



G-frame
structures ltd

A selection of award winning residential projects

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County Down Barn

An architect's home on Grand Designs

A contemporary take on a traditional barn conversion formed of a one-storey CLT structure installed above a restored stone barn. The CLT upper floor of the long, narrow house is formed of a long open span with limited structural interruptions to the flow. This has been achieved by use of an innovative system of external 'over-truss' roof supports developed by G-frame as part of the design, supply and installation of the CLT superstructure.

The County Down Barn is featured on Grand Designs – Series 18, Episode 3.

Type of Project: Private Residential
Location: Ballygowan, Northern Ireland
Client: Private
Architect: Micah T Jones
Main Contractor: N/A
Timber Engineer & Contractor: G-frame / Furness Partnership
Glulam Supplier: Bullinger
CLT Supplier: Stora Enso
Project Duration: 4 Days
Area: 122 m²
Completion: May 2016



RSUA Design Awards: House of the Year



RSUA: Small Project of the Year



RIBA Northern Ireland: Regional Award



Structural Timber Awards: Shortlisted

IMAGES: Roberts & Treguer



CLT was specified for several reasons including its enhanced thermal and air tightness performance – a major benefit as all the insulation on the house is external. Other key considerations were CLT's structural ability to achieve the clean, long spans that Micah was looking for its high quality finish which was important because internally the CLT has been left exposed throughout.

The Barn is laid out as an upside-down house with the main living space on the first floor and the bedrooms and bathroom at ground floor level. The house is long and narrow and Micah has designed the CLT upper floor to create a 'tunnel of timber' effect, formed of one long open span. This has been achieved by an 'over-truss' solution developed for the project by CLT specialist G-frame Structures where the trusses are placed on top of the roof and the roof is 'hung' from them making only the tie beams visible internally.

CLT off-cuts from the windows and doors have been used to form the staircase which links the ground floor sleeping areas to the living space above. CLT offcuts have also been used to form kitchen furniture, tables, built in furniture and an internal log store; both to minimise waste and create a cohesive finish.



“The initial brief was to have no trusses at all and to use twice as many beams placed externally, but this added too much cost and G-frame were able to design a solution that works really well, uses less timber and has had the added benefit of opening up and zoning the space,” says Micah. “The result is the modern, open space we wanted instead of the more traditional barn conversion with internal triangular trusses placed every few metres which would have effectively closed down the space.”



A centrally located 'hub' on the first floor landing provides a family room with a mezzanine play space above. To one side of this, at the top end of the house, is the open plan kitchen, dining space and living area or 'snug'. Another, quieter living space is located on the other side, from where the full length of the house can be seen with the surrounding landscape visible through the doors at the far end.

The County Down Barn is believed to be Northern Ireland's first completed CLT building and it has set a precedent with NI Building Control which it is hoped will pave the way for people wanting to build with the material in the future, including a fire engineered solution which allowed the CLT to be left exposed internally.



Holly Lodge

Luxury family home in rural setting

A high-end two-bedroom family home set within a secluded, tree lined plot in the Essex village of Childerditch. Inspired by the unusual sloped site, the house is formed of a gabion walled basement housing a double garage and workshop, with a cantilevered CLT structure above featuring two floor to ceiling structurally glazed gables, which provides the main family living space. Working jointly with our parent company Murform, G-frame delivered a full CLT and concrete package incorporating the design, supply and installation of the CLT structure along with the piling, groundworks, drainage and installation of the reinforced waterproof concrete basement.

Type of Project: Residential
Location: Childerditch, Essex
Client: Private
Architect: Spatial Design Architects
Main Contractor: MKH Builders
Concrete Works: Murform Ltd
Engineering: G-frame / Furness Partnership
CLT Supplier: Binderholz
Project Duration: Concrete: 10 weeks
CLT: 3 weeks
Area: Concrete Basement – 80 m²
CLT ground Floor – 150 m²
Completion: 2021

IMAGES: Spatial Design Architects / Murform



Redshank Beach House

Artist's beach studio

A private beach home built from hybrid CLT and steel frame accommodating a single storey CLT dwelling which is elevated 2.7 m above ground level using three large steel columns. The new home is located on the coastal salt marshes of St Osyth, an area within a National Nature Reserve and Site of Special Scientific Interest. The area is prone to flooding and elevation of the frame has helped to address this issue as well as minimising environmental impact and disruption to the nature reserve.

