



The system

Bearing-Frame

From interconnected components to an interconnected structural system

Load-bearing frame structure, prefabricated in modules, assembled on site

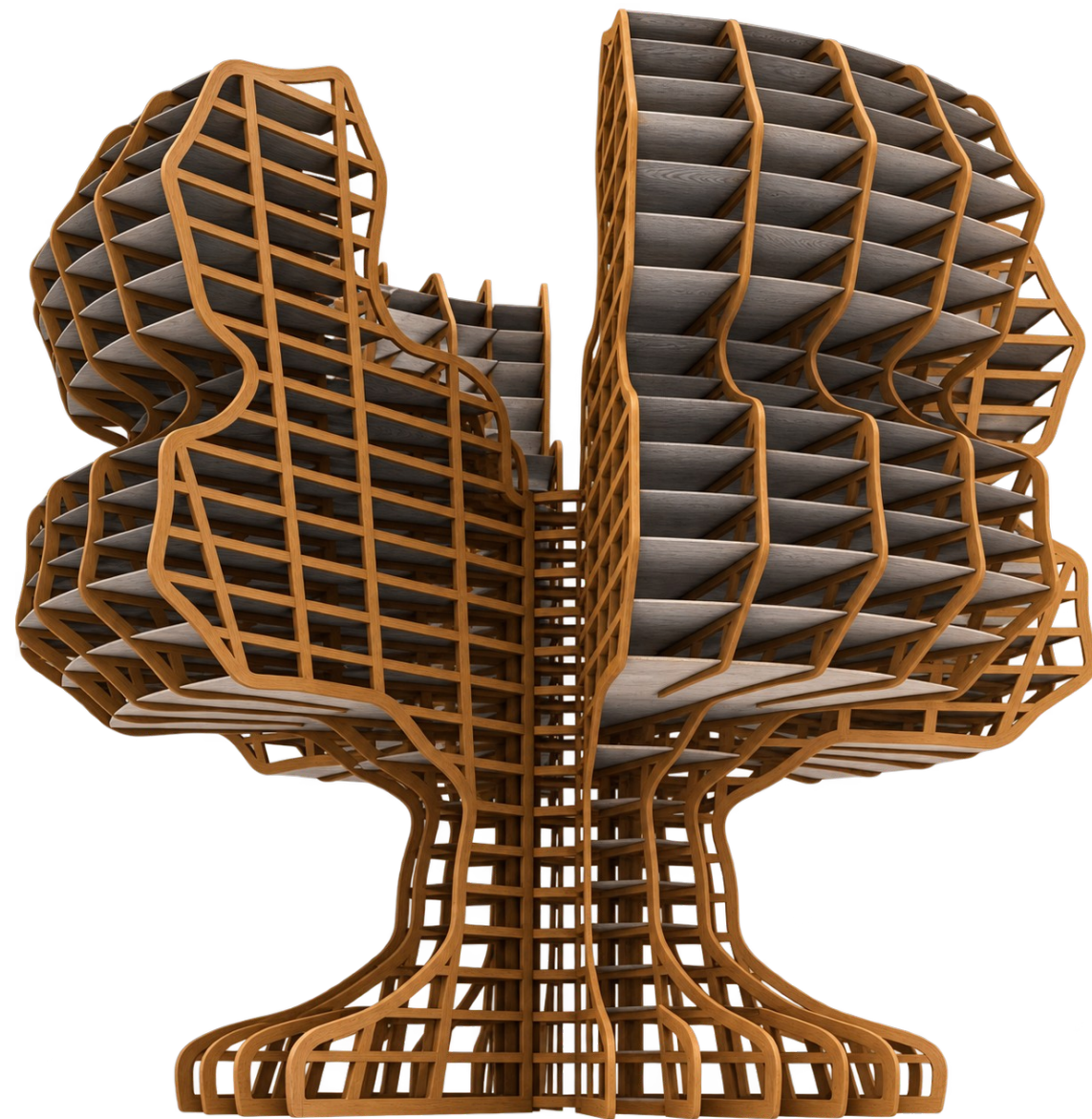
International application **WO 2026/190848 A1**

Published on 17 September 2026

Priority IT 102025000005180 of 13 March 2025

Inventor and applicant Rocco Guarino

[Contents ›](#)



Concept: tree-shaped building made with Bearing-Frame frames (project render)

Contents

The system. Each entry leads to its page; the number at the bottom brings you back here.

THE SYSTEM

- 03** **THE PROBLEM** Efficient frame structures, but made of large elements
- 04** **THE PRINCIPLE** Shell, internal grid and nodes: a single structural organism
- 05** **THE NODE** Continuity along the beam, fixed connection between beams
- 06** **PERFORATED SPLICE PLATE** Beneath the shell, continuous reinforcement
- 07** **REDUNDANCY** An interconnected, highly statically indeterminate structure

Efficient frame structures, but made of large elements

Many technologies achieve individual advantages; no paradigm derives them all from the same structural architecture.

How frames are built today (prior art, WO 2026/190848)

Reinforced concrete

Rigid beam-to-column connections through the combined use of concrete and steel.

Steel

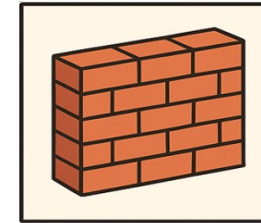
Beams and columns joined by mechanical fasteners or by material continuity with site welding.

Timber

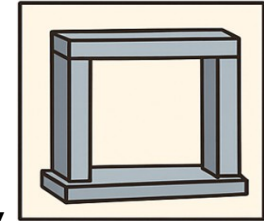
Nodes relying on joints, angle brackets, nailed or welded plates, internal steel plates at the ends.

Common limitations

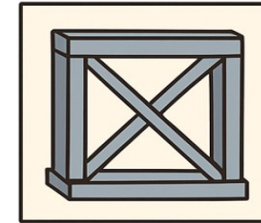
- 1 Large elements, with the related economic and performance drawbacks.
- 2 Large projects require extensive production space and oversize transport.
- 3 Secondary elements may be fixed with nails, screws and makeshift fasteners that risk weakening the structure.



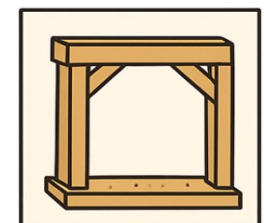
Load-bearing masonry



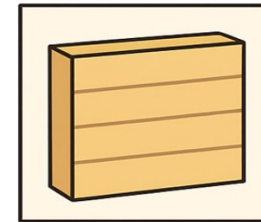
Reinforced concrete



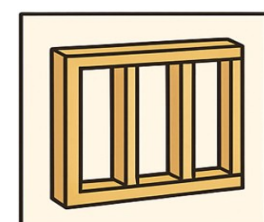
Steel frames



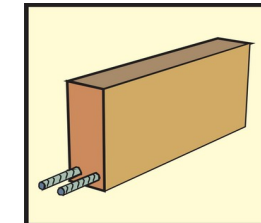
Glulam columns and beams



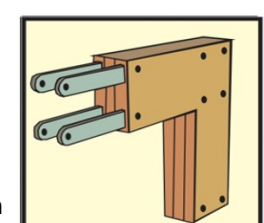
CLT / X-Lam



Light frames



Armalam®



Bearing Frame

Shell, internal grid and nodes: a single structural organism

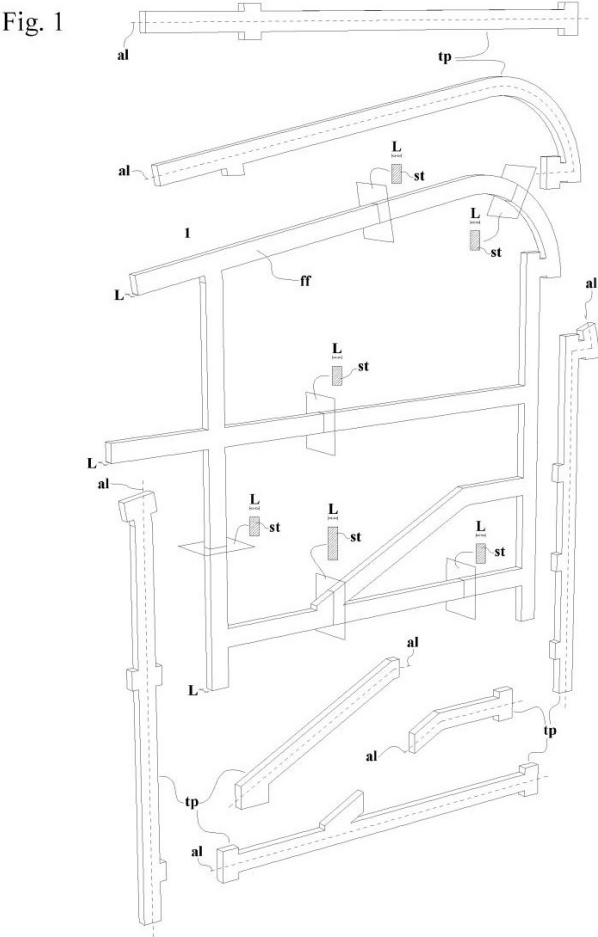
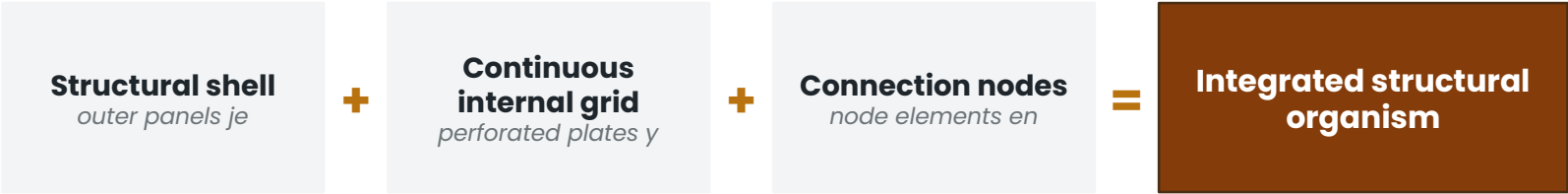


Fig. 1 — seven load-bearing beams intersecting in a single frame, with no discontinuity at the nodes



Analogy with reinforced concrete (WO description)

Reinforced concrete	Bearing-Frame
Longitudinal bars	Longitudinal plates yl, linked "like a chain" by the yg plates
Stirrups	Stackable perforated plates ys and splice plates yg
Diagonal bars	Diagonal perforated plates yd
Concrete casting	Shell (outer panels je) and technical adhesive, in the factory

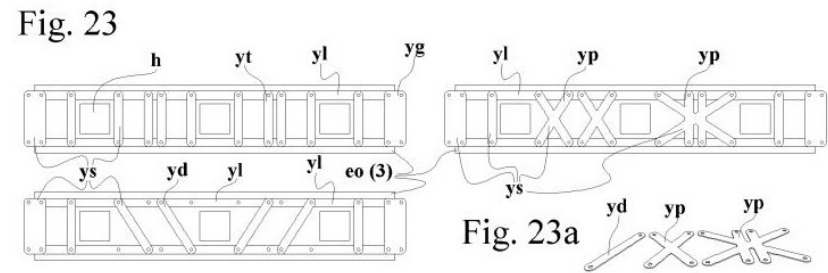


Fig. 23 — three layouts of the internal grid in an optimised element: yl longitudinal, yt transverse, yd diagonal, yp special

Continuity along the beam, fixed connection between beams

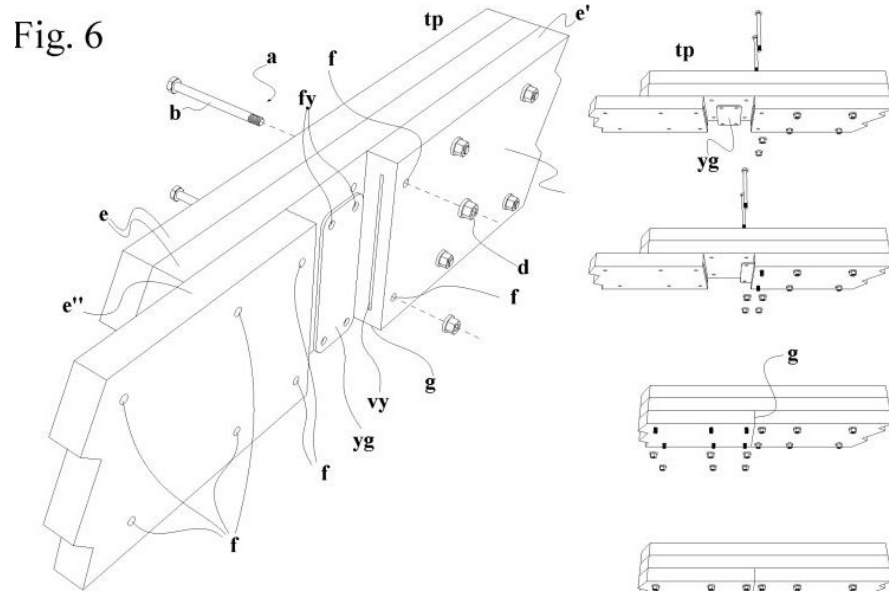


Fig. 6 – splice plate yg in the joint between two adjacent elements

1 The joint

The yg plate sits half in each adjacent element and is bolted to both: the internal grid runs uninterrupted from one end of the beam to the other.

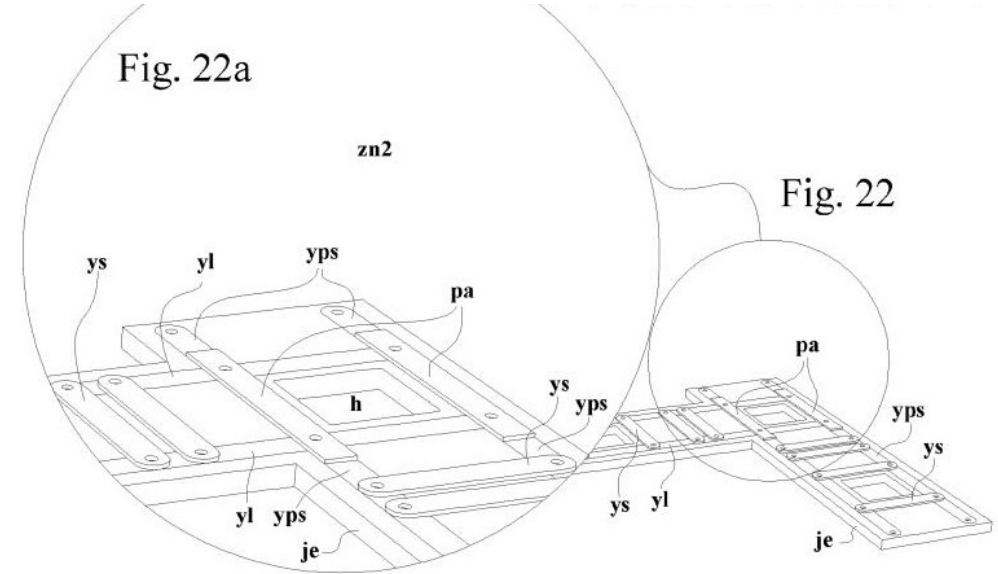


Fig. 22/22a – inside node zn2: yl and yps plates crossing each other

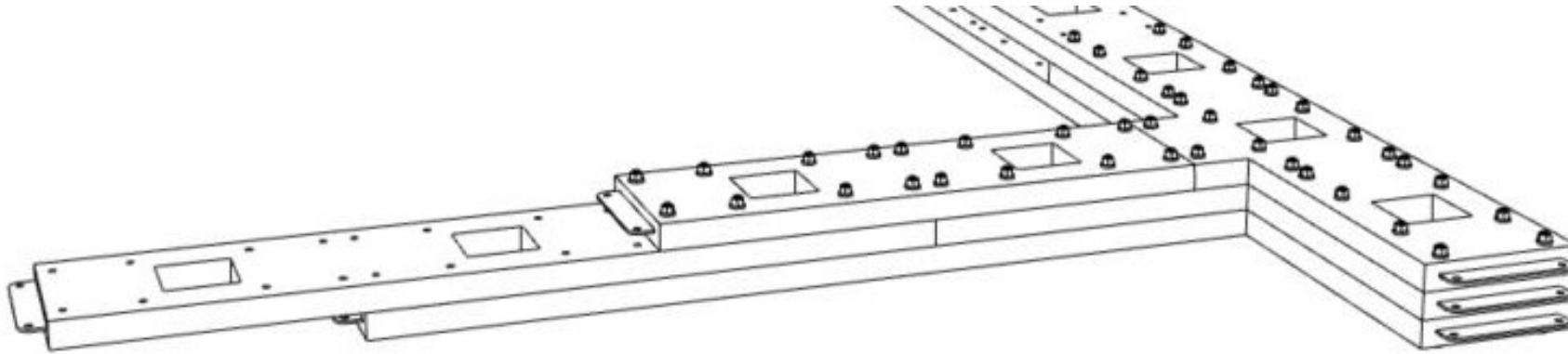
2 The node

The node elements en belong to both beams. Inside them, the yl and yps plates cross like the reinforcement in a reinforced-concrete frame node: the result is a rigid, repeatable fixed connection.

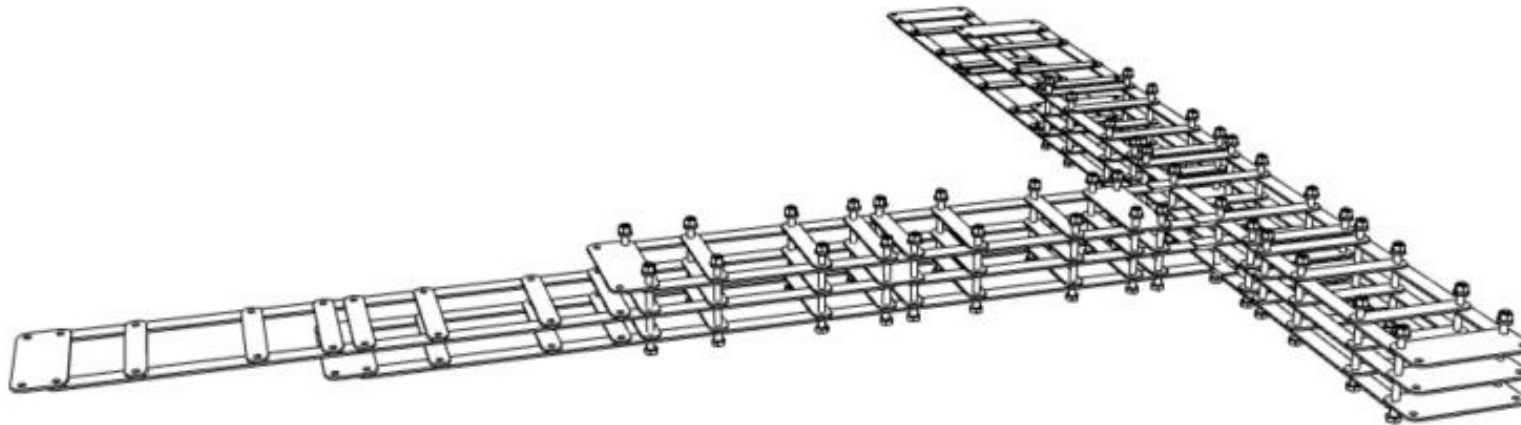
The strength of the fixed connection is inversely proportional to the number of overlapping joints in a section; the plates crossing in the node increase with the number of layers.

