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Your guide to Decking Subframes

Choosing your subframe

The subframe of a decking area is one of the **most important** parts of having a deck installed. Whilst the subframe is generally hidden, it is crucial for the decks longevity.

A poor subframe choice or install can lead to the decking being damaged or can even lead to the decking becoming **structurally dangerous and eventually failure**. With so many different subframes to choose from, which one is best and what should you look out for?

This document looks in depth at three different subframe options: timber, recycled plastic (Plas-Pro) & aluminium (DuoSpan). We will review the benefits and drawbacks of each and the guidance for the installation.

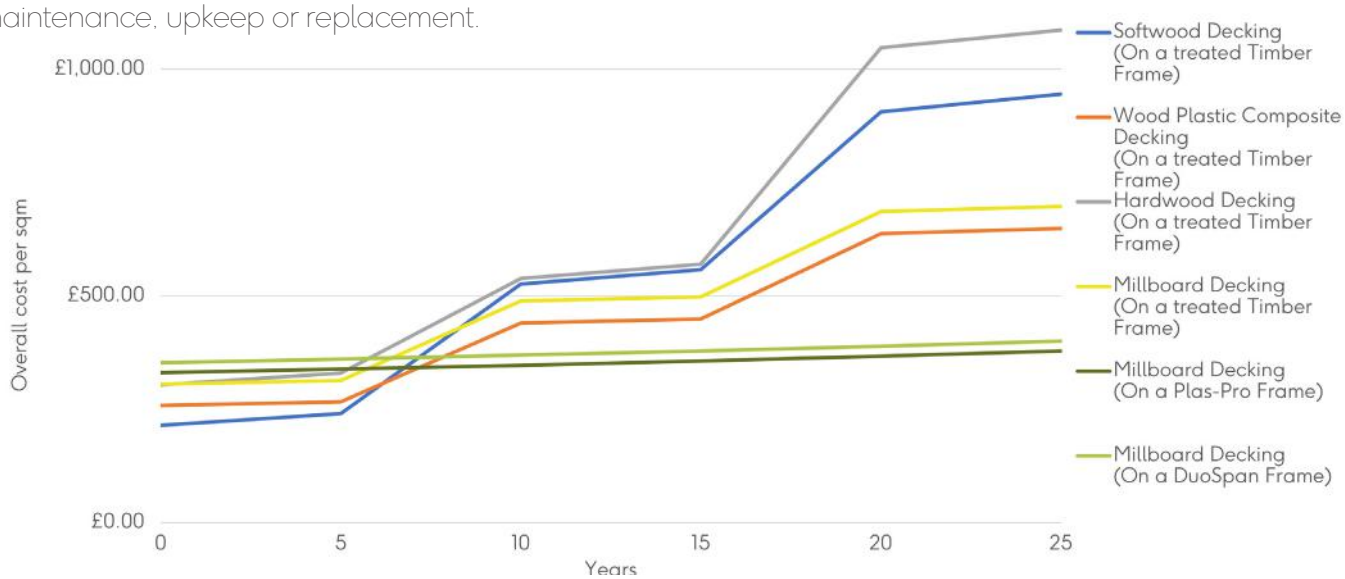
An overview

Each subframe option has pros and cons. Use the below table to decide the best option for your project and client. Further detail for each option is provided within the guide.

	Softwood Timber	Plas-Pro	DuoSpan®
Resistant to rot	★☆☆	★★★	★★★
No ventilation required	☆☆☆	★★★	★★★
Ease of install	★★★	★★☆	★★★
Speed of install	★★☆	★★☆	★★★
Resistant to warping or twisting	★½☆	★½☆	★★★
Strength	★★★	★★☆	★★★
Lifetime structural strength	★☆☆	★★☆	★★★
Use in high-moisture areas	★☆☆	★★★	★★☆

Cost comparison

The costs for each subframe option over a 25 year period can vary dramatically. Use the comparison graph below to look at the value of the subframe choice compared to other options, taking into account maintenance, upkeep or replacement.



Based on a flat clear area without any extra detailing, additional detailing, project size and complexity may change the costs. Regional variations due to topography, access and location can also affect costings. Inflation at a rate of 2% per annum taken into consideration. All rates excluding VAT.

For an accurate installed cost for your project please consult your nearest Millboard Approved Installer **www.millboard.co.uk/find-an-installer**

Timber Subframes

Softwood timber is the most common material used for decking subframes, Millboard decking has been fitted on these types of subframes for over ten years.

Timber is **easy to work with, generally readily available**, and is naturally a **strong product** with a high strength-to-weight ratio. When correctly specified and installed, timber subframes can have a long service life.

However, there have been many examples of timber subframes that have **failed within 6 years** of being installed, with the failings being identified to be attributed to: a lack of understanding of the requirements of timber, incorrect timber being used in the wrong location and bad workmanship.

