the areas where the additional forces are anticipated.

Something that may be overlooked, however, is the need for acoustic screening. While acoustic panels - like our HushMonkey solutions - aren't a significant load, a smart engineer will need to anticipate wind loading from the screens.

Let's paint a picture: You're in a typical three storey town or city building, and experience a gusting wind speed of 45m/s (common enough across 90% of Australia and New Zealand). Your 1.8m high screen receives up to a 2.8kPa wind force acting on the screen and a 4.3kN force acting either up or down on your mounting point and to the 1.2m centre purlins below. And our HushMonkeys are often 3m tall, almost doubling that force! Screens generate high overturning moments and put specific purlins under extreme loading like gusts, so engineers and designers need to take into account the bigger picture when purlin or portal mounting, and not simply apply a blanketed 2.5kPa vertical loading to the purlins below the platforms.

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Because the Purlin-mount Plant Platform is constructed from high-tensile T6 marine grade aluminium, it's significantly lighter than steel structures giving you the same performance with less weight on the roof.

Purlin mounts are best suited for new buildings

Mounting to the purlin is a common enough enterprise when significant weight isn't a major consideration, which is why you'll often see pergolas and solar panels mounted this way in residential applications. But for commercial or industrial buildings, where the weight of equipment can climb into the order of tonnes, existing purlins simply may not be strong enough.

So why not add extra purlins?

In new buildings, that's easy. But for an existing roof, sometimes it's not feasible or practical to get a 9m member into a roof space, nor is the cost justifiable - so consider a portal/rafter mount, where the platform can be strategically designed to transfer the loads back to the stronger building elements and bracing system, bypassing the weaker elements. There's a better chance of strategic loading, especially about knee joints.

For any roof mounting system, great or small, a Monkeytoe Purlin-mount Plant Platform ensures the simple and effective installation and mounting of condenser units, large package units or any heavy-duty equipment.

The Monkeytoe Purlin-mount Plant Platform

The Purlin-mount Plant Platform is the ultimate prefabricated solution that can be seen across Australasia in applications from rooftop mounting for air conditioning units to, viewing decks, and landings for roof area entry and exit. Anywhere that reliable strength is needed, you can find a Monkeytoe.

Because the Purlin-mount Plant Platform is constructed from high-tensile T6 marine grade aluminium, it's significantly lighter than steel structures giving you the same performance with less weight on the roof.

Best of all, we've developed the modular system to require no onsite welding or hot works. We prefabricate everything to be assembled and crane-lifted on site to get you and your clients into their spaces in no time.



PURLIN MOUNTS IN ACTION:
SYLVIA PARK GALLERIA

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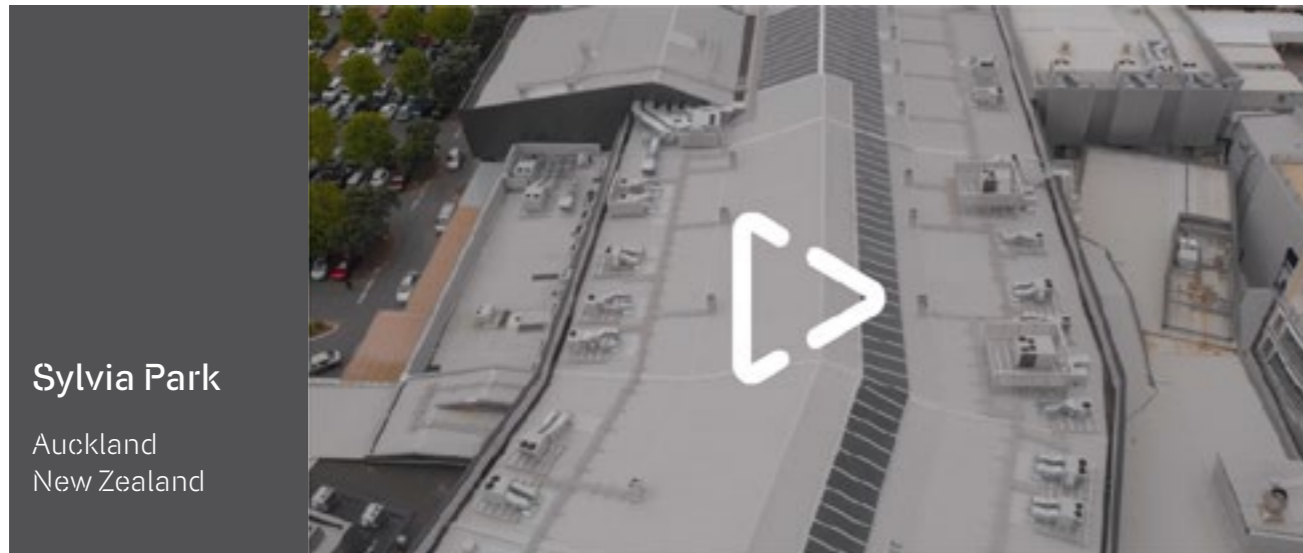
With the latest Galleria modifications, Sylvia Park has recently taken up the mantle of the largest shopping centre in New Zealand.