Beneath the shell, continuous reinforcement

Assembled frame



Reinforcement only



On site, only the perforated splice plates yg are added, with the bolts.

All the rest of the reinforcement arrives already bonded inside the elements.

The longitudinal plates yl, linked like a chain by the yg plates, provide continuity from one end of the beam to the other, like the bars in reinforced concrete.

**Ref. WO p. 15; claim 1; p. 6
(reinforcement bonded in the factory)**

References: WO = WO 2026/190848 · p. = page of the description · Symbols: e element · en node element · vy seat · yg perforated splice plate · f holes · fy plate holes · a bolts

An interconnected, highly statically indeterminate structure

1 Fully connected

In the optimised structure all internal grids are connected to one another, and so are all outer shells, by means of perforated brackets, splice plates and bolts (claim 6).

2 Alternative load paths

If a connection loses effectiveness, forces can redistribute to the other restraints that are still effective.

3 Out of plane as well

The restraint in the third direction is less stiff at any single point, but it is repeated at every purlin connected with the optimised brackets mo.

Behaviour to be quantified through calculation and testing (see About us)

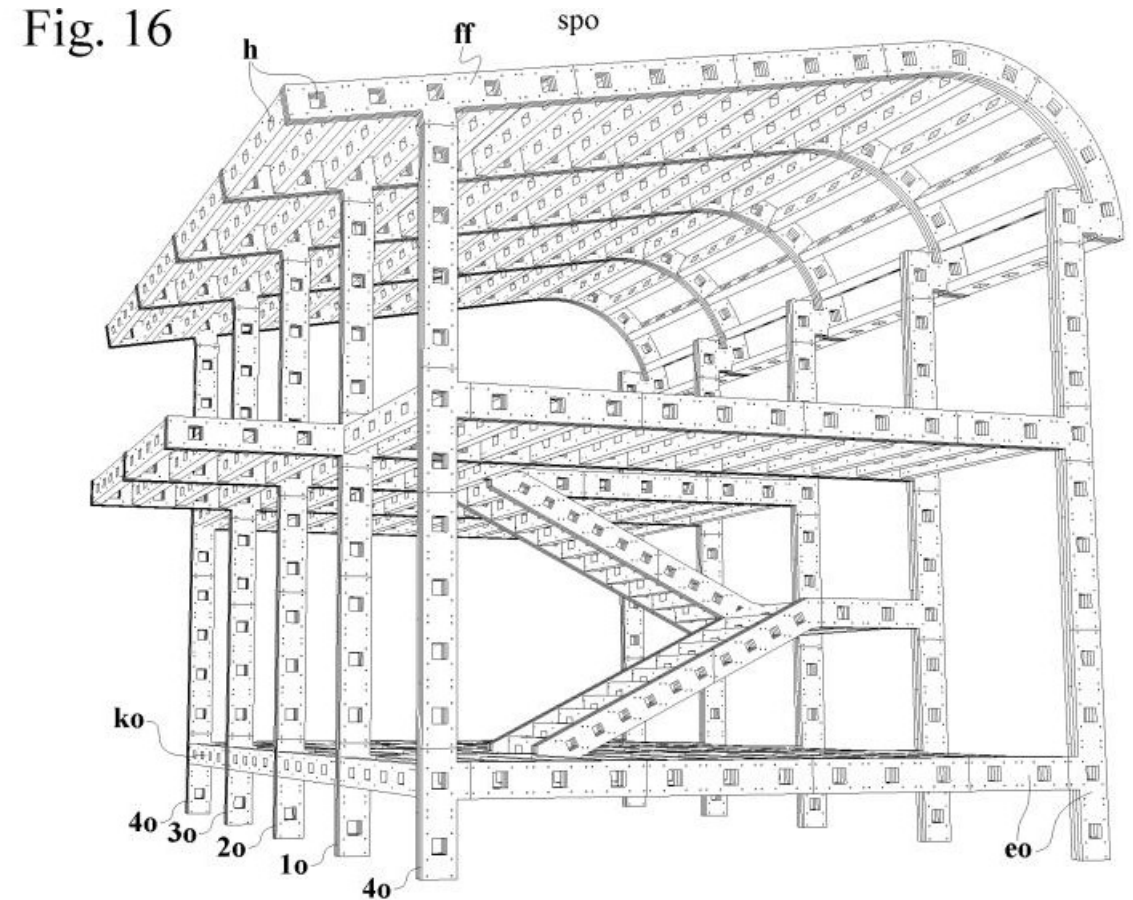


Fig. 16 — optimised load-bearing structure spo: frames 10–40 connected by optimised purlins ko, with cavities h for building services



Performance and production

Bearing-Frame

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Load-bearing frame structure, prefabricated in modules, assembled on site

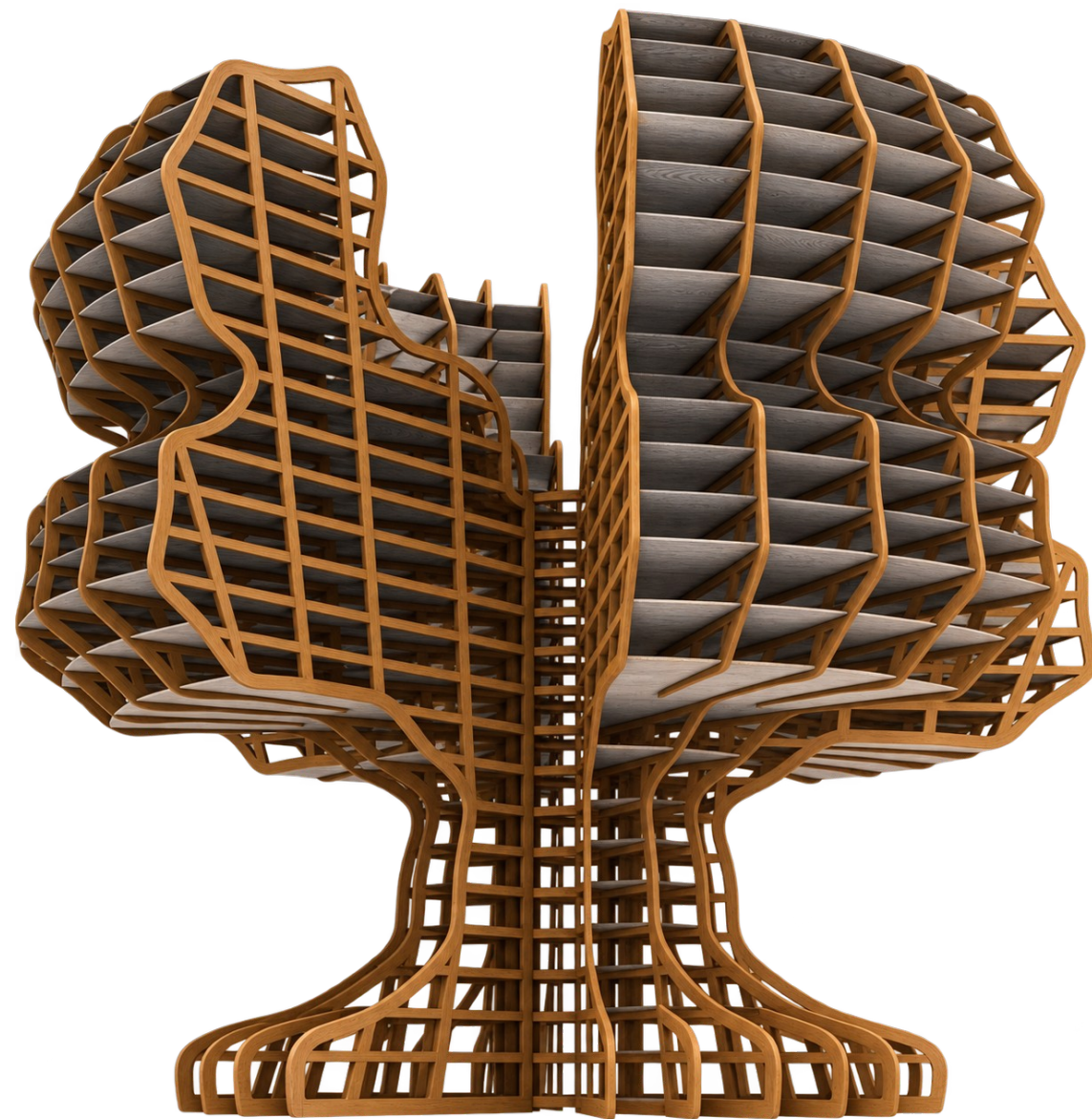
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[Contents ›](#)



Concept: tree-shaped building made with Bearing-Frame frames (project render)

Contents

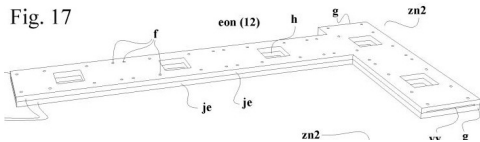
Performance and production. Each entry leads to its page; the number at the bottom brings you back here.

PERFORMANCE AND PRODUCTION

- [03](#) **ADVANTAGES** More advantages from the same architecture
- [04](#) **PLATFORM** A multi-material platform, not a single product
- [05](#) **STANDARDISATION** A finite catalogue of elements, many tailor-made structures

More advantages from the same architecture

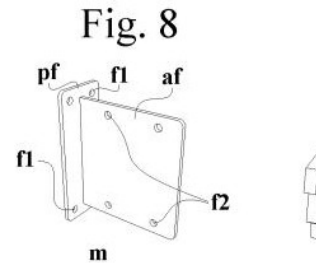
The same modularity that makes the element suitable for industrial production allows the shell to be designed; the same shell can protect both the structure and its connections.



Integrated building services

Cavities h and pre-marked surfaces, which can be drilled on site even after completion, to route building services through beams and columns.

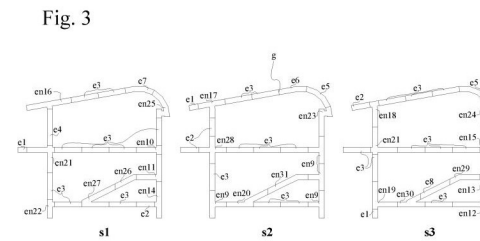
Claimed · claim 7



Calculable interfaces

The perforated brackets connect foundations, beams, bracing, infill walls and building services to the grid, without makeshift nails and screws.

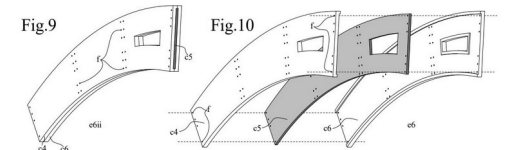
Claimed · claim 1



Demountable and repairable

Layers not bonded to each other and joined by bolts: the structure can be dismantled, reassembled, extended and repaired by replacing damaged modules.

Described in the WO



Fire protection

High-performance layer concealed within the shell (IT18 claim 4, Fig. 9–10); bolts and nuts in deep recesses, closed with plugs of the same material.

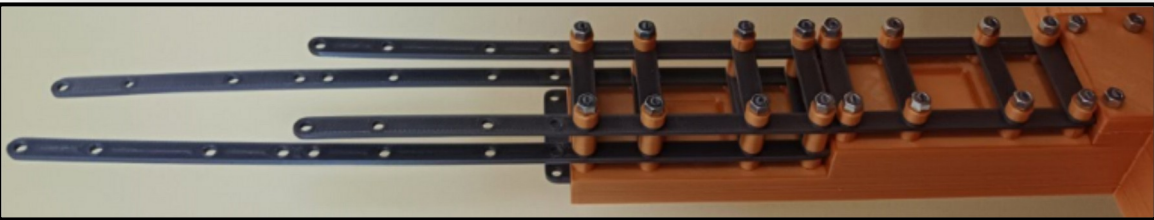
IT18 claim 4 · not in the WO

Further unclaimed potential: seismic behaviour through energy dissipation by friction between unbonded layers (described in the WO) · pre-cambering of horizontal beams at design stage (suggested by the inventor).

A multi-material platform, not a single product

Same geometry and same interfaces; materials and production processes change.

Shell	CLT panels, sawn boards including local species, oriented strand boards, polymer composites with natural or mineral fibres. CNC milling or 3D printing (including fibre-reinforced clay and cementitious materials).
Internal grid	Perforated metal or pultruded strips, crossed longitudinally and transversely and sized in the design. Laser cutting or punching.
Assembly	In the factory: shell, reinforcement and technical adhesive are pressed into a single body, then machined and certified. On site: through bolts.



Variable number of layers where needed

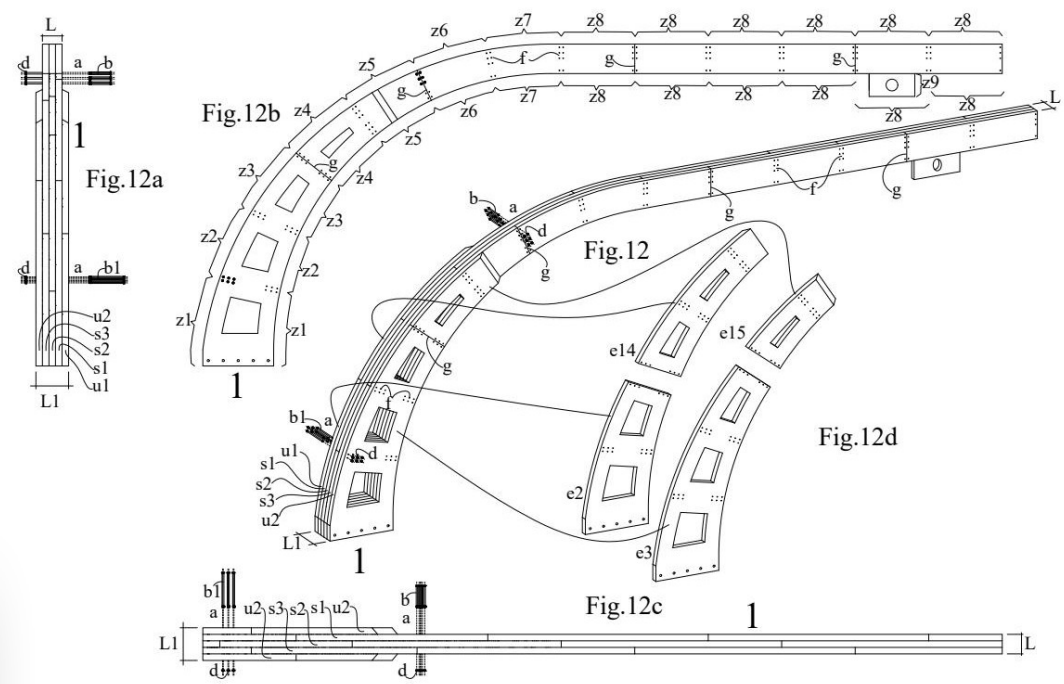
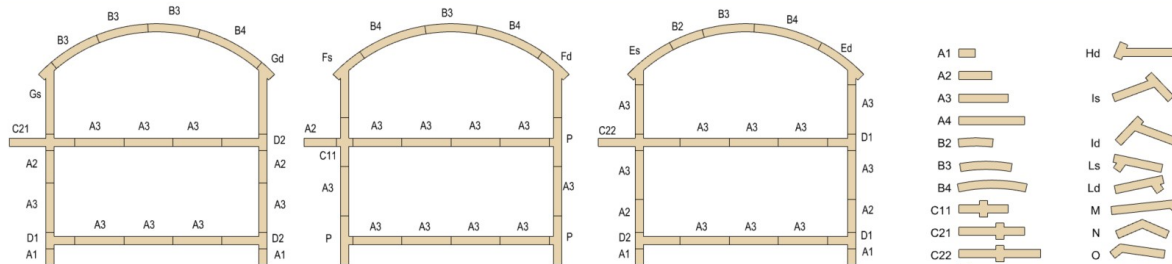


Fig. 12 of patent IT 102018000008076 — the same beam goes from 3 to 5 layers. In the WO the number of outer and inner panels can be increased freely.

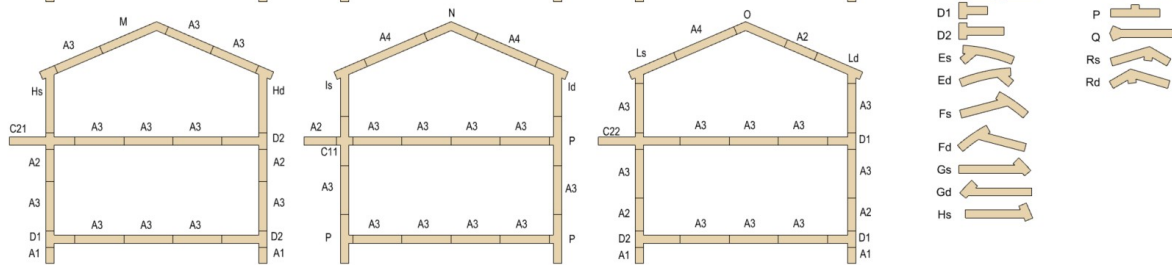
A finite catalogue of elements, many tailor-made structures

With the same standard elements, different frames can be designed: standardised yet customisable, even over time.

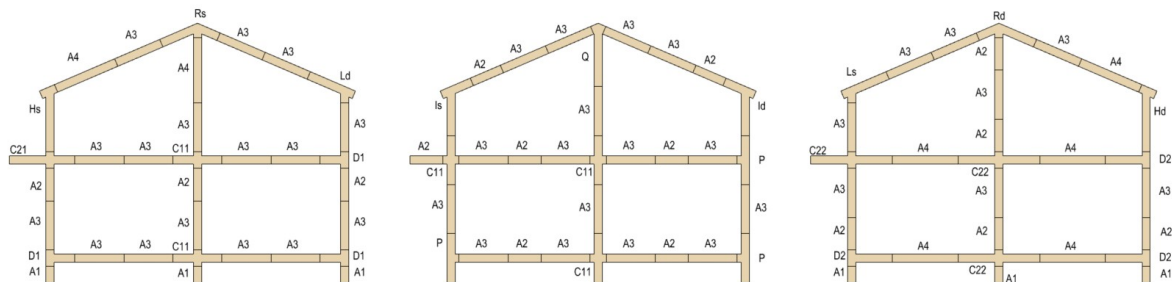
Frame 1
layers s1, s2, s3



Frame 2
layers s1, s2, s3



Frame 3
layers s1, s2, s3



Three different frames (arched roof, pitched roof, two bays): each row shows the three layers of a frame, with staggered joints. On the right, the 31 standard elements, from A1 to Rd; many are mirror pairs l/r (project drawing).