Whilst a common belief is that 'all treated timber is suitable for decking subframes', this is incorrect as the classification of pressure treatment can make a big difference on the longevity of the frame.

Although two treated timber profiles may look the same they may carry **very different classifications** and be designed for use in **different locations**.

On the following page we have detailed a number of points to bear in mind when buying timber for a subframe, as well as guidance that should be taken into account and followed when building the framework.

This guidance is readily available from industry professional organisations such as The WPA (Wood Protection Association) and TRADA (The Timber Research and Development Association).

Additional material details and installation tips

• Any softwood timber used for a decking subframe should be **treated to Use Class 4 (UC4)**, this is a higher classification than a 'interior-grade' Use Class 2 (UC2) timber which is typically used. More information on this can be found on the WPA's website here: www.thewpa.org.uk/make-sure-it-s-4

• This pressure treatment Use Class should not be confused with timber structural grading (C16, C24, etc), although **C16 should be used as a minimum requirement**

• Any cuts, notches or drill holes should be coated in two liberal brush coats of suitable **end grain preservative**, and only the **uncut post end** should be used in the ground or in a concrete foundation.

• It is recommended for the post to be raised off the ground by a metal support bracket, if sunk into the ground the timber posts should be coated in a bituminous paint or similar.

• The timbers should have a **moisture content of less than 22%** before being used, therefore they may need to be left to dry out before being installed. This is to minimise the potential for defects such as cupping, warping and cracking during installation.

• Timber subframes should be clear of the ground and must have an **airflow ventilation gap** around the outside, and a free air space across the whole underside of the frame that will not impede the free flow of air. A minimum gap of 50mm is normally required.

• The best type of construction is with beams attached to the posts with the **joists across the top**. Alternatively, if the joists are at the same level as the beams, joist hangers should be used.

• Any beam/joist attached to a wall as a ledger should be **packed off by 10mm** and should not block airbricks.

• Stainless steel, hot-dipped galvanised or high-performance coated metal components/fixings should be used, **not standard electroplated fixings** (BZP or Zinc and Yellow).

Plas-Pro Subframes (Recycled Plastic)

Plas-Pro is an excellent alternative to timber for constructing the framework for decks, seating, planters and more. Constructed from recycled plastic, Plas-Pro is **strong, versatile and easy to work with**.

Available in a range of sizes to act as posts, joists and bearers, it can be fitted in a similar way to wood yet **never rots, even when placed in water.**

The flexibility of Plas-Pro means that it can also be used to create **unique and special outdoor constructions**, incorporating **curves and twists** that would be impossible with conventional materials.

The benefits of Plas-Pro over timber are that Plas-Pro can be used in contact with the ground and in water **without the need for any airflow ventilation gaps**; it can be sunk into the ground and surrounded fully with moisture without adverse effect.

Being a non-rot system, Plas-Pro can be used in areas where the subframe is likely to **constantly get wet**, such as areas around swimming pools, areas in boggy marshland, areas over lakes/pond and other similar environments.

It is also the ideal solution for subframes over roof terraces where **heights are reduced** and therefore ventilation is closed off, as timber would have a higher chance of rotting.

Plas-Pro is similar to timber in that it can be **cut, drilled, fixed into and bolted**, making it an easy framework for building planters, seating, flowerbeds or other small outdoor structures.

As Plas-Pro is made from recycled plastic there are a number of points to bear in mind when using it for your subframe, which we have detailed on the next page.

Additional material details and installation tips

• Slight differences in relation to colour, texture, temperature, and dimensional variations are possible **within +/- 3%**.

• The profiles may exhibit length variations of +/- 1.5% due to temperature fluctuations. **An expansion distance (expansion joint) must therefore be maintained during installation**. As a rough calculation the profiles move at around 0.165mm/m/°C, therefore a 125x50x3000mm profile will move roughly 0.5mm per degree of temperature change.

• **Plastic doesn't have the same strength-to-weight ratio as timber** therefore will need more support. The spanning capability of Plas-Pro is around half that comparatively of timber.

• When bolting Plas-Pro together, **the profiles to be fastened must be pre-drilled**. The hole must be larger than the bolt, if using Millboard 6.3x90mm hexhead screws, an 8mm hole should be used. Elongated slots are recommended to account for the temperature-related expansion of the material.

• To avoid material deformation, do not store in the sun or on uneven ground. Direct sunlight can cause the lengths to bow slightly. Whilst timber can twist when it is drying out, **once Plas-Pro is straightened out it will relax into this position**.

• Recycled plastic products have a **closed surface**. The core may have a honeycomb structure, which becomes visible during machining. The main strength in the product is in 5-10mm of the outer edge.