Considering that all works were undertaken in a live mall, and with the speedbumps of lockdown, Naylor Love rightly called the work 'extremely challenging' - but the final product has been well worth the effort. It was particularly rewarding for us here at Monkeytoe. We were brought on board for a huge undertaking, including 1,348m of walkways, 73 platforms, seven stairs, and two ramps - and we reckon it's been a resounding success.

To maintain a comfortable environment across 250 stores, Sylvia Park required a significant amount of HVAC and associated units. To best home the plants and utilise the space, we developed those 73 purlin-mounted platforms - with 831sqm of low platforms and 394sqm of high platforms - to take advantage of the excellent roofing structures and distribute the load across the robust purlins.

On completing the project, Naylor Love evaluated their many subcontractors - and Monkeytoe was one of only four subcontractors who achieved the second highest possible rating of "Preferred Contractor" based on eleven categories, including Quality, Punctuality, Organisation, Defects (or lack thereof!), Environmental, Documentation, Safety Documentation, Competence, Participation and Practices.

We're proud to have been involved with Naylor Love, Kiwi Property, and Sylvia Park on this, and to have had the chance to showcase our skills on this major project.



Sylvia Park

Auckland
New Zealand

PURLIN MOUNTS IN ACTION:
CADDENS CORNER, SYDNEY

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With over 5,000sqm of specialty retail and dining outlets, Caddens Corner in Sydney needed the best platform and access systems. We at Monkeytoe were more than happy to help with accessways to navigate their solar panel network and their new HVAC platforms.

As with any large shopping complex, there's a significant demand for platforms to host the HVAC units, as well as help navigate the solar panel-studded roof that Caddens Corner use to power the complex.

Caddens Corner's project managers approached us to design and fit out 13 purlin-mounted platforms, as well as enough Hushmonkey screening to divert any noise from shoppers so they can enjoy the full range of the complex with ease.

Portal/rafter mounting was an option with Caddens Corner, but after consultation with the Monkeytoe design team, we found the best solution was to distribute the loading across the roofing structure through the sturdy, designed-for-purpose purlins and get a great result for a more economical price.



At Monkeytoe, our focus (alongside innovation) has always been making the process easier for all involved.

Across all Monkeytoe solutions, including our portal/rafter and purlin mounts, we offer a custom design process that encompasses everything from consultation to installation. Sometimes we're talking to architects about how to maximise space with lighter, stronger solutions like the XBEAM; we might be visiting sites to scope measurements; or we're talking with the installation team to ensure it comes together just right.

Because we've developed our platforms from standard components in custom configurations (and some custom components too), we're able to develop mounting and access solutions that can span any scenario, anywhere, and for any need.

Plus, we have all the expertise in-house, which means you don't have to deal with multiple trades or consultants to get your project done, since we have dedicated specialists designing with the final outcome in mind. Step by step, we provide it all: consultation - design - manufacture - installation. We incorporate many of our modular designs and products into our custom designs, which streamlines the process even further.

We're here to make it easy. So whether you need unbiased advice, engineering and design support, or help installing your Monkeytoe purlin- or portal-/rafter-mounted platform, reach out to us.



Coles
Flagstone

Brisbane
Australia



KEY TAKEAWAYS

	Monkeytoe Portal/ Rafter Mount	Monkeytoe Purlin Mount
Basis	Transfers all forces to building portals or rafters	Loads off roofing purlins at up to 2400mm truss spacings
Pre-work required	Minimal	Additional purlins designed into roof structure
Constructed from	XBEAM carbon fibre and T6 marine grade high tensile aluminium	T6 marine grade high tensile aluminium
Best suited for	New or existing buildings	New buildings
Applications	Anywhere where long spans are required and self weight	HVACs, plant equipment where existing structure is suitable
Speed of install	Fast	Fast
Ease of install	Excellent	Great
Hot works at height	None	None
Ease of access to roof below	Excellent	Good
Risk of ingress	None with Monkeytoe boots	None with RC01 or adhesive
Fixing methods	Boots with back flashings through roof	RC01 fixing detail mount through or adhesive on the roof flange
Customisable design	Yes	Yes



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