1

Few elements, different frames

The same 31 standard elements make up the three layers of frames with different roofs, spans and cantilevers.

Ref. WO claim 1, Fig. 3 and 4 (three layers, 31 standard elements); inventor's drawings

2

Lower production costs

Elements grouped by similarity and mass-produced: standardisation, less waste, shorter lead times and lower costs.

Ref. WO p. 17; IT18 p. 6; IT16 p. 5

3

Free interior spaces and façades

The frame carries the loads; infill walls, partitions and building services connect to the perforated brackets wherever needed.

Ref. WO claim 1; p. 7

4

One floor more or less

In the configurations foreseen by the designer, a floor can be added or removed, even over time: the structure is demountable, re-assemblable and extendable.

Ref. WO p. 1; additional floor: inventor's suggestion

References: WO = WO 2026/190848 · IT16 = IT 102016000085836 · IT18 = IT 102018000008076 · p. = page of the description



Technical appendix

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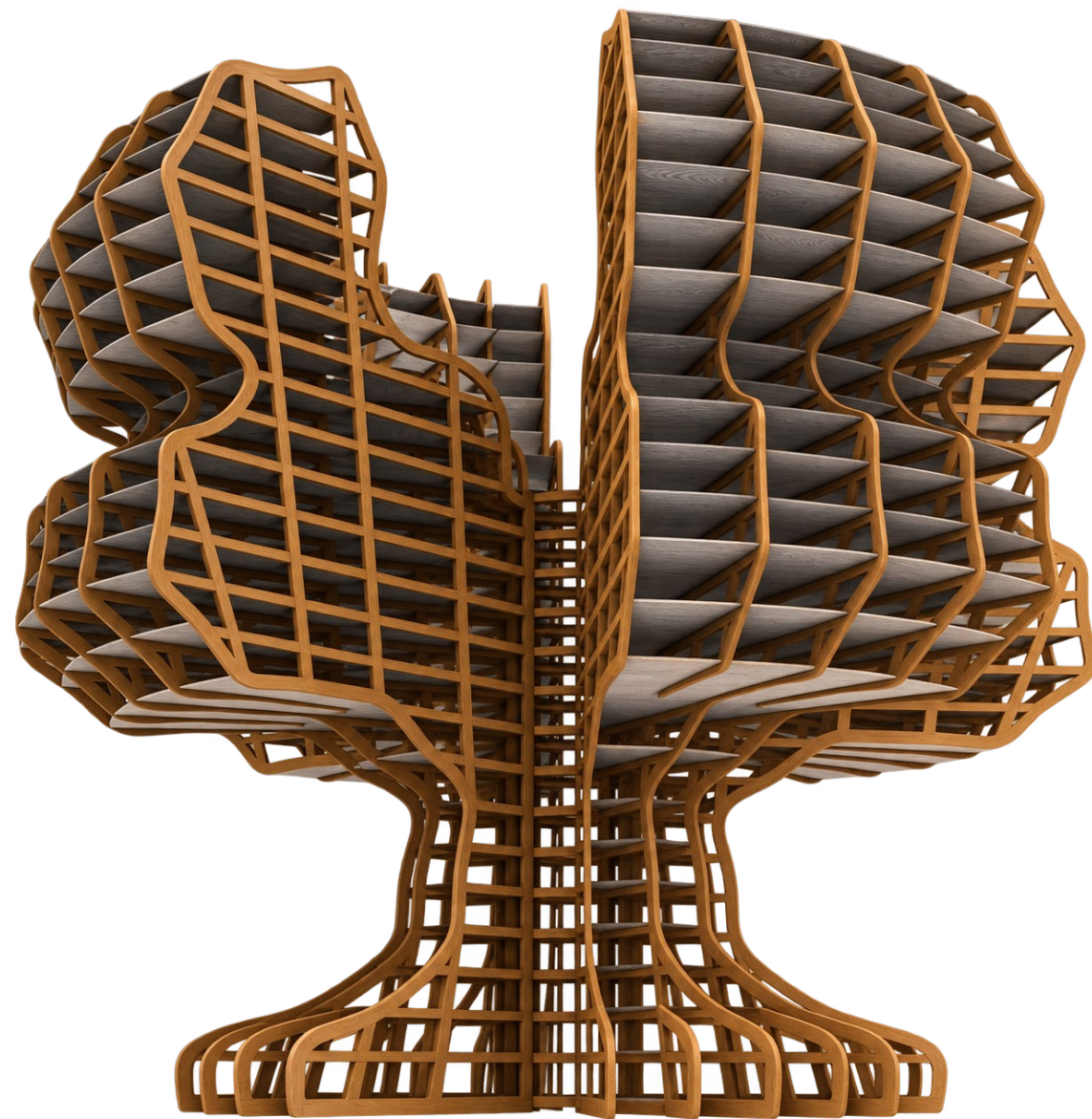
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[Contents ›](#)



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Contents

Technical appendix. Each entry leads to its page; the number at the bottom brings you back here.

TECHNICAL APPENDIX	
04	PERFORATED SPLICE PLATE The plate that gives continuity to the beam
05	PERFORATED SPLICE PLATE Assembly: from plates in their seats to the bolted frame
06	CONNECTIONS The perforated bracket: a single interface for everything that connects
07	CONNECTIONS Frame to frame, frame to foundation
08	CONNECTIONS From a single connection to the interconnected structure
09	REINFORCEMENT AND FASTENERS A family of components, designed and certified
10	REINFORCEMENT AND FASTENERS Tailor-made plates, like the bars in reinforced concrete
11	PURLINS Purlins on site: brackets on the frame, through bolts
12	PURLINS Guided placement: the pin finds its notch
13	BUILDING SERVICES Services through beams, columns and floors, even after completion
14	BUILDING SERVICES Drilling without weakening the structure
15	REINFORCEMENT AND FASTENERS Invisible anchorages: appearance and protection
16	PRODUCTION Subtractive or additive: the same module, the same precision
17	PRODUCTION Materials of today and tomorrow
18	FROM DESIGN TO SITE Compact modules, factory-made, assembled on site
19	ARCHES Few module types, a single production process
20	ARCHES Small modules, large structures
21	ARCHES Arches integrated into frames: longer clear spans
22	ARCHES No limits on form
23	ARCHES Wherever there is a frame, there is an application

Technical appendix

In-depth material for due diligence: components, connections, performance, production and form. Every page links back to the contents.

Components and connections [pp. 4–12](#)

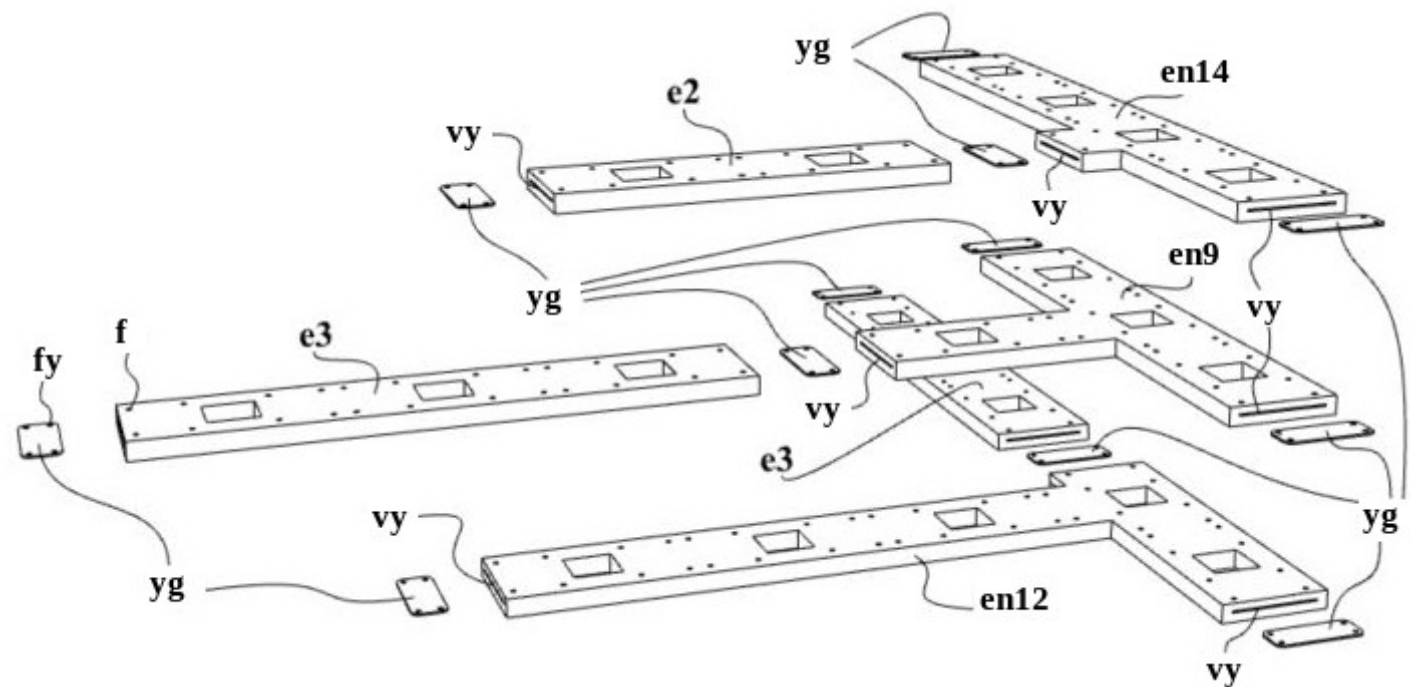
Performance [pp. 13–15](#)

Production [pp. 16–18](#)

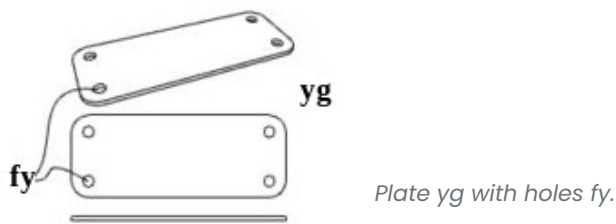
Form and arches [pp. 19–23](#)

The plate that gives continuity to the beam

In every joint between adjacent elements a perforated plate yg, housed in the seats vy, ties the elements together and continues their reinforcement.



Exploded view of a layer: elements e, node elements en, seats vy and perforated splice plates yg (inventor's drawing, symbols aligned with the WO).



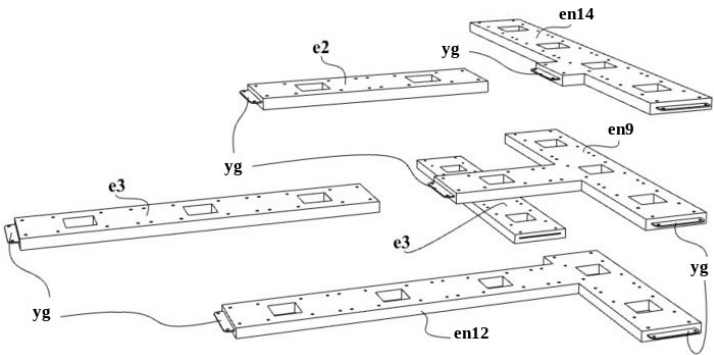
- 1 A plate in every joint**
Every joint g between adjacent elements receives a perforated splice plate yg.
Ref. WO claim 1; p. 3
- 2 Straddling the joint**
The plate fits into the seats vy of the two adjacent elements and is clamped with the bolts a.
Ref. WO p. 9; Fig. 6
- 3 Aligned holes**
The holes fy of the plate coincide with the holes f of the elements, through which the bolts pass.
Ref. WO p. 12; claim 1

References: WO = WO 2026/190848 · p. = page of the description · Symbols: e element · en node element · vy seat · yg perforated splice plate · f holes · fy plate holes · a bolts

Assembly: from plates in their seats to the bolted frame

Three steps: plates inserted into the elements, layers assembled, layers stacked with staggered joints and clamped by the bolts.

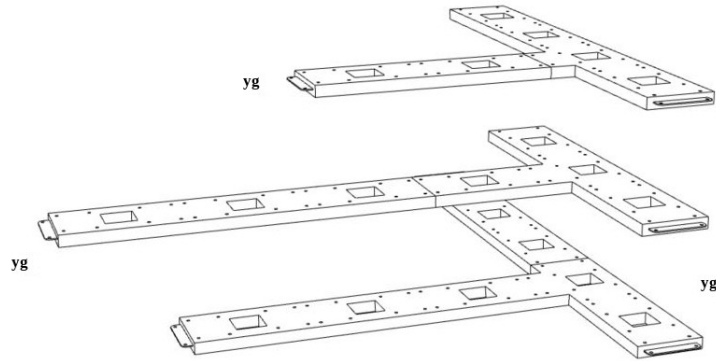
1 Plates in the seats



Each element receives the yg plates in its seats vy.

Ref. WO p. 9; Fig. 6

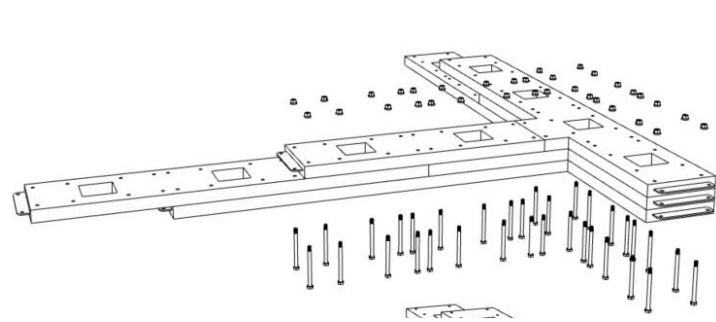
2 Assembled layers



The elements of each layer are joined by the plates; at the ends the plates await the next element.

Ref. WO claim 1

3 Stacked and bolted layers



The layers are stacked with staggered joints and clamped with through bolts a.

Ref. WO claim 1; p. 9; Fig. 5b

References: WO = WO 2026/190848 · p. = page of the description · Symbols: e element · en node element · vy seat · yg perforated splice plate · f holes · fy plate holes · a bolts

The perforated bracket: a single interface for everything that connects

Purlins, other frames, foundations and secondary elements always connect to the frame in the same way: perforated brackets and through bolts.

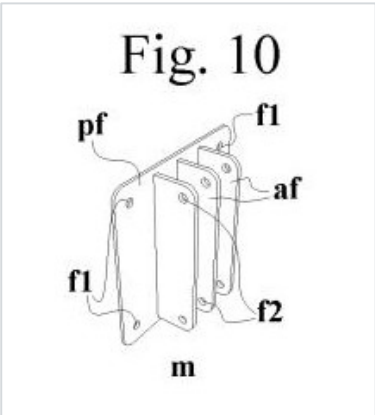


Fig. 10 — perforated bracket m

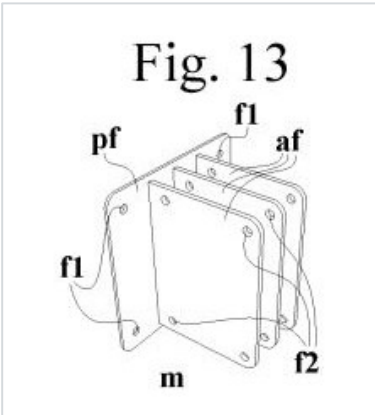


Fig. 13 — perforated bracket m, another shape

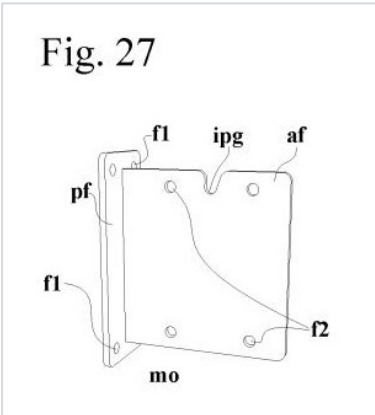


Fig. 27 — optimised bracket mo with notch ipg

What connects with the brackets (claim 1; p. 7)

Purlins	Connecting beams	Foundations	Bracing
Anchorage	Infill walls	Building services	Other secondary elements

- 1

How it is made

A perforated plate pf (holes f1) integral, by material continuity, with one or more perforated flanges af (holes f2).

Ref. WO claim 1; p. 10; Fig. 8, 10, 13
- 2

How it is fixed

To the frame with the same through bolts that clamp the layers (holes f and f1); to the other structure with further bolts (holes fa and f2).

Ref. WO claim 1; p. 10
- 3

Calculable, therefore safe, joints

Every structure connects directly to the reinforcement; no nails, screws or makeshift fasteners that may weaken the frame.

Ref. WO p. 7
- 4

Guided positioning

The optimised bracket mo has a notch ipg that holds the purlin pin pga: the piece is positioned correctly on site.

Ref. WO claim 4; Fig. 25, 27

References: WO = WO 2026/190848 · p. = page of the description · Fig. = WO drawings

Frame to frame, frame to foundation

Load-bearing connecting beams have seats that receive the bracket flanges: the joint is part of the beam.