Type of Project: Private Residential
Location: St Osyth, Essex
Client: Private
Architect: Lisa Shell Architects with Marcus Taylor
Main Contractor: Macmillan & Wright Ltd
Timber Engineer & Contractor: G-frame / Furness Partnership
CLT Supplier: Stora Enso
Project Duration: 5 Days
Area: 60 m²
Completion: 2015



RIBA East Small Project of the Year

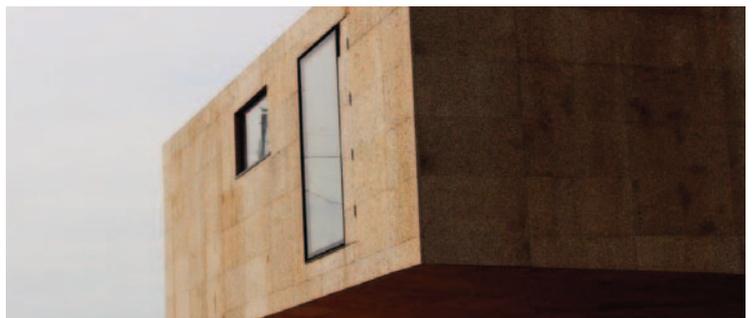


RIBA House of the Year: Finalist



RIBA Homes Awards: Finalist

IMAGES: Stora Enso



Origami House

New living space created in garden of family home

A unique one bedroom, open-plan family annexe formed of an unusual folded plate Origami structure. The highly constrained site backs onto a church and is located within a sensitive West London conservation area, in the rear garden of a locally listed house. The sculptural Origami geometry was inspired by the retained irregular foundation footprint of a previous garden studio which the new building replaces. G-frame Structures were responsible for the supply, design and installation of the CLT structure.

Type of Project: Residential
Location: Ealing, London
Client: Private
Architect: KSKa Architects
Main Contractor: ARI Construction
Engineering: G-frame / Furness Partnership
CLT Supplier: Stora Enso
Glulam Supplier: N/A
Project Duration: 1 week
Area: 65 m²
Completion: Autumn 2019



Don't Move, Improve Awards:
Shortlisted



Structural Timber Awards:
Shortlisted



Ealing Civic Society Awards:
Commended

IMAGES: KSKa Architects



Origami House is a one bedroom, open-plan family annexe formed of an unusual Cross Laminated Timber (CLT) folded plate Origami structure. The new building, which has been designed to meet Passivhaus standards, replaces a dilapidated home office in the rear garden of their listed house. The scheme was designed by KSKa Architects who, following their original award winning extension of their client's home, were given a free hand to reimagine and repurpose the old building into a single storey starter home for their adult daughter.

The main home is located in a conservation area, sitting opposite a Grade II listed Victorian gothic church – an iconic landmark which, now converted to flats, has moved operations to a church hall building adjacent to Origami House. The original outbuilding footprint has been expanded to meet the church hall's boundaries and replaced with a new build dwelling supported on the original recycled floor slab and piled foundations which have been lowered by 15cm.

“The original flat roofed brick building had little architectural merit except for its unusual polygon shaped footprint which was generated by the geometry of the corner of the garden in which it was sited,” says Matt Keeler of KSKa Architects. “The unusual building footprint was a gift that presented geometric opportunities to re-sculpt the space using a combination of two simple rectangular volumes for the bedroom and dining spaces, arranged to produce a triangular bathroom and polygon shaped open-plan living space.”

“The triangulated, folded plate ‘Origami’ geometry grew from our explorations and, combined with the need to work within the conservation area's tight planning height constraints, added layers of sculptural complexity to the exposed CLT structure. It was really about working with the existing geometry: what flowed naturally from the polygon shape was to consider how to create the roof in the most elegant way, while overcoming the height constraints. The folded plate roof concept offered the most efficient structural solution to achieve maximum height and volume over uninterrupted 6m CLT spans, but with the minimum thickness of structure. The structural and dimensional properties of CLT made it the natural choice for this project, allowing the creation and expression of a folded plate solution for both roof and structural wall panels.”