• **Plas-Pro profiles are best cut using circular saws with carbide-tipped (TCT), multi-purpose blades with fewer teeth**. Quickly remove any shavings to avoid smearing the plastics, do not force the saw when cutting.

• When fixing into Plas-Pro, due to it being a denser material, the board may jack up when fixing. It may be necessary to drive the fixing in three-quarters of the way, undo it to half of the way, then fully fix to **5mm below the surface of the Millboard decking board**. This should reduce the board jack up effect.

• If Plas-Pro is being used in cold weather it can become harder and brittle. Therefore, in addition to the 8mm relief hole, **a 5mm pilot hole** should be used when using the Millboard 6.3x90mm hexhead screws, keep the fixing 10-15mm from the outer edge – to help prevent the edges of the Plas-Pro from splitting.

DuoSpan Subframes (Aluminium hybrid)

DuoSpan is a unique landscape construction frame, it is made with a combination of aluminium joists and beams, aluminium brackets and plastic support profiles. This combination enables **distinctive design opportunities** for decking and outdoor structures that would be impossible with timber subframes, due to the superior strength of aluminium and flexibility of plastic.

There are many advantages for using the DuoSpan subframe over timber subframes, this includes the material properties of DuoSpan and also the **ease and speed of the installation**.

Being made from aluminium, the joists are **resistant to rotting or moisture ingress**, negating the need for airflow gaps to the framework or end-grain preservative treatment.

With other solutions the profiles aren't always rigid and straight, leading to numerous noggins being required to help in the installation, whereas with DuoSpan the aluminium joists and beams are almost **perfectly straight**, resulting in a **faster install.**

The DuoSpan subframe system comes with a range of fixed and flexible brackets that allow the components to be connected at **almost any angle** these brackets are uniquely designed to fit perfectly into the side of the joist, helping each joint sit flush.

Screw-locating grooves on the side of the joists and self-drilling screws ensure **fast, consistent fitting**. The self-drilling screws provided with the brackets are made from **A4 marine-grade** stainless steel and they are coated in a **cathodic barrier coating.** This is to minimise the potential for galvanic corrosion between the aluminium and stainless steel, as seen with typical screw fixings.

DuoSpan has been designed with the help of industry professionals to comply with **Eurocode 1: Actions on Structures (BS EN 1991-1-1)**, it has been assessed for point loading and square metre loading in both domestic and commercial applications.

This means that the joists and beams can achieve increased **spans of up to 1.8m and can cantilever up to 600mm***, both comparably larger than that of timber or plastic subframes.

The DuoSpan joists and beams can be cut in a similar way to timber with an aluminium cutting blade, standard carpentry tools are used in fitting the framework together. We have detailed a few installation tips and points to note when working with DuoSpan.

*Please refer to our loading tables for the full lists of spans in the required locations

Additional material details

- The DuoSpan joists and beams should not be placed in close proximity to sea salt, direct contact with water or sunk into the ground without a protective coating, the **Plas-Pro profiles are best suited for putting into the ground**.
- Where the DuoSpan Joists and Beams are used in **highly alkaline or acidic areas**, including industrial locations, they should be coated to reduce the risk of corrosion.
- If the DuoSpan joists or beams are used within 1m of a swimming pool, they should be installed with a **strip of DPC across the top** to limit the likelihood of chlorinated water contacting the aluminium.
- Where the DuoSpan joists and beams are placed in direct contact with concrete, a protective layer is required. They should be **powder coated or coated in a bituminous paint in these applications**. If the joists are being laid directly over a concrete base, they can be separated by the DuoLift acoustic separation pads.
- Avoid using different fixings or putting the **DuoSpan aluminium components in contact with other metals, as increased galvanic corrosion could occur**. If they do need to be put together they should be separated by a separation/insulation material, such as: plastic (DPC), EPDM or Neoprene

"The guys at WT Construction came up with a proposal to try the composite and aluminium deck frame system from The Millboard Company. The client wants a 60m2 deck on a difficult and exposed site and this system appears to fit the bill.

When I am sourcing new products the strength of the technical sales team is a really important factor. The people we have spoken to thus far have been superb.

The system is really straight forward to install and is obviously well thought out, there is nothing worse than a good idea that hasn't been tested and refined. The guys have about half the frame down and should finish the rest of it tomorrow."

Hywel Joseph, Director at WT Construction

millboard.co.uk

fenceweb.com

The Millboard Company Ltd
UK Head Office
Unit A, Castle Court
Bodmin Road
Coventry CV2 5DB

T +44 (0) 24 7643 9943
F +44 (0) 24 7661 1668
E enquiries@millboard.co.uk

Company registered No. 06061318
VAT No: 980 616602

Fenceweb B.V.
Strootsweg 8
7547 RX Enschede
The Netherlands

T: +31 85 064 56 53
E: business@fenceweb.com