Fig. 9

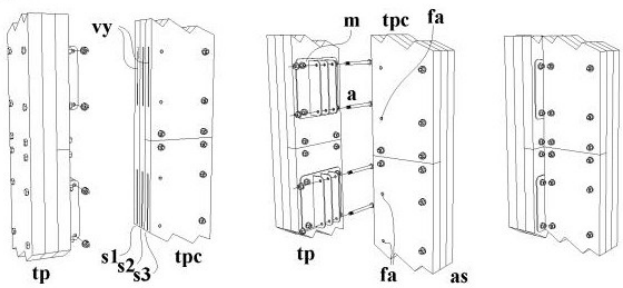


Fig. 9 – connecting beam tpc alongside beam tp: seats vy, brackets m, finished joint

Fig. 11

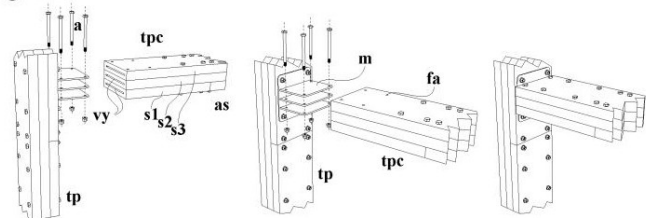


Fig. 11 – orthogonal tpc, connected with horizontal brackets

Fig. 12

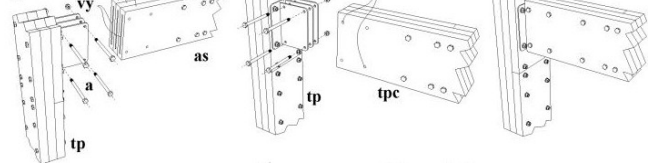


Fig. 12 – orthogonal tpc, connected with vertical brackets

Fig. 14

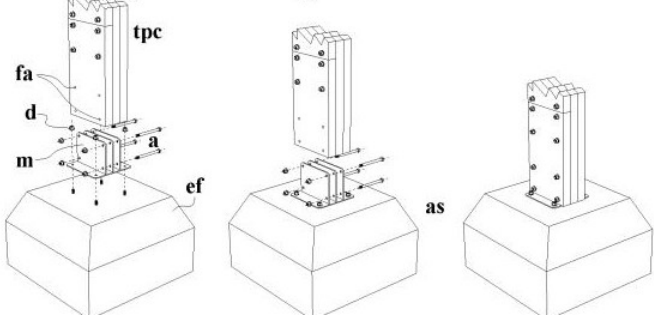


Fig. 14 – column connected to the foundation element ef

1

Connecting beams

Load-bearing beams with seats vy, obtained by material removal, that receive the bracket flanges af.

Ref. WO claim 1 (characterising part); Fig. 9, 11, 12, 14

2

Foundations

The bracket connects the column base to the foundation element with bolts and nuts.

Ref. WO p. 10; Fig. 14

3

Out of plane as well

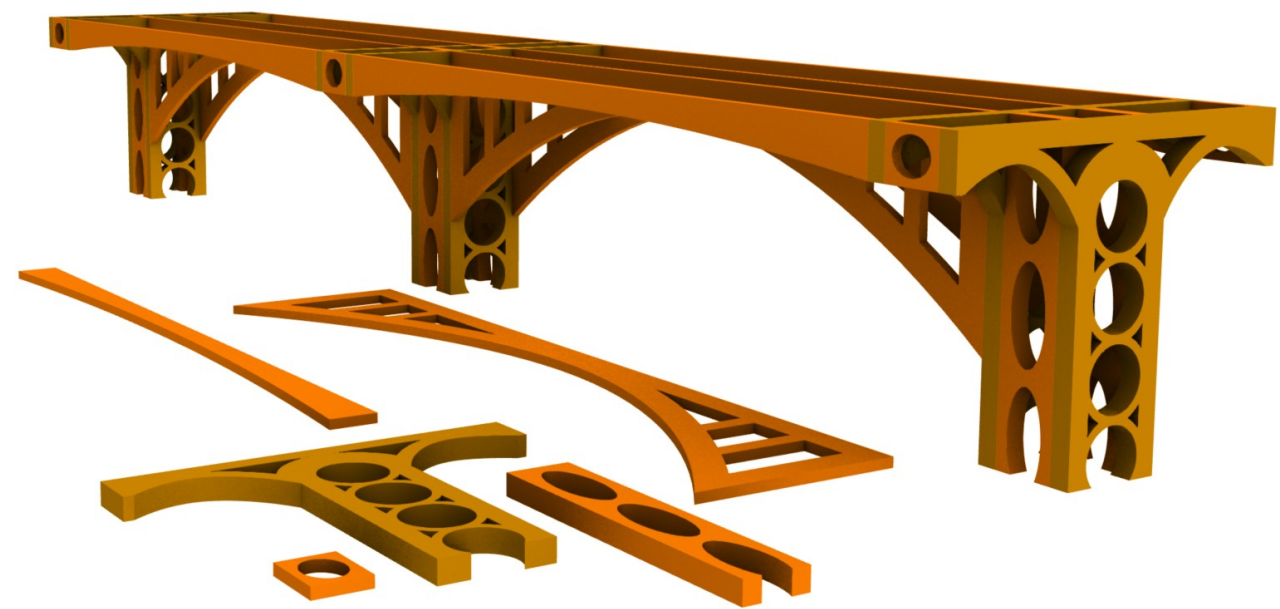
The restraint in the third direction is repeated for every purlin or structure connected to the frame.

Ref. WO p. 18

References: WO = WO 2026/190848 · p. = page of the description · Fig. = WO drawings

From a single connection to the interconnected structure

Frames, purlins and other structures, connected with brackets and bolts, form a single load-bearing structure.



Frames connected by longitudinal beams; in the foreground, some components in exploded view (project render).

1 Load-bearing structure

Several frames, purlins and other structures permanently connected form the load-bearing structure sp.

Ref. WO claim 6; Fig. 15

References: WO = WO 2026/190848 · p. = page of the description · Fig. = WO drawings

2 Everything interconnected

In the optimised structure all internal grids and all shells are connected to one another with brackets, splice plates and bolts.

Ref. WO claim 6; Fig. 16

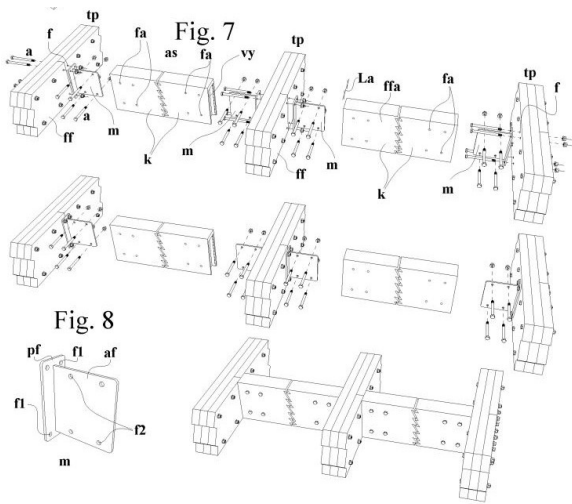


Fig. 7–8 — purlins k connected to the frames with brackets m, up to the assembled structure.

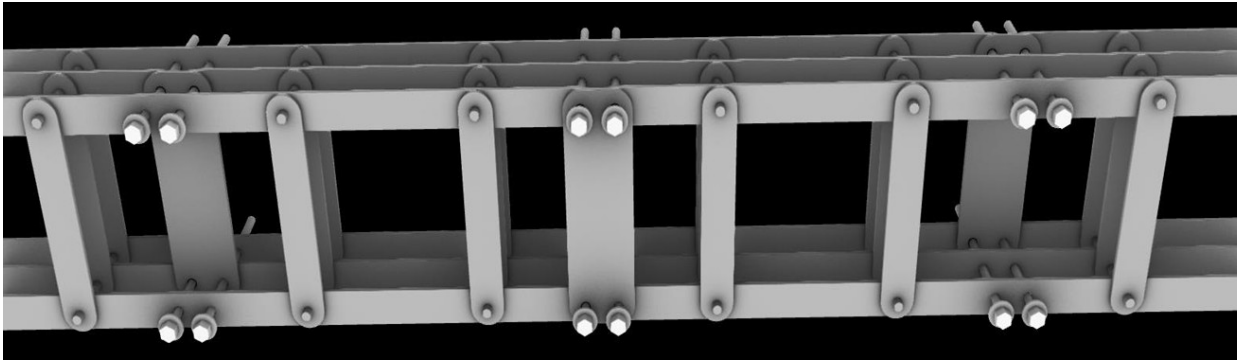
3 Demountable and extendable

Components held together by perforated brackets and bolts: buildings that can be dismantled, reassembled, extended and repaired.

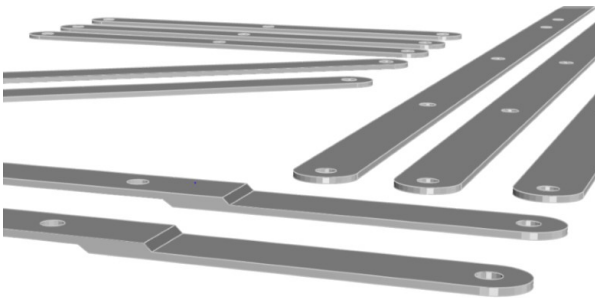
Ref. WO p. 1

A family of components, designed and certified

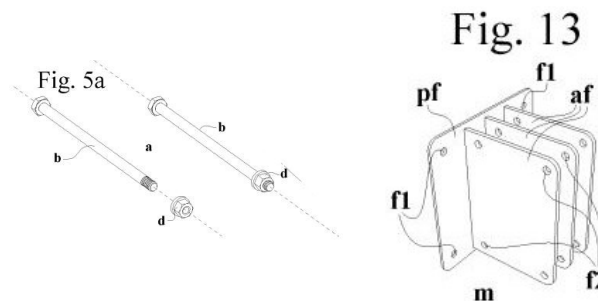
Plates, splice plates, brackets and bolts are all reinforcement: sized in the design, produced and certified in the factory.



Assembled reinforcement: longitudinal plates, stackable plates and bolts (project render).



*Perforated plates y and
Stackable perforated plates in the foreground
(render)*



*Fasteners a:
bolts b and nuts d (Fig. 5a)*

Bracket m (Fig. 13)

References: WO = WO 2026/190848 · IT18 = IT 102018000008076 · p. = page of the description · Fig. = WO drawings

1 Everything is reinforcement

Reinforcement means the perforated plates y, the splice plates yg, the brackets m and mo and the fasteners a (bolts and nuts).

Ref. WO p. 6

2 Certified performance

Optimised elements and purlins, which contain the reinforcement, undergo certification of the performance required by the design.

Ref. WO p. 5; claim 5

3 Open choice of materials

Metals, pultruded profiles and other newly developed materials; for exposed parts, measures against deterioration.

Ref. WO pp. 6–7

4 Variable shapes and layouts

The patent covers all variants in the shape and arrangement of the components, provided they are consistent with the claims.

Ref. WO p. 18

Tailor-made plates, like the bars in reinforced concrete

The internal grid is designed according to the required performance: transverse, diagonal or special-shaped, with the same process.

Fig. 26

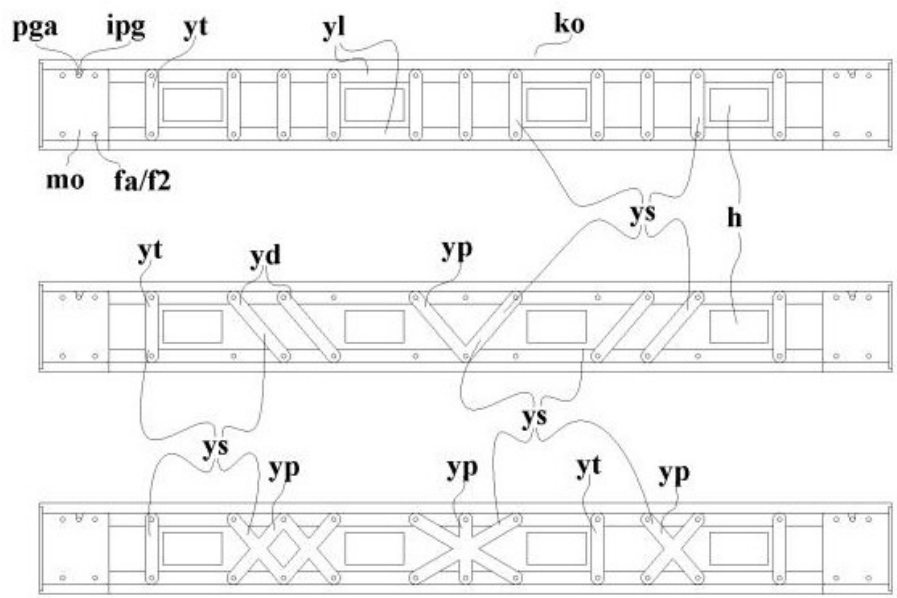


Fig. 26 — three layouts of the internal grid in an optimised purlin ko: transverse plates yt, diagonal yd, special yp.

Fig. 26a

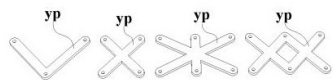


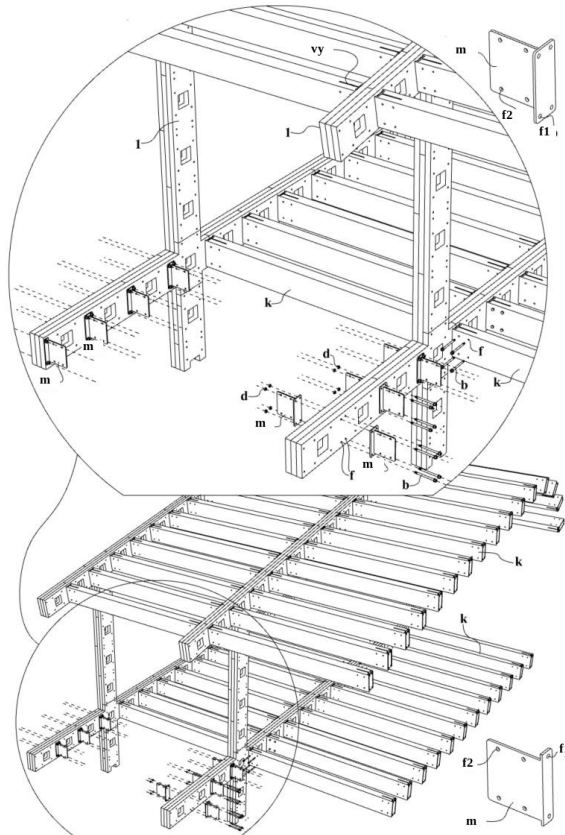
Fig. 26a — four examples of special plates yp, flat pieces with material continuity.

- 1 Like stirrups**
The stackable plates ys, which keep the longitudinal plates stable, are comparable to the stirrups in reinforced concrete.
Ref. WO pp. 15–16
- 2 Like diagonal bars**
The diagonal plates yd are specified and calculated like diagonal bars, with the same structural functions.
Ref. WO p. 16
- 3 Special plates yp**
Tailor-made shapes for unusual structural requirements, a kind of wild card for the designer; flat pieces with material continuity.
Ref. WO pp. 14, 16; claim 3; Fig. 26a
- 4 Same process**
Whatever its shape, the plate sits in tailor-made seats vy, with holes matching those of the shell.
Ref. WO p. 6

References: WO = WO 2026/190848 · IT18 = IT 102018000008076 · p. = page of the description · Fig. = WO drawings

Purlins on site: brackets on the frame, through bolts

The brackets are fixed to the frames, the purlins are placed and clamped: the frames become a single load-bearing structure.



Purlins k mounted on frames l with brackets m (inventor's drawing, symbols aligned with the WO).

1 Brackets on the frame

The brackets m are fixed to the frame with the same bolts that clamp the layers, through holes f and f1.

Ref. WO claim 1; p. 10

2 Purlin on the brackets

The purlin k rests on the flanges and is clamped with further bolts, through holes fa and f2.

Ref. WO claim 1; Fig. 7

3 A single structure

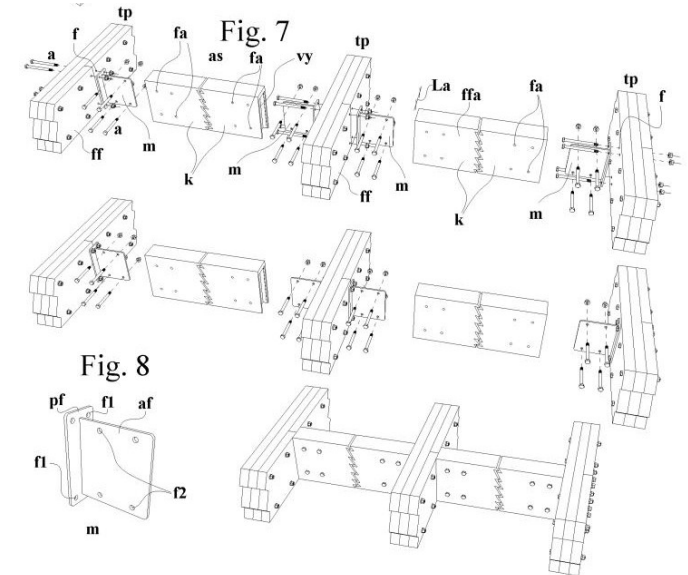
Permanently connected frames and purlins form the load-bearing structure sp.

Ref. WO claim 6; Fig. 15

4 Repeated restraint

Out of the plane of the frame, the restraint is repeated at every connected purlin.

Ref. WO p. 18

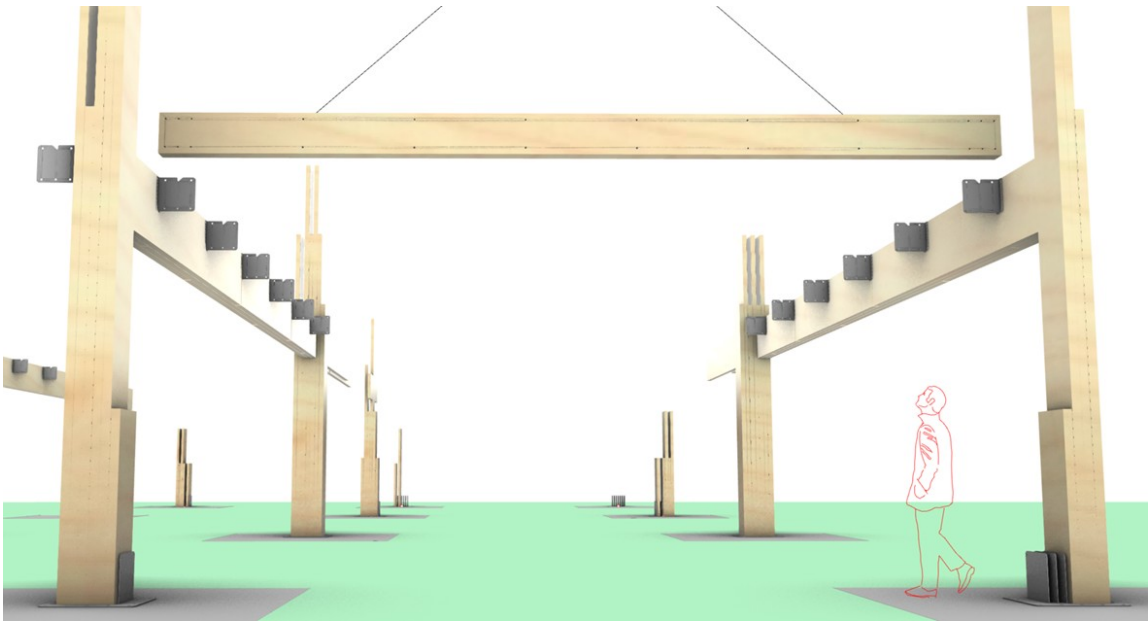


WO Fig. 7-8 — from bracket m to the assembled purlin.