Fabric first principles were adopted from the outset and use of CLT was a key element that enabled the enhancement of the specification to aim for as close to Passivhaus standards as possible. The CLT frame is super insulated externally to achieve Passivhaus standard U values of 0.12 W/Sq.mK for walls and 0.13 W/Sq.mK for the roof. The glazing specification has been enhanced to triple glazing. The precision of the CLT superstructure is the foundation to achieving such a high level of air tightness and a high efficiency mechanical ventilation heat recovery unit (MVHC) together with a super insulated air tight envelope means that very little heat is required from the additional warm water underfloor heating.

“As KSKa's first exploration of structural timber, this small building is a demonstration of the structural, aesthetic and logistical benefits of CLT. Erecting the panels on site was effectively a scaled up version of the cardboard design maquette we made in the office,” Says Matt. “Because we were building in the garden of a private home, it was essential to achieve a fast, clean and efficient build therefore CLT's speed and ease of construction were key considerations.”

CLT is a clean and tidy method of construction which meant the disturbance for neighbours was minimised with less waste and fewer deliveries and operatives on site. Hybrid construction specialists G-frame Structures who were responsible for the design, supply and installation of the CLT structure were on site for a total of two days with just three operatives and one delivery of CLT.

CLT's high degree of accuracy also ensured that the complex geometric frame would be pre-fabricated and arrive on site ready to be erected within mm tolerance. Aluminium doors, windows and rooflights were pre-fabricated and fitted immediately the structure was completed meaning it was weathertight within a week. This in turn enabled the fast commencement of cladding and interior fitout.

Internally, exposed CLT provides the finished surfaces of the roof and walls, therefore all electrical sockets and switches were factory pre-cut simultaneously with doorways and window apertures.

“Minimal additional internal finishes were required since the beauty of the CLT structural panels has been left on show,” says Matt. “The owners love the Origami concept and have bought into a Scandinavian aesthetic of exposing the CLT internally. They have high standards and are very into style; they liked the idea that Origami House would have a completely different feel to the main home.



Coombe Road, Kingston Upon Thames

Residential rooftop extension on commercial building

A CLT structure erected on the roof of an existing three storey building to create an office to residential conversion at Coombe Road, Kingston. Fifteen 1-bed and 2-bed flats have been created with an additional eight rooftop duplex apartments. The building was occupied throughout requiring the roof to remain in-situ and water-tight at all times. G-frame Structures devised an innovative method of erecting the structure on temporary stilt-like brackets drilled into the roof at 500 mm intervals which were filled with resin to prevent water penetration. Once the new structure was water-tight the temporary brackets were removed and the CLT infill panels installed.

Type of Project: Residential
Location: Kingston Upon Thames, London
Client: Kingstreet Group
Architect: Stephen Davy Peter Smith Architects
Main Contractor: Trident
Timber Engineer & Contractor: G-frame
Engineer: Furness Partnership
CLT Supplier: Stora Enso
Glulam Supplier: Bullinger Holzwerke
Project Duration: 14 weeks
Area: 800 m²
Completion: February 2016

IMAGES: Kings Street Group / Dexters



Water Gardens Pod

Roof top extension created in tight infill space

High-end rooftop extension installed on top of a building which sits beneath a seventeen storey apartment block. The innovative new home slots neatly between the two existing buildings demonstrating the versatility of CLT and its ability to overcome tough design and site requirements. The mono-pitched pod accommodates three inward facing bedrooms and three bathrooms. The dwelling, which features exposed CLT internally, sits on an elevated platform and links to the main building by a glass entranceway. G-frame Structures were responsible for the design, supply and installation of the CLT structure.

Type of Project: Residential
Location: Paddington, London
Client: Private
Architect: Fletcher Crane Architects
Main Contractor: ME Construction
Engineering: G-frame / Furness Partnership
CLT Supplier: Binderholz
Glulam Supplier: N/A
Project Duration: 1 week
Area: 75 m2
Completion: Autumn 2020



Structural Timber Awards:
Shortlisted

IMAGES: The Furniture Warehouse



Cross Laminated Timber airspace extensions

G-frame Structures Managing Director, Lee Murphy, assesses the challenges and benefits of using mass timber in roof top construction.

The G-frame team designed, supplied and installed CLT for all projects mentioned.

Benefits and challenges

Expanding into the airspace is a good way for building owners to maximise the return on their investment, and it meets the 'Don't Move, Improve' agenda by providing additional family living space or an independent first home for adult offspring squeezed out of the housing market by spiralling costs. However, there will be some issues for project teams to be aware of that are specific to rooftop developments, including the questions of weight and how to interface with the existing structure. As a mass timber and hybrid construction specialist we have recently delivered several cross-laminated timber (CLT) airspace schemes and there are generally logistical constraints around site access, material deliveries to site and working on the rooftop of a potentially occupied residential building. This is where CLT comes into its own; CLT is a lightweight material, highly accurate and efficient due to prefabrication, and its use ensures speed and ease of construction with zero waste. Operating on just-in-time principles, the number of deliveries with CLT is minimised, as is disturbance to neighbours and the pre-cut panels can be lifted on by crane, which is a major benefit due to the constrained nature of many rooftop sites.



Residential extensions

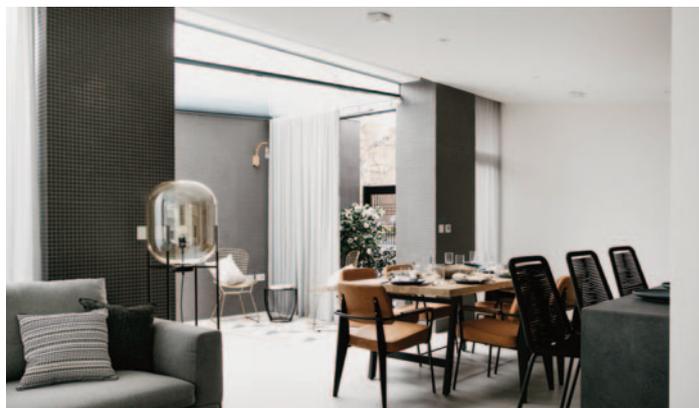
The private residential sector is seeing an increase in the number of airspace schemes, both single and multiple units. 'There's a huge opportunity for airspace developments in the private residential sector, as long as they're done well,' says Mark Stevens of HASA Architects. 'The development needs to be responsive to the typology and context. I think we could develop airspace typologies, for example, with modularised systems or a choice of typologies that can work on Edwardian or Victorian terraces. This could certainly address the shortfall in housing, as well as giving people the option to grow instead of having to move.'

HASA has recently completed a 25m² rooftop extension for a private client in Tanner Street, south London. The home is an end of terrace house, part of an original Victorian boarding school that was converted in 2000 into six semi-detached houses. 'The client wanted to achieve an en-suite master bedroom with roof terrace and to get the maximum amount of light possible to the property. They had a relatively limited budget and wanted something that would be quick to erect, so we took them through the path of looking at a CLT prefabricated structure that could sit on the existing building. We used CLT in its raw state with a light white wash.'

'One thing we learned was that if we were to do a similar project we would partner up earlier on in the planning stages with a mass timber specialist like G-frame Structures. There is a lot of thought required and by partnering with a specialist early on you get greater cost certainty.'

Harry Reid, Architect at Fletcher Crane Architects, comments: 'The majority of new buildings are still using traditional construction, but the question is - is it a responsible piece of architecture in terms of materiality and climate? Architects need to have this at the forefront of their minds and persuade stakeholders and clients down this route, even if it ultimately costs them a bit more.'

Fletcher Crane Architects completed Water Gardens Pod in 2019, delivered after winning a competition held by the Church of England Commissioners to design a home for private rental at Paddington's famous brutalist Water Gardens Estate. The innovative new home slots neatly between two existing buildings demonstrating the versatility of CLT, and its ability to overcome tough design and site requirements. The mono-pitched pod, which accommodates three inward-facing bedrooms and three bathrooms, features exposed CLT internally and links to the main building by a glass entranceway.



Commercial to Residential extensions

Commercial buildings also provide an ideal environment for the addition of two or more storeys. In 2016 Lancelot Homes used CLT to create eight duplex apartments on the roof of a 1970s, three-storey brick built, mixed-use commercial and residential building in Kingston-upon-Thames. The scheme was designed by Stephen Davy Peter Smith Architects to Level 4 of the Code for Sustainable Homes.