References: WO = WO 2026/190848 · p. = page of the description · Symbols: l frame · k purlin · ko optimised purlin · m, mo perforated brackets · f, f1, f2, fa holes · b bolts · d nuts · vy seat

Guided placement: the pin finds its notch

In the optimised version the purlin settles into the right position by itself, even before it is bolted.



Placing a purlin between two frames: the notched brackets are already fixed to the beams (project render).

- 1

Pins at the ends

The pins pga are located at the ends of the optimised purlin ko.

Ref. WO claim 4; Fig. 24

- 2

Notch in the bracket

The notch ipg is a cut in the flange af of bracket mo, which holds the pin.

Ref. WO claim 4; Fig. 27

- 3

Correct placement, then tightening

The pins act as guides; then the bolts connect the bracket to the frame (f, f1) and to the purlin (fa, f2).

Ref. WO claim 4; pp. 13–14

Fig. 25

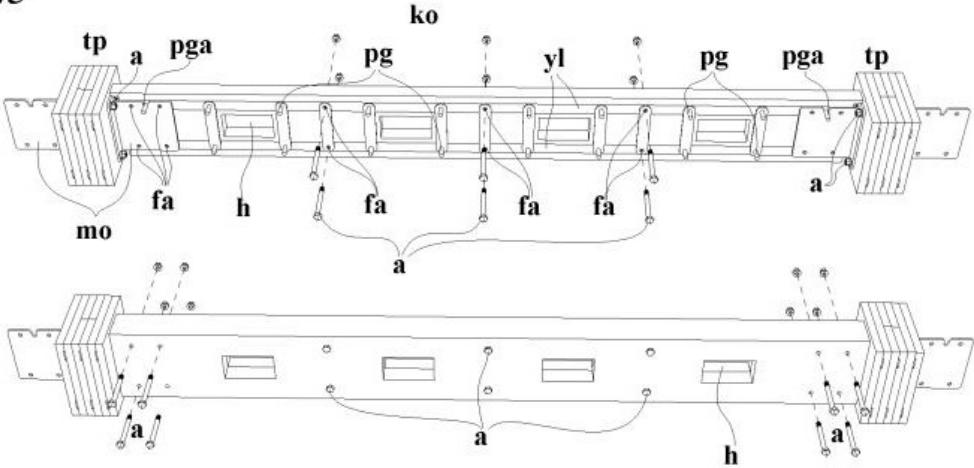


Fig. 25 — optimised purlin ko connected to two beams tp: brackets mo, pins pga, bolts a.

Fig. 27

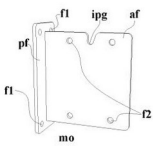


Fig. 27 — bracket mo with notch ipg.

References: WO = WO 2026/190848 · p. = page of the description · Symbols: 1 frame · k purlin · ko optimised purlin · m, mo perforated brackets · f, f1, f2, fa holes · b bolts · d nuts · vy seat

Services through beams, columns and floors, even after completion

Drillable zones are drawn in the design and opened on site only where needed: also in the purlins, to carry building services into the floors.



Frame structure with through cavities in beams, columns and purlins (project render).

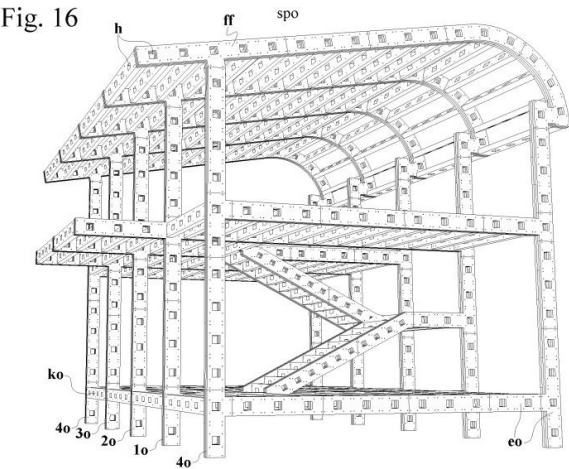


Fig. 16 — optimised structure spo: cavities h in the frames and in the optimised purlins ko, for concealed routing of building services.

1

Cavities planned in the design

Through cavities h across the full width, perpendicular to the face, in the frame and in the purlins.

Ref. WO claims 1 and 2; p. 10; Fig. 16

2

Pre-marked zones

The zones that can be drilled perpendicularly on site are marked on the elements: the pre-marked cavities.

Ref. WO claim 7; p. 17

3

Even after completion

They are opened with drills, milling cutters or toothed blades, provided this is done within the pre-marked zones.

Ref. WO p. 18

4

Only what is strictly necessary

Only what is needed is drilled, to the benefit of stability; building services are laid out more rationally.

Ref. WO pp. 17–18

5

Thinner floors

With holes in the purlins, services run within the floor depth, which is reduced.

Ref. holes in the purlins: WO claims 2 and 7

6

Maintenance without demolition

Cavities filled with lightweight, sound-absorbing and thermally insulating granules that can be removed: panels are dismantled, nothing is demolished.

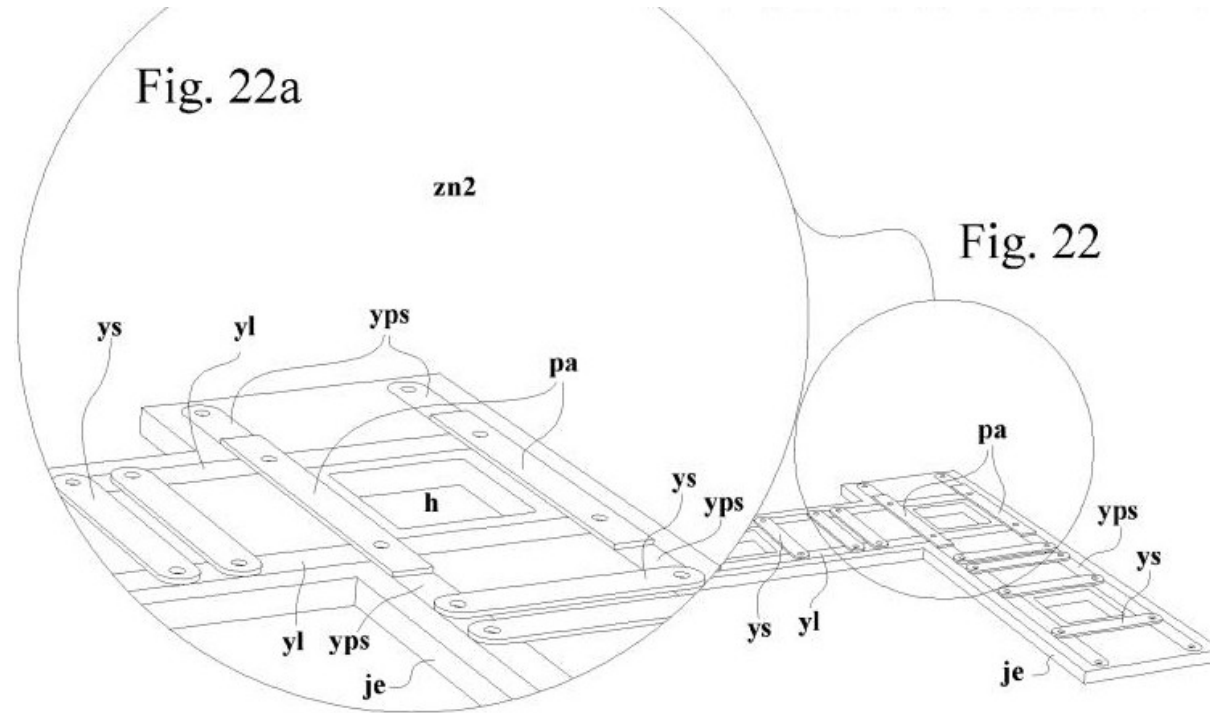
Ref. inventor's suggestion

In the floors · inventor's suggestion

References: WO = WO 2026/190848 · IT18 = IT 102018000008076 · p. = page of the description · Fig. = WO drawings

Drilling without weakening the structure

The cavities lie where the reinforcement does not pass, with a safety margin comparable to the concrete cover in reinforced concrete.



Invisible anchorages: appearance and protection

By designing deep recesses for nuts and bolts, once the structure is complete the reinforcement remains entirely within the shell.

1 Integrated, concealed reinforcement

With known techniques, the reinforcement can be fully integrated and concealed within the shell.

Ref. WO p. 7

2 Deep recesses, planned in the design

They house nuts and bolts and are closed with components made of the same material as the shell.

Ref. WO p. 7

3 Appearance

It meets more demanding aesthetic and architectural requirements: once the structure is complete, the anchorages are not visible.

Ref. WO p. 7

4 Fire and oxidation

The 2018 patent already indicates concealing the metal parts, also for fire and oxidation resistance.

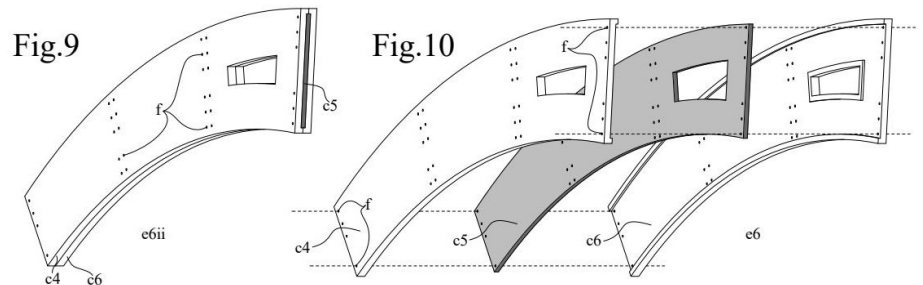
Ref. IT18 pp. 4, 11; claim 4

IT18 claim 4 · not claimed in the WO



Fig.9

Fig.10



IT18, Fig. 9–10 — high-performance layer (in grey) concealed between the layers of the shell.

Subtractive or additive: the same module, the same precision

High-precision vector design, instructions to the robotic machine, compliant element: whatever the process (IT18 pp. 6, 8).

Subtractive technology CNC milling, laser, waterjet



From constant-thickness panels with numerically controlled machines, for series production.

Ref. WO pp. 5–6

Timber and composites cross-laminated multilayer panels; fibre composites in a polymer matrix.

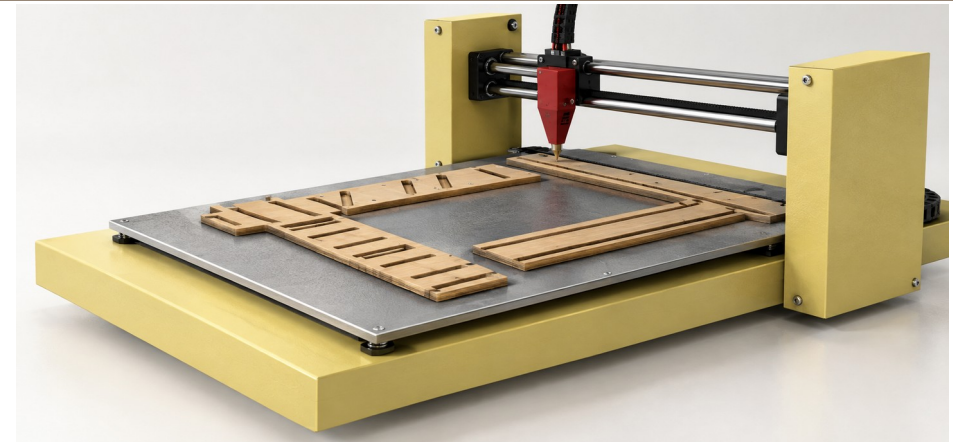
Ref. WO p. 6

Three-dimensional cuts seats and grooves made by the same robotic machine.

Ref. IT18 p. 11

References: WO = WO 2026/190848 · IT18 = IT 102018000008076 · p. = page of the description

Additive technology 3D printing, including cementitious mixes (3DPC)



Printing modules (project render)

3D printing foreseen among the production technologies for the shells.

Ref. WO p. 6

Low-cost, local materials recycled or sourced locally, regenerated and adapted to the

Ref. WO p. 6

Fibre cement and raw earth new mixes for the modules (see the Materials page).

Ref. inventor's suggestion

Materials of today and tomorrow

The patent does not tie the system to one material: the architecture stays the same, the materials can evolve.

Timber and engineered panels

Cross-laminated plywood, machined by CNC milling.

Ref. WO p. 6

Described in the WO

Fibre-reinforced composites

Fibres of various kinds in a polymer matrix: strength, lightness, ductility.

Ref. WO p. 6

Described in the WO

Fibre cement and cementitious materials

3D-printed modules (3DPC) or machined from sheet.

Ref. inventor's suggestions

Inventor's suggestion

Raw earth with basalt microfibres

With additives to make it waterproof and stronger in tension; good fire behaviour expected.

Ref. fire: to be verified by testing

Inventor's suggestion

Open to materials we do not yet know

New materials every day
industry keeps developing them to surpass current performance; combined, they offer more complex performance and forms than reinforced concrete, steel and timber.
Ref. WO p. 4

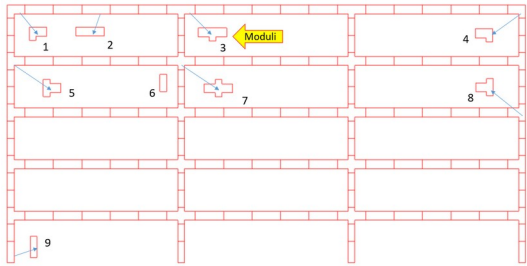
For the reinforcement too
metal or pultruded plates, without excluding newly developed materials.
Ref. WO p. 6

Local raw materials
to provide modern, safe and affordable homes.
Ref. WO p. 4

References: WO = WO 2026/190848 · IT18 = IT 102018000008076 · p. = page of the description

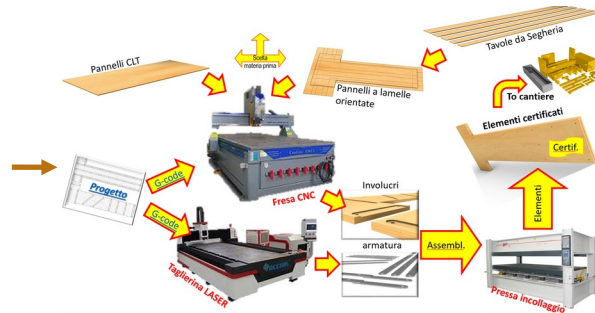
Compact modules, factory-made, assembled on site

1 Design



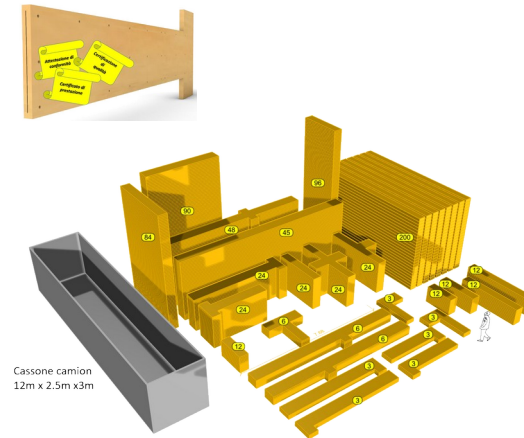
Frame divided into modules, keeping the number of types to a minimum; staggered joints across the three layers; every component calculable in advance.

2 Production



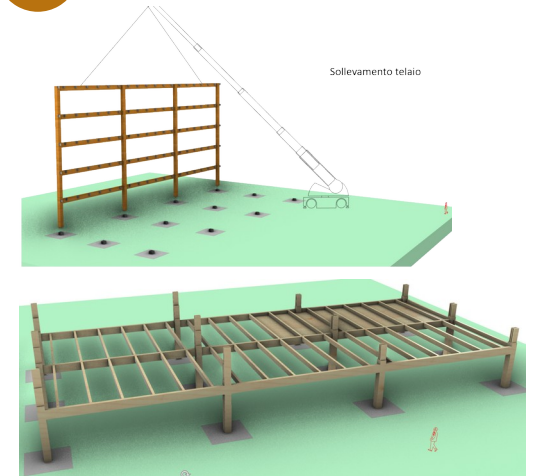
CNC milling or 3D printing for the shells, laser for the reinforcement, bonding press for timber elements; elements machined, tested, marked and certified in the factory (claim 5).

3 Transport



Compact modules: no large production spaces or oversize transport; element volume matched to a 12 × 2.5 × 3 m truck body.

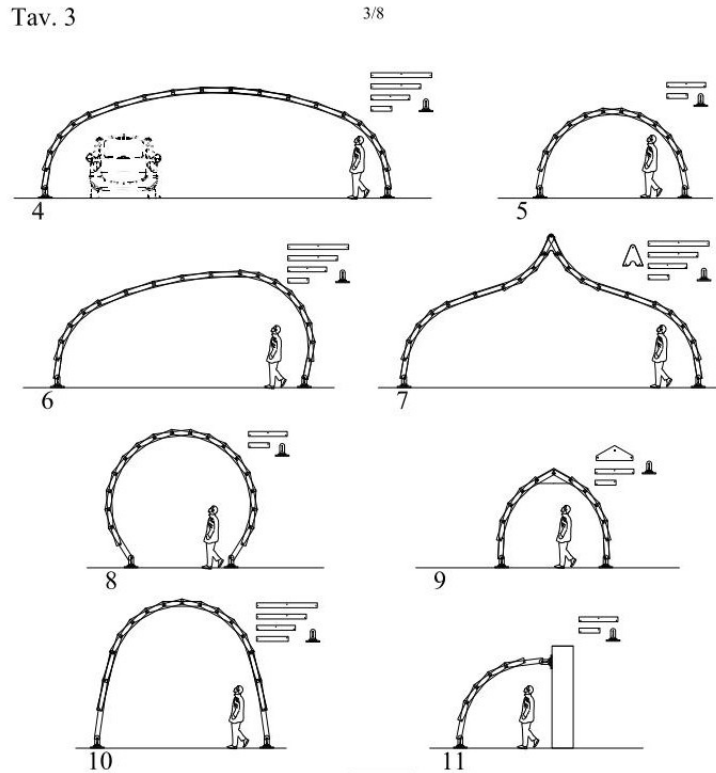
4 Assembly



Frames assembled on the ground and lifted, or elements assembled in place. No scaffolding: guardrails, ladders, mobile towers and a lift are enough; floors usable immediately.

Few module types, a single production process

The simpler the form, the fewer the module types; with complexity the number of types grows, the process does not change.



IT16, Sheet 3 — next to each arch, the component types that form it: few for the round arch (5) and the horseshoe arch (8), more for articulated forms (4, 6, 7).

1 Simple form, very few types

A single-radius circular arch is built with identical modules; varying the radius changes span and rise together.