'From the outset the design intent was to develop generously sized residential units that would be compliant with the London Plan should the client wish to sell it on, for example to a housing association,' says Architect, Stephen Davy. 'Lancelot homes were keen to use CLT for the scheme and we were familiar with CLT and keen to use it, too. The building structure and layout could accommodate CLT and it helped resolved complex roof geometries at the rear of the scheme where a small neighbouring courtyard raised some right of light and sunlight issues. The fact that the panels are formed in highly efficient factory conditions and the elements cut to fit allowed us to get an envelope up quickly, including the complicated roof pitches which were then overclad. This was far easier than installing a steel frame then having to adjust and work the geometries and fill the gaps between.'

The great thing about this building was that, although only three storeys in height, it was a concrete frame, a pretty solid structure for that scale of building, which meant adding the two storeys on top wasn't an issue. A commercial building is generally designed to take heavier loads and, by using a lightweight structural material such as CLT, the potential is there to add storeys. However, some more modern commercial buildings may have a substantial frame, but the nature of the build could make it trickier; for example, with a steel frame office building you would have to consider more carefully the detailing and isolation for sound transfer between units.'



It is clear that airspace extensions offer a new avenue of opportunity for innovative construction. In terms of land use, these schemes are all about re-use and adaption which are two of the key issues of our time for inner city living. Fundamentally, the projects address the issues of high density living in an ingenious and creative way with the efficient re-use of existing structure. CLT is the ideal material for the versatile and flexible design required to make the most of these sites. Its environmental benefits can only add to its suitability as a construction method for achieving airspace extension.



Blaker Island

Blaker Island – The Warehouse and Howard’s House

A new private residential CLT development built in Stratford’s Back Rivers on a small, man-made, operational lock-keeper’s island. The new five-storey apartment block and pair of semi-detached town houses are highly energy efficient and have been designed to meet passivhaus airtightness standards of 0.6 ACH. To overcome complex weight and accessibility constraints presented by the island, G-frame Structures devised an innovative installation strategy: a 100 tonne mobile crane was erected adjacent to the site and used to lift in a self-erecting IGO50 mini tower crane to the island. This enabled the G-frame team to safely and efficiently deliver both buildings in just six weeks.

Type of Project: Residential
Location: Stratford, London
Client: Roberts & Treguer
Architect: Roberts & Treguer
Main Contractor: Argyll Building Services
Engineering: G-frame / Furness Partnership
CLT Supplier: Stora Enso
Glulam Supplier: Holzwerke Bullinger
Project Duration: 6 Weeks
Area: 1140 m²
Completion: Spring 2018



Structural Timber Awards: Winner

IMAGES: Roberts & Treguer



Blaker Island, a small, operational lock-keeper's island on Stratford's Back Rivers has been transformed by Roberts & Treguer's residential scheme which provides seven spacious homes in two new semi-detached town houses (Howard's House) and a five storey apartment block (The Warehouse) built either side of a listed and refurbished 1930's lock keepers house.

Roberts and Treguer's design concept was driven by the desire to provide high quality, low energy homes whilst preserving the location's history. It is estimated that over a 60 year period a typical dwelling at Blaker Island will save 192 tonnes of CO2 compared with a typical UK home. Airtightness details for both new buildings are designed to 0.6 ACH which is the maximum allowed for achieving Passivhaus standard. Windows are triple glazed and junction detailing between window and CLT wall panels has been carefully considered. Energy efficiency is further improved by a compact unit in each dwelling which combines MVHR with an air source heat pump to provide ventilation, heating and hot water

Sound separation at the Warehouse was achieved by the use of double-layer CLT walls around the full height central core which houses the lift shaft and staircase. The two walls are separated by only a 90 mm space and to overcome the inaccessible nature of this element of construction, G-frame Structures used discreet connections which also contributed to the overall aesthetic of the building.

Use of CLT was key in overcoming weight and access limitations presented by the site which is surrounded by river walls owned by the Canal Trust. The G-frame team installed both Howard House and the Warehouse apartments in just 6 weeks. The installation strategy involved the erection of a 100 tonne mobile crane adjacent to the site which was used to lift in a self-erecting IGO50 mini tower crane to the island.

The G-frame team installed both Howard House and the Warehouse apartments in just 6 weeks

Externally the development presents a varied streetscape and Roberts & Treguer have taken care to reflect the history of the Island and surrounding waterways. Though having the external appearance of one single house, Howard's House is comprised of two spacious three bedroom homes. The design is based on the original home of the 19th Century chemist and amateur meteorologist Luke Howard which was originally situated on the island but demolished in 1934. Howard is known as the 'Namer of Clouds' for having developed the nomenclature system for cloud classification which is still used today.

Inspiration for the adjacent Warehouse, is taken from the local vernacular of traditional warehouses to be found on the rivers and canals of Stratford. The Warehouse is very generously proportioned with just one three bedroom apartment on each of the ground, first and second floors and a two bedroom penthouse on the third and fourth floors. Bedrooms and large open plan kitchen/living spaces lead from a central hallway and the building features a recessed roof garden which has been achieved by an innovative solution developed by G-frame Structures and Furness Partnership whereby the beams effectively act as a cradle for the floor which hangs beneath.

Internally, all the new homes feature exposed CLT throughout with accent provided by a simple monochrome palette which contrasts well with the texture and colour of the wood. All homes on Blaker Island were sold on first viewing.



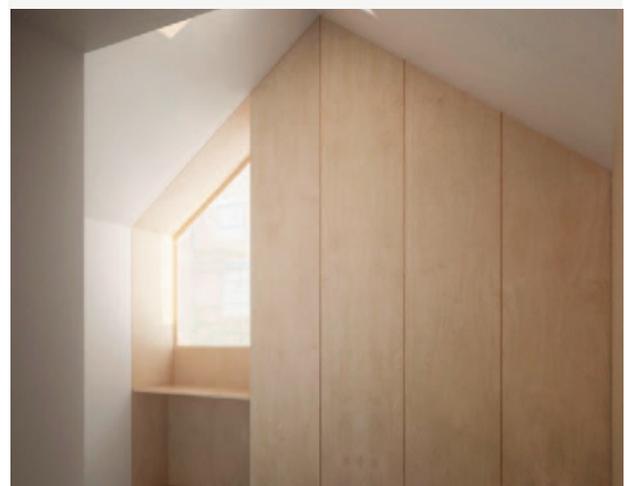
Tanner Street

South London airspace extension

A 25m² airspace extension at a private dwelling in south London. The end of terrace home is part of an original Victorian boarding school that has been converted into six semi-detached houses. The roof-top extension, which comprises an en-suite master bedroom with roof terrace, is designed to maximise available light and features a limited palette of materials. The CLT has been treated with a light whitewash and left exposed throughout. G-frame were responsible for the supply and installation of the CLT structure.

Type of Project: Residential
Location: South East London
Client: Private
Architect: HASA Architects
Main Contractor: Giles Oliver
Engineering: Axiom
CLT Supplier: Binderholz
Project Duration: 5 Days
Area: 25m²
Completion: Spring 2021

IMAGES: HASA Architects



Lammasfield Farm

Family home in rural Somerset

A four bedroom family home which replaces an old stone building located on a complex curved site. The original stone has been re-used at ground floor and a CLT upper floor added which features high vaulted ceilings and floor to ceiling windows in the main living spaces. CLT has also been used to create shutters, sliding panels and bespoke joinery. At first floor the house opens into an upper garden with a swimming pool and the ground floor opens into a lower garden. A courtyard has also been created with part of the existing structure. G-frame Structures were responsible for the design, supply and installation of the CLT structure.

Type of Project: Residential
Location: Somerset
Client: Private
Architect: Micah Jones Architects
Main Contractor: Stonewood Builders
Engineering: G-frame / Furness Partnership
CLT Supplier: Binderholz
Project Duration: 2 Weeks
Area: 50m²
Completion: Autumn 2021

This is the second of our projects with Micah Jones Architects.

IMAGES: Micah Jones Architects





Award winning mass timber and hybrid structures

G-frame Structures is a family run construction firm specialising in the delivery of Cross Laminated Timber, glulam and hybrid frames. Our award winning projects range from rooftop extensions, small projects and bespoke private homes to multi-storey residential, educational and workspace buildings. Our parent company is a specialist in groundworks, formwork, rebar and concrete which enables us to deliver a unique hybrid mass timber, concrete and steel package. This unified approach simplifies the procurement route and achieves programme efficiencies in terms of speed, accuracy and overall project co-ordination.

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