Ref. IT16 pp. 6 and 8

2 More complexity, more types

Multi-centred, reflex, horseshoe, Tudor or rampant arches result from combining arches of different radii: the number of component types increases.

Ref. IT16 pp. 6–7, Sheet 3

3 Standardisation and costs

With straight or constant-radius curved profiles, modules differ little: more standardisation, less waste, shorter lead times and lower costs.

Ref. WO p. 17; IT18 p. 8

4 Same process for every form

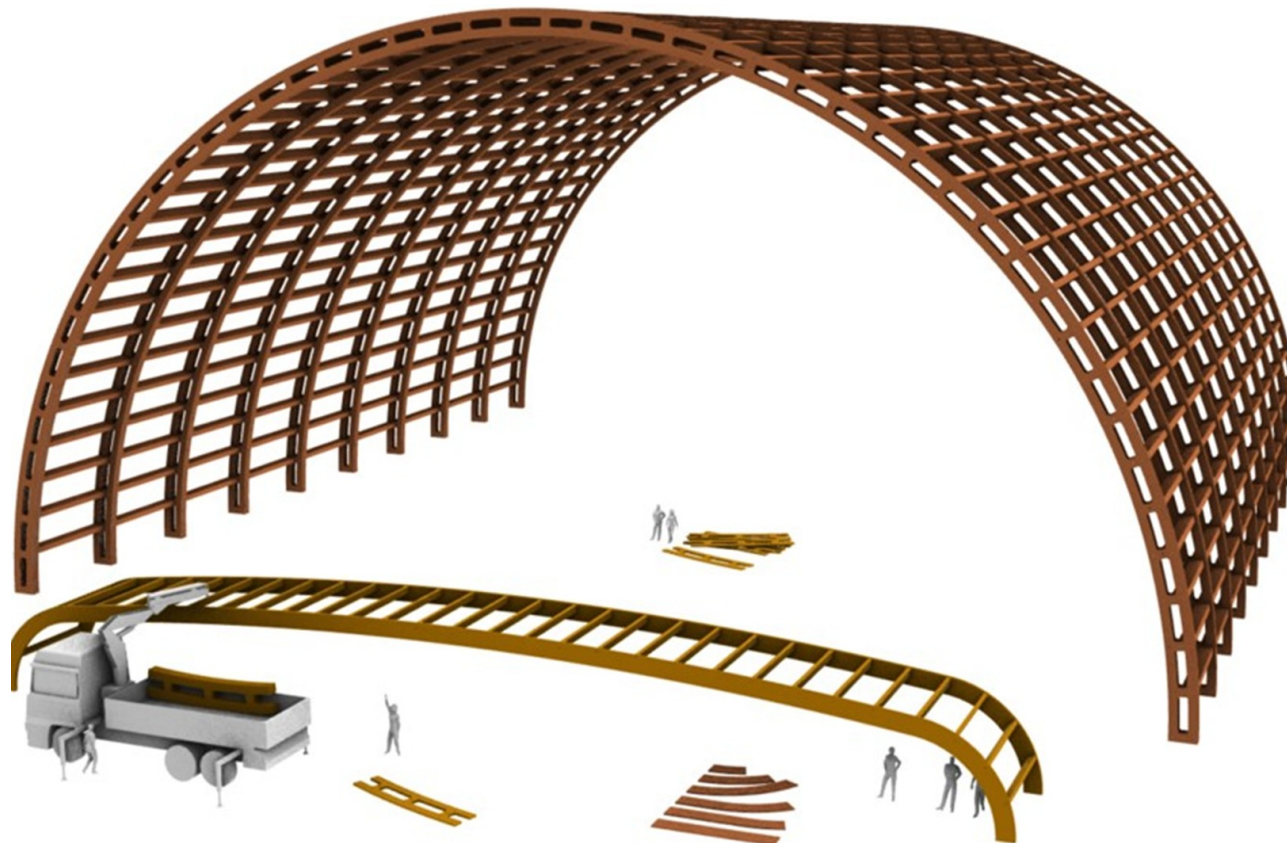
The robotic process requires no retooling and produces any form with the same precision; complex forms only require more organisation.

Ref. IT18 p. 8; WO p. 17

References: WO = WO 2026/190848 · IT16 = IT 102016000085836 · IT18 = IT 102018000008076 · p. = page of the description

Small modules, large structures

The size of the structure does not depend on the size of the elements: modules are transported, pre-assembled on the ground and lifted.



Long-span arch: modules transported by truck, arch pre-assembled on the ground and lifted by crane (project render).

References: WO = WO 2026/190848 · IT16 = IT 102016000085836 · IT18 = IT 102018000008076 · p. = page of the description

1 Large structures with compact modules

No large production spaces or oversize transport; for the same element size, larger structures than the prior art.

Ref. WO p. 17

2 Theoretically unlimited length

The beam is produced in elements and assembled on site; production space, machinery and storage are reduced.

Ref. IT18 pp. 8–9

3 Simplified transport

Transporting large beams, which weighs on the cost of the project, is solved by final assembly on site.

Ref. IT18 p. 9

4 Pre-assembly on the ground

Frames are assembled on the ground and lifted complete; the 2016 arch was already erected without ladders or work at height.

Ref. inventor's assembly sequence; IT16 p. 5, Sheets 7–8

Arches integrated into frames: longer clear spans

In the frame the arch is a beam like any other: it connects at the nodes and helps free spans from central columns.

1 Curved beams allowed by the claim

The axes of the frame beams may be straight, broken, curved or mixed, provided they are coplanar.

Ref. WO claim 1, Fig. 1

2 The arch works with the frame nodes

The curved beam also shares the node elements with the beams it intersects: same fixed connection, same continuity of the internal grid.

Ref. WO claim 1; pp. 3, 16

3 Already in the patent figures

The frame in Fig. 1–2 includes curved and diagonal sections; the structure in Fig. 15 has a sloping, curved roof.

Ref. WO pp. 8, 10; Fig. 1, 2, 15

4 Longer spans

The load-bearing arch, suitably sized, serves uses requiring longer spans: sports halls, swimming pools, sports pitches, public squares.

Ref. IT16 p. 1

Reduction of central columns: design goal to be verified by calculation



Multi-storey frame with arches under each floor (project render).

References: WO = WO 2026/190848 · IT16 = IT 102016000085836 · IT18 = IT 102018000008076 · p. = page of the description

No limits on form

Non-parallel frames, profiles of any shape, mouldable shells: form follows the design, not the technology.



Free-form arches with decorative openings; on the right, for scale, an arched vault (project render; physical prototype in About us).

1 Any profile

Beams with a longitudinal profile of any shape, in strict compliance with the design specifications.

Ref. IT18 p. 8

2 Non-parallel frames

Frames can also be mounted non-parallel, with purlins of different shapes and sizes: bolder forms, free from constraints.

Ref. WO pp. 14–15

3 Mouldable shell

The shell can always be freely shaped and the reinforcement precisely positioned inside it.

Ref. WO p. 15

4 Openings and decoration

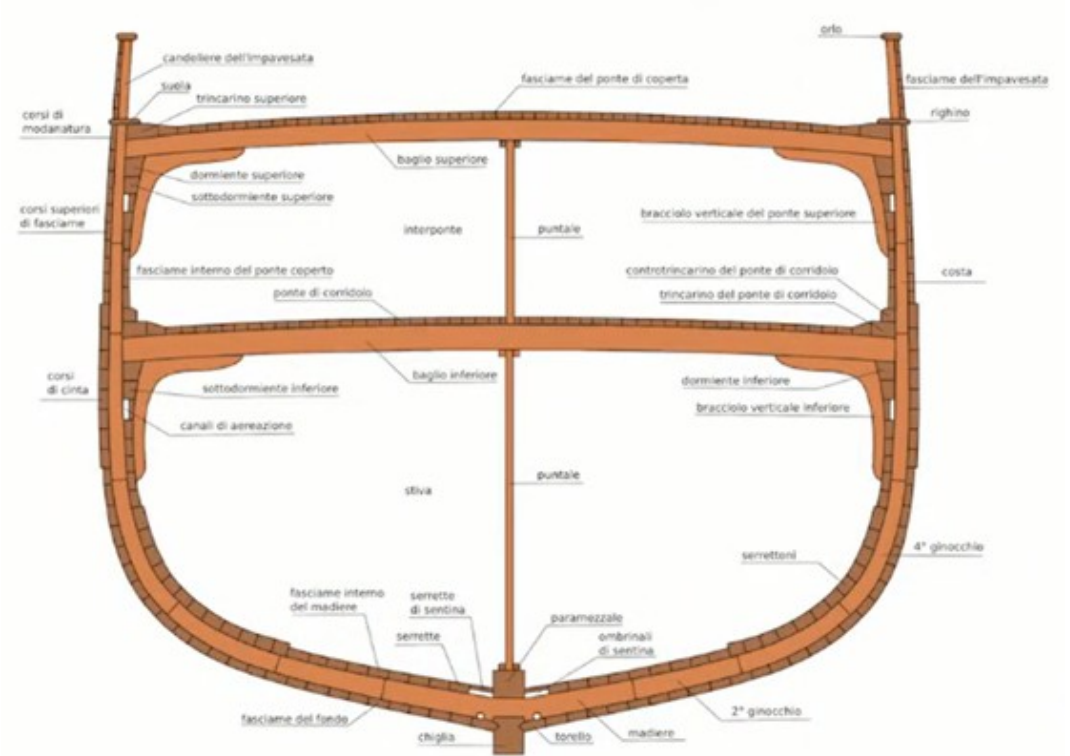
Cavities in the beam lighten the structure, have an aesthetic function and create no production difficulties.

Ref. IT18 p. 10

References: WO = WO 2026/190848 · IT16 = IT 102016000085836 · IT18 = IT 102018000008076 · p. = page of the description

Wherever there is a frame, there is an application

The claim defines the frame in general terms: coplanar beams, possibly curved, that intersect and support floors.



Midship section of a wooden ship: a plane frame of curved and straight members supports several decks (illustrative image).

Analogy: ship frame and Bearing-Frame frame

Wooden ship	Bearing-Frame
Ribs and floor timbers, curved members	Beams with curved or mixed axes (claim 1)
Deck beams	Horizontal frame beams
Knees between deck beam and rib	Fixed connections in the node elements
Decks	Load-bearing floors supported by the frame
Frames repeated along the hull	Frames connected by purlins

General claim Frame of coplanar intersecting beams, suitable for supporting at least one load-bearing floor, with straight, curved or mixed axes. **Ref. WO claim 1**

To be verified The WO description indicates building structures as the field: extension to other sectors, such as shipbuilding, should be assessed with the patent attorney.

References: WO = WO 2026/190848 · IT16 = IT 102016000085836 · IT18 = IT 102018000008076 · p. = page of the description



Bearing-Frame

A load-bearing frame that grows the market

One specification, many workshops, one ecosystem.

WO 2026/190848 A1 • Rocco Guarino, inventor and applicant

The Technical section, with description, claims and drawings, is available on this website.



Concept render: flagship project site, modules and purlins placed dry, guardrails only and no scaffolding.

[Contents ›](#)

Contents

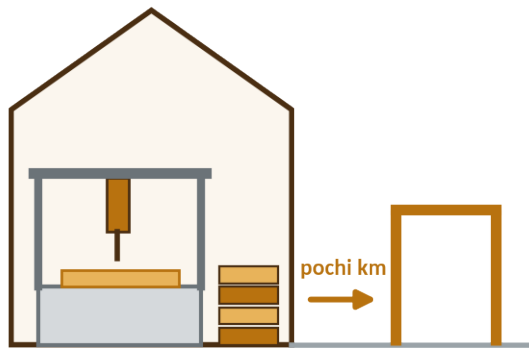
The vision. Each entry leads to its page; the number at the bottom brings you back here.

THE VISION

- [03](#) **THE POSSIBLE FUTURE** Imagine 2035
- [04](#) **AT A GLANCE** Bearing-Frame on one page
- [05](#) **A PLATFORM** A structure that brings the market with it
- [06](#) **A DISTRIBUTED SUPPLY CHAIN** One specification, many workshops
- [07](#) **FROM SMALL TO LARGE** Non-parallel frames, free forms
- [08](#) **APPLICATIONS** Applications and markets
- [09](#) **CLIMATE AND CIRCULARITY** Ready for the rules that are coming

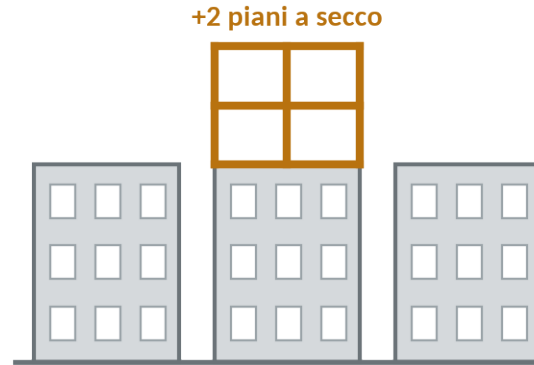
Imagine 2035

Four scenes from a market that Bearing-Frame can create.



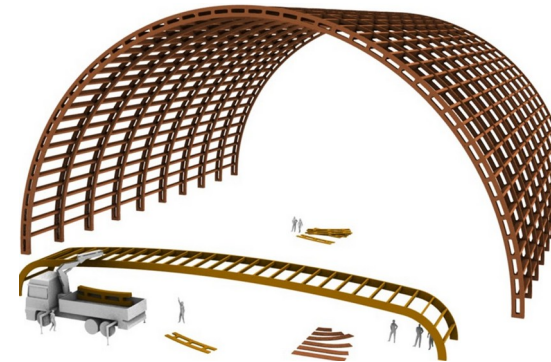
In every province

A workshop with CNC machines or 3D printers produces Bearing-Frame modules for nearby sites, to the same specification as all the others.



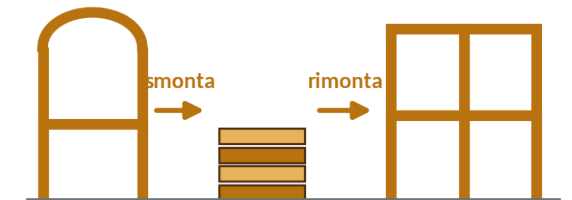
A neighbourhood that grows

An existing building gains two storeys, built dry, without demolition. Another, ageing one is lightened and partly reborn with Bearing-Frame.



A long span

A stadium or a covered square beneath long-span arches, assembled on the ground and lifted, without scaffolding: a crane and an aerial platform are enough.



A building reborn

A structure is dismantled and its frames go back to work on another site, even in a new configuration foreseen in the design.

Each scene rests on a property described in the patent: small modules, dry assembly, integrated arches, demountability.

Bearing-Frame on one page

A load-bearing frame that starts from compact modules and becomes a single structural organism.

The technology	The protection	The opportunity
Integrated organism Shell, continuous internal grid and fixed-connection nodes form a highly statically indeterminate frame. Ref. WO claims 1 and 6 Compact modules Factory-made, transported without oversize vehicles, assembled on site with ordinary fasteners, bolts and nuts. Ref. WO p. 17; claim 5 Multi-material CNC-machined timber, composites, 3D-printed cementitious materials and clays on the same architecture. Ref. WO p. 6	WO 2026/190848 International application published on 17/09/2026, priority 13/03/2025. Ref. WO front page Search report Category A documents only: no X or Y documents. Ref. ISR, EPO Territories still open National phase entry by September–October 2027: the new assignee chooses the countries. Ref. 30/31 months from priority	Active participation Lead assignee, development partner, network partner or technical partner: also as a consortium. Ref. page Join the project Existing plants Production uses CNC mills, lasers, presses or 3D printers, technologies that are already widespread. Ref. WO pp. 5–6 Competitive process Participation proposals by 30 October 2026. Ref. page Why now

A structure that brings the market with it

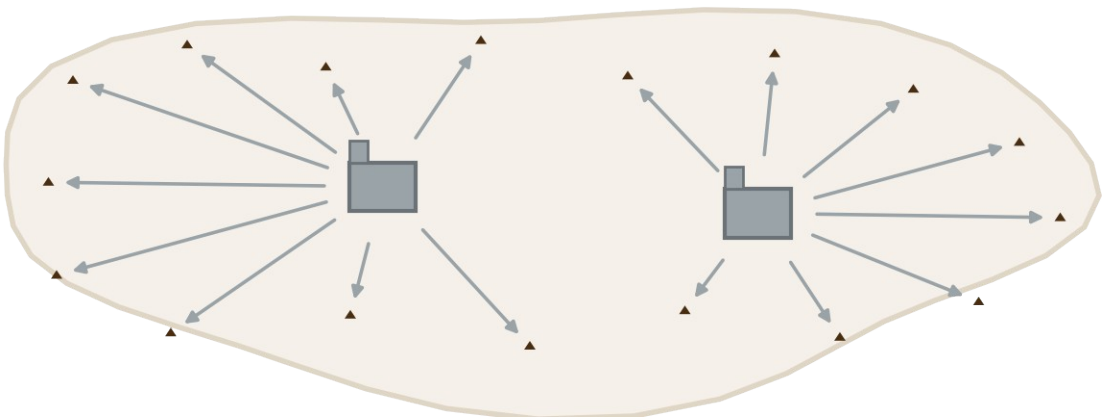
Bearing-Frame replaces no one: it is the load-bearing structure on which the entire existing supply chain works better.

CLT and X-Lam New uses for panels: floors, roofs, infill walls and partitions on frames that go higher.	Connections and fasteners A system that relies on perforated brackets and bolts: more components, to a certified specification.	Façades and envelopes Frames with ready-made interfaces: faster, calculable installation.	Building services Openings planned in the design in beams, columns and floors: fewer clashes and less breaking-through.
Insulation and finishes Cavities and floors designed to house them, including in removable form.	CNC, laser and 3D New work for the machines workshops already have.	Designers New tools, qualifications and out-of-scale projects.	Contractors Dry construction sites, faster, without scaffolding.

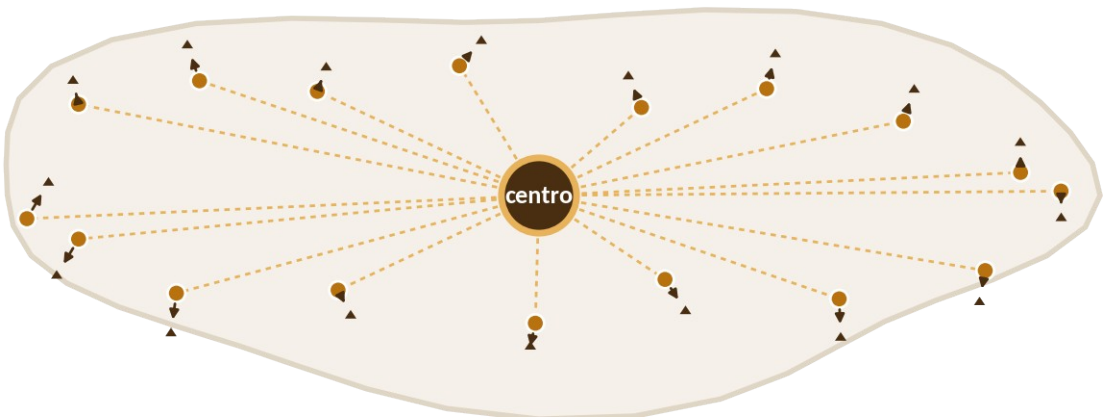
It takes work away from no one: it multiplies it for everyone.

One specification, many workshops

No large factories needed: a network of small and medium-sized enterprises produces the same quality, close to the sites.



Today: a few large plants



With Bearing-Frame: a distributed network that already exists

The hub

Patent, certification, software, specification, brand and training.

The production network

Licensed SMEs with territorial exclusivity: they produce the modules with the machines they already have.

The installation and design network

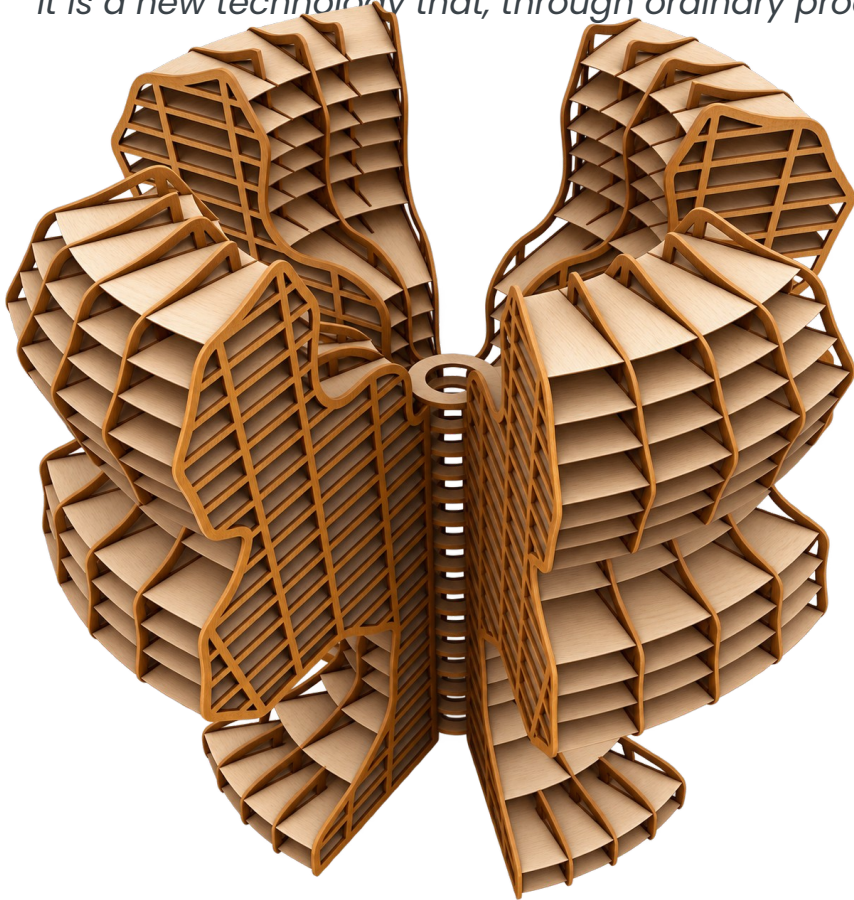
Qualified contractors and professionals who assemble and design with the system.

Why it is possible: small modules without oversize transport (WO p. 17), certified factory production (claim 5), the same digital process for every piece (IT18 pp. 6, 8). A model already proven in timber: the Holz100 network, with 161 regional partners.

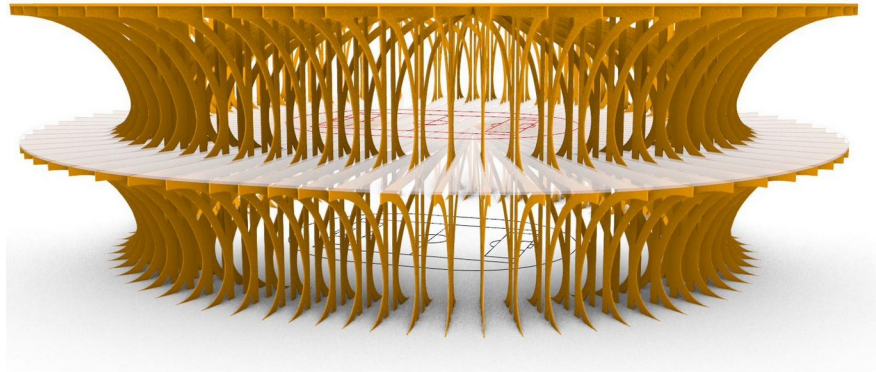
Non-parallel frames, free forms

Frames can be mounted non-parallel, with purlins that differ from one another. three-dimensional structures with bolder forms.

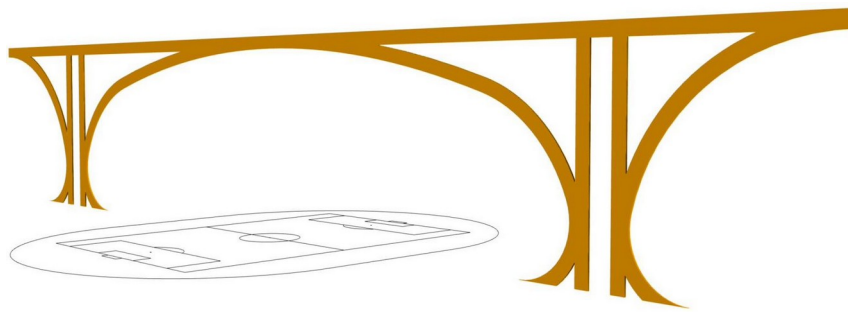
It is a new technology that, through ordinary production, opens up extraordinary possibilities.



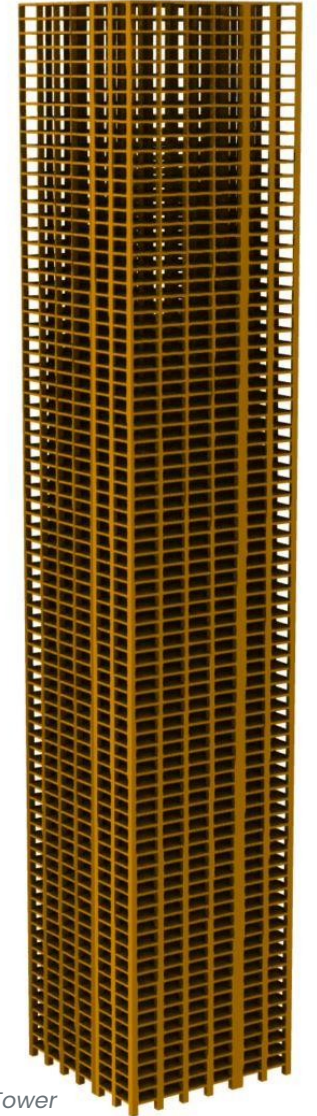
25-storey tree-shaped building



Two stacked stadiums, with stands and offices, topped by a garden square

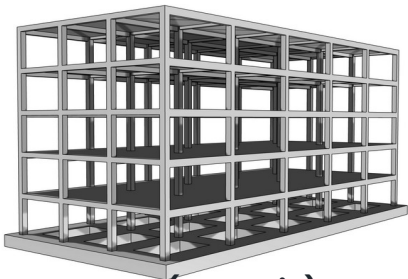


Arch over a sports pitch

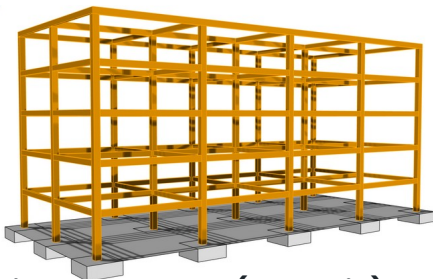


Tower

Applications and markets



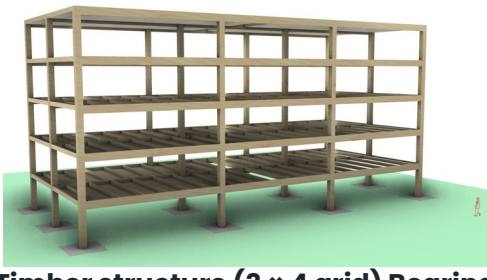
RC structure (4 × 5 grid)



Timber structure (3 × 5 grid)



Timber structure (3 × 4 grid)



Timber structure (3 × 4 grid) Bearing-Frame

Cost comparison · inventor's estimate

Load-bearing structure of a school building: 5 storeys, footprint 15 × 35 m

System	Cost	€/m²
Reinforced concrete (4 × 5 grid)	€792,400	302
Timber (3 × 4 grid)	€790,655	302
Timber (3 × 5 grid)	€798,500	304
Bearing-Frame (engineered timber, 3 × 4 grid)	€783,400	298*

* Inventor's estimate: value expected to decrease as the product is standardised

- 1 **Multi-storey frame buildings**
New residential, educational and commercial buildings.
- 2 **Urban regeneration**
Replacing deteriorated parts, adding storeys, seismic exoskeleton.
- 3 **Long spans and sports facilities**
Sports halls, swimming pools, sports pitches; stadiums (concept).
- 4 **Demountable and repairable structures**
Demountable, extendable, repairable after disasters or damage.
- 5 **Multi-material prefabrication**
Timber, composites, 3D-printed cementitious materials and clays.
- 6 **Every sector that uses a load-bearing frame**
For example shipbuilding (suggested by the inventor; see the Technical section).

Ready for the rules that are coming

Carbon, reuse and local materials: three demands of tomorrow's market that the system meets by design.

Whole-life carbon

The European Energy Performance of Buildings Directive (EPBD, 2024/1275) introduces the calculation of life-cycle global warming potential (GWP) for new buildings, from 2028 for large buildings and from 2030 for all. A dry-built timber frame with little steel starts at an advantage.

To be demonstrated with LCA

Reuse, not just recycling

Buildings that can be dismantled, reassembled, extended and repaired: frames can go back to work on another site. It is the highest form of circularity, and the rarest in construction.

Described in the WO · p. 1

Local materials and production

Local raw materials, including regenerated ones, and production close to the site: less transport, more local value, safe and affordable homes.

Described in the WO · pp. 4, 6

LCA = Life Cycle Assessment (ISO 14040/44)





IP protection

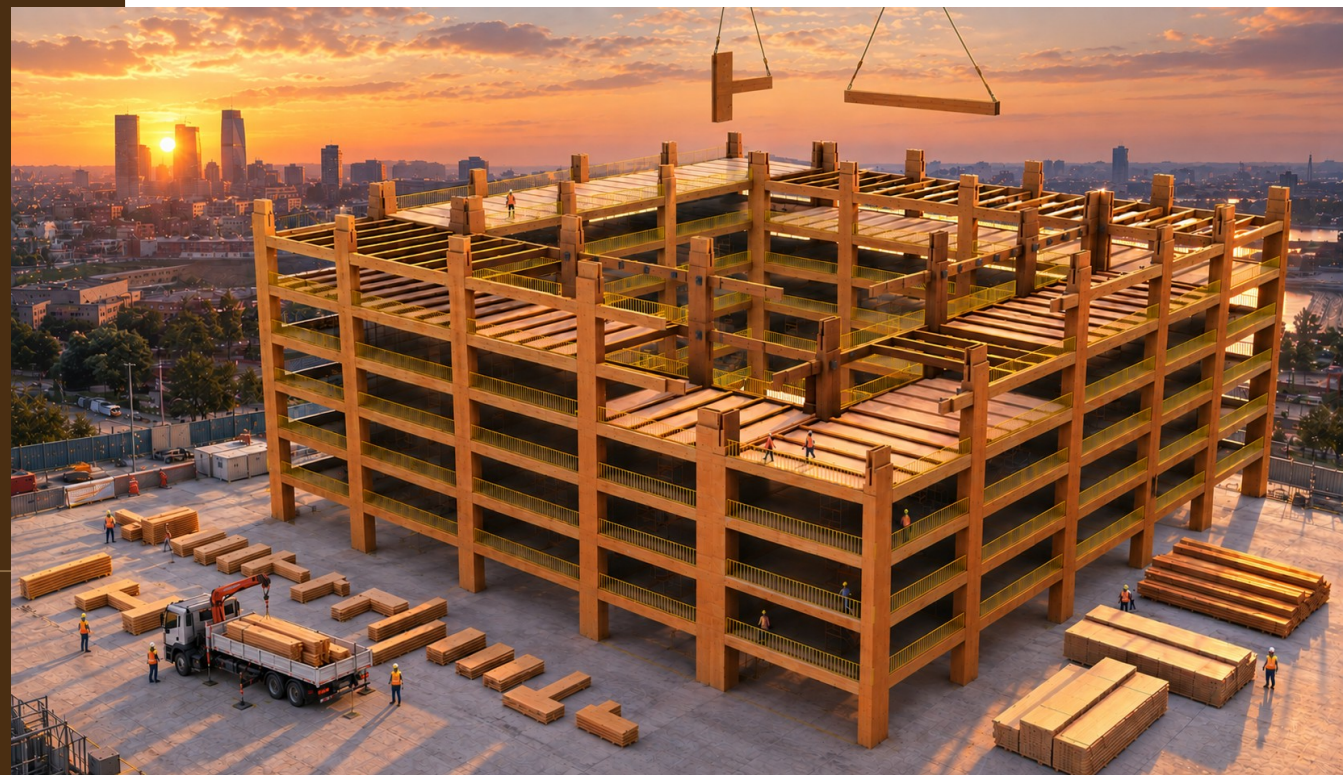
Bearing-Frame

A load-bearing frame that grows the market

One specification, many workshops, one ecosystem.

WO 2026/190848 A1 • Rocco Guarino, inventor and applicant

The Technical section, with description, claims and drawings, is available on this website.



Concept render: flagship project site, modules and purlins placed dry, guardrails only and no scaffolding.

[Contents ›](#)

Contents

IP protection. Each entry leads to its page; the number at the bottom brings you back here.

THE VALUE OF IP

- [03](#) **INTELLECTUAL PROPERTY** Patent position
- [04](#) **THE VALUE OF PROTECTION** With the patent, or without protection?
- [05](#) **IP ECOSYSTEM** Whoever controls the patent controls the ecosystem
- [06](#) **CERTIFICATION** From signature to market: the certification path
- [07](#) **THE ROADMAP** A scenario in three stages
- [08](#) **THE ROADMAP** Feet on the ground: the first steps
- [09](#) **THE FLAGSHIP PROJECT** A building worth more than a hundred presentations

Patent position

Application data

Publication

WO 2026/190848 A1 · 17/09/2026

PCT application

PCT/IT2026/050050 · 11/03/2026

Priority

IT 102025000005180 · 13/03/2025

Applicant and inventor

Rocco Guarino

IPC

E04B 1/26, E04B 5/12, E04C 3/12, E04C 3/16, E04C 3/42

What the claims protect

Claim 1 frame of intersecting beams with shared node elements; staggered joints with plate yg; internal grid yl/yys crossing at the nodes

Claims 2–4 optimised purlins, transverse, diagonal and special plates, notched brackets

Claim 5 elements bonded, tested, marked and certified in the factory

Claim 6 all internal grids and all shells connected to one another

Claim 7 pre-marked cavities for building services

International search report

3 documents cited, all category A (general state of the art). No X or Y documents.

JP 2016-180296 A · IT 102018000008076 (same applicant) · CA 2 232 848 A1 (claim 2 only)

EPO, mailed on 10/08/2026

Patentscope.wipo.int – Documents – (ISA/237, 9 p.)

Written Opinion of the International Searching Authority, (ISA/210, 3 p.) International Search Report.

National and regional phases

within 30/31 months from priority: September–October 2027: the assignee can still choose the territories.

Anyone wishing to combine grid continuity, redundancy, modularity and node–element–grid integration must change the structural architecture, not just the construction technology.

With the patent, or without protection?

The patent makes it worthwhile to invest in what creates the market: testing, certification, software, training, brand.

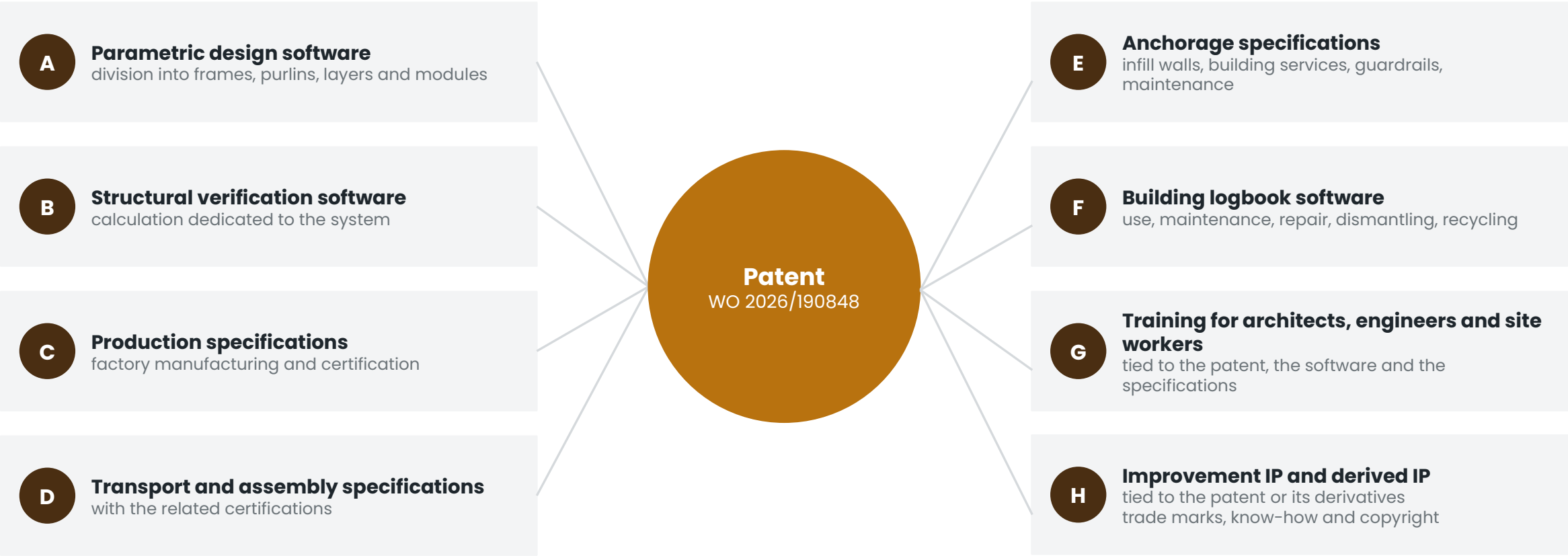
	With the patent	Without protection
Those who invest in the system	Reap the rewards of licences, testing and certification for twenty years and, beyond the patent, of trade marks, know-how and copyright.	Also pay for competitors, who arrive later for free
Network companies	Join a certified system, with territorial exclusivity	Everyone with their own variant, competing on price alone
Professionals	Tools, qualifications and a recognised system	No common standard for years
Clients	Certified performance and a quality benchmark that grows over time	A single failure damages trust in the entire system

Coming under the patent costs less than going it alone.

Anyone wishing to use the system without a licence would have to fund engineering, testing and certification alone, for years. With a licence they gain access to an already certified system, with moderate royalties.

Whoever controls the patent controls the ecosystem

A technology that can become the basis of multiple products, services and certifications.

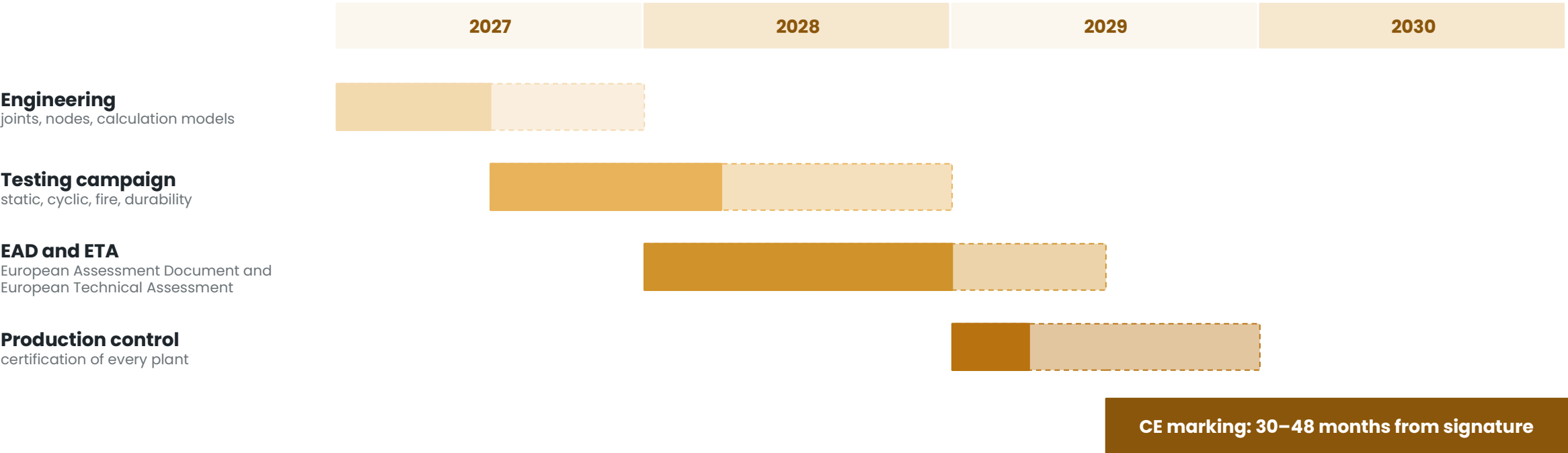


Possible derived IP suggested by the inventor.

Indicative estimate · to be confirmed with a Technical Assessment Body

From signature to market: the certification path

Engineering, testing and European technical assessment: a defined and predictable path.



Solid bar: minimum duration · hatched: maximum duration

Valid throughout Europe

The ETA is valid in the EU, the European Economic Area, Switzerland and Türkiye; it is often accepted elsewhere too.

A tailor-made EAD

If no suitable assessment document exists, a new one is developed in about nine months: the rules derive from the system.

Pilot buildings first

National approvals case by case; in Italy, with the Technical Assessment Certificate (CVT).

A scenario in three stages

Those who lack the strength to do everything alone do not need it: knowing how to orchestrate is enough.



Separating the decisions saves time.

By 2027 only the countries need to be protected; certification can start later, with the right partners. This way the patent is not lost while development is being organised.

Feet on the ground: the first steps

Six concrete steps, within reach of those starting out, that make everything else credible.

1

Country strategy

With a patent attorney: which markets to protect, at what cost and on what timescale.

→ Targeted coverage by 2027

2

Technical pre-assessment

A Technical Assessment Body indicates whether a new EAD is needed, with costs and timescales.

→ A certification path with firm dates

3

Joint and node tests

The first laboratory tests on the components that carry the system.

→ The first measured structural data

4

Life cycle assessment

A preliminary study with a university on a typical frame.

→ A first credible carbon figure

5

Full-scale prototype

A complete frame, assembled, loaded, then dismantled and reassembled.

→ Visible proof of the system

6

Pilot network

Three to five workshops with CNC machines or 3D printers trained on the specification.

→ The distributed model put to the test

Then the flagship project: once the numbers are there, we can dream big.

A building worth more than a hundred presentations

*The first demonstration project, of high architectural and structural quality, becomes the lever for the market.
A courtyard of four multi-storey buildings (60 × 60 m) with a floor plan free of central columns.*



Concept render: flagship project site, modules and purlins placed dry, guardrails only and no scaffolding.

1

Demonstrate

The system at full scale: performance, speed of assembly, architectural quality. Results comparable with existing solutions.

2

Validate in the field

Test and monitoring data to support certification.

3

Communicate

A showcase for architects, clients and network companies.

4

Co-fund

European programmes for sustainable and circular construction, to be checked call by call.



Participation

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[Contents ›](#)

Contents

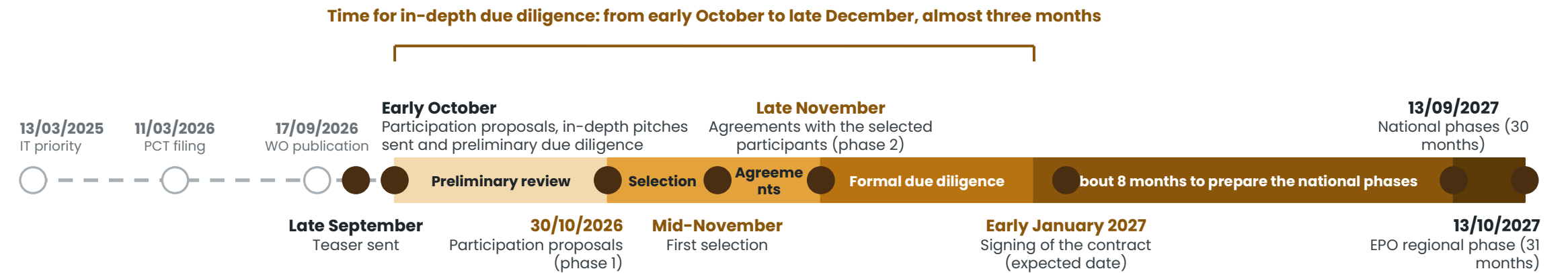
Participation. Each entry leads to its page; the number at the bottom brings you back here.

PARTICIPATION

- [03](#) **WHY NOW** Why now: the process timeline
- [04](#) **PARTICIPATION** Join the project
- [05](#) **PARTICIPATION** Two phases, to take part without commitment
- [06](#) **PARTICIPATION** Your participation proposal

Why now: the process timeline

Just over three months from presentation to signature; then about eight months for the national phases, without rushing.



1 Choosing the countries

With the assignment, the new proprietor chooses entirely independently the countries in which to extend protection, based on its own strategic markets. Once the deadlines have passed, the choice is no longer possible.

2 Tight timing, comfortable national phases

The timeline is tight for a reason: by signing in early 2027, the new proprietor has about eight months to prepare the national and regional phases without chasing deadlines.

3 A competitive two-phase process

Participation proposals are used for a first selection in mid-November; roles, consortia and terms are then defined with those selected. Ownership will go to a single party.

Timeline not to scale: the period before publication is compressed. Deadlines calculated from priority (30 and 31 months), to be confirmed with the patent attorney.

Join the project

We are not just looking for a buyer: we are looking for those who want to build this market. Alone or as a consortium.

1

Owner and lead partner

Acquires ownership of the patent, protects the countries by 2027 and orchestrates the ecosystem.

2

Development partner

Joins the development company with capital or expertise: engineering, certification, production, markets.

3

Network partner

Workshop or contractor that produces and installs under licence, with territorial exclusivity.

4

Technical partner

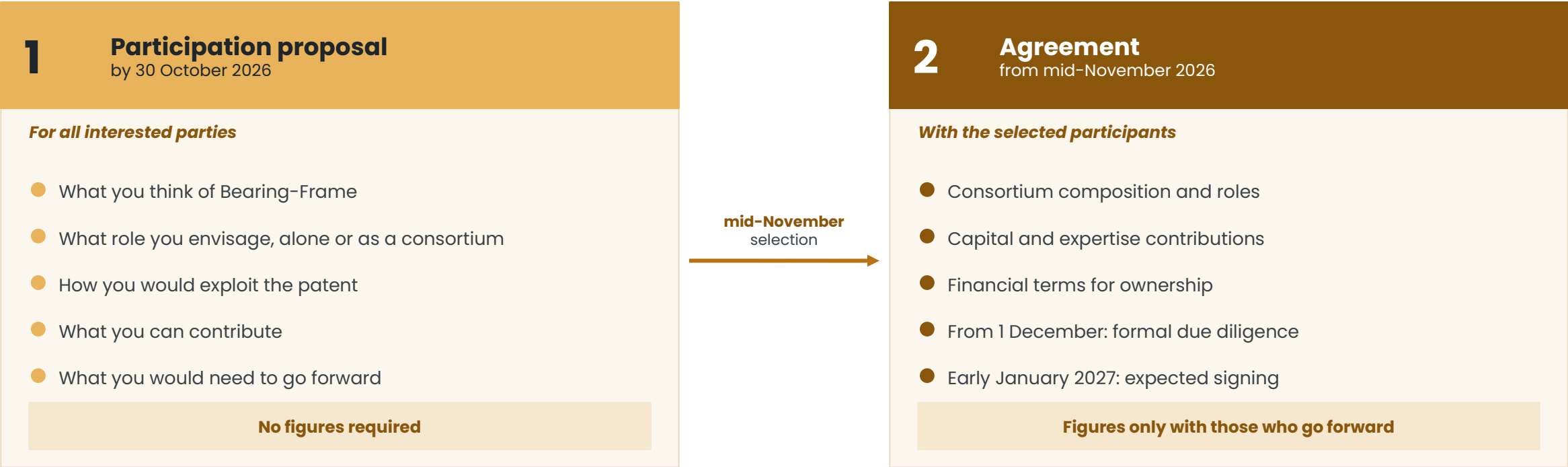
Firm, university or laboratory for testing, life cycle assessment, flagship project.

Several companies can apply together.

Ownership will remain with a single legal entity, company or development company; financial terms are defined with those who go forward, in phase 2.

Two phases, to take part without commitment

First you tell us how you see yourselves in the project; agreements and figures come only with those who go forward.



What we are looking for: a convincing development vision, the ability to deliver it, also together with others, and experience in exploiting intellectual property, also through partners or advisers.

Your participation proposal

Five open questions. Answer as you prefer, even with an e-mail of a few lines.

1

What do you think of Bearing-Frame?
What convinces you and what does not.

2

What role do you envisage for yourselves?
Owner, development partner, network partner or technical partner; alone or as a consortium, and with whom.

3

How would you exploit it?
Products, materials, territories, derived IP.

4

What can you contribute?
Capital, expertise, plants, markets, experience in intellectual property.

5

What would you need to go forward?
Information, tests, meetings.

SEND BY

30 October 2026

Selection in mid-November

Write to

rocco.guarino@bearingframe.it

In writing only: proposals, questions and requests for clarification. No confidential information is required at this stage.

Non-binding proposal. Financial terms for ownership will be defined only with the selected participants, in phase 2.



About us

Bearing-Frame

From interconnected components to an interconnected structural system

Load-bearing frame structure, prefabricated in modules, assembled on site

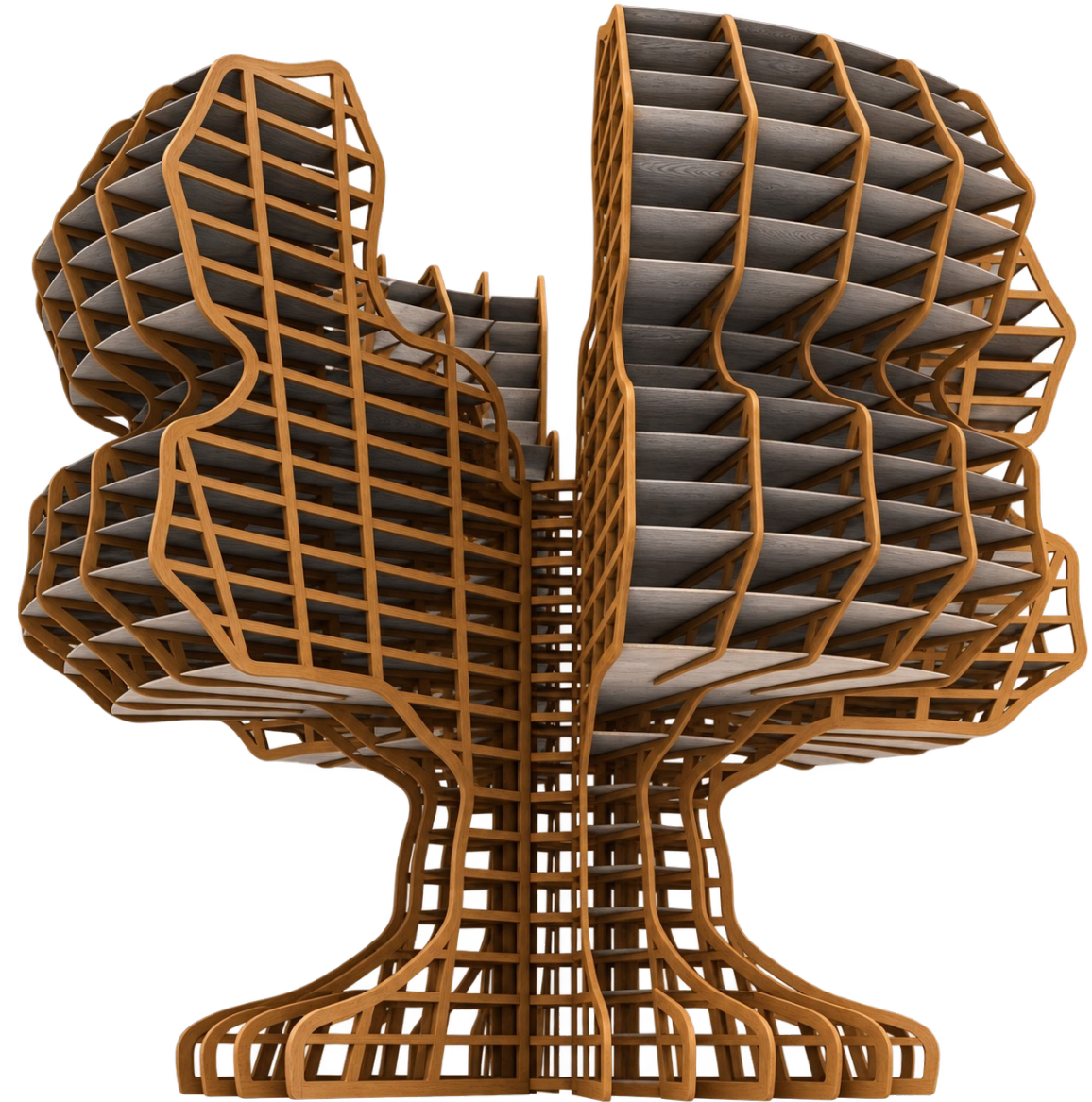
International application **WO 2026/190848 A1**

Published on 17 September 2026

Priority IT 102025000005180 of 13 March 2025

Inventor and applicant Rocco Guarino

[Contents ›](#)



Concept: tree-shaped building made with Bearing-Frame frames (project render)

Contents

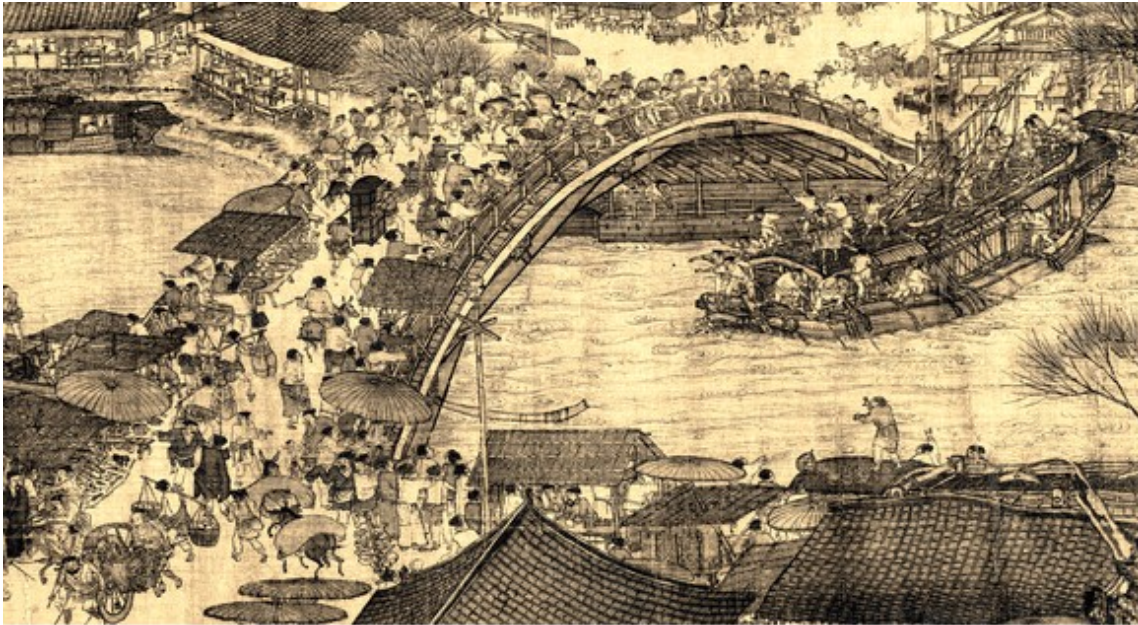
About us. Each entry leads to its page; the number at the bottom brings you back here.

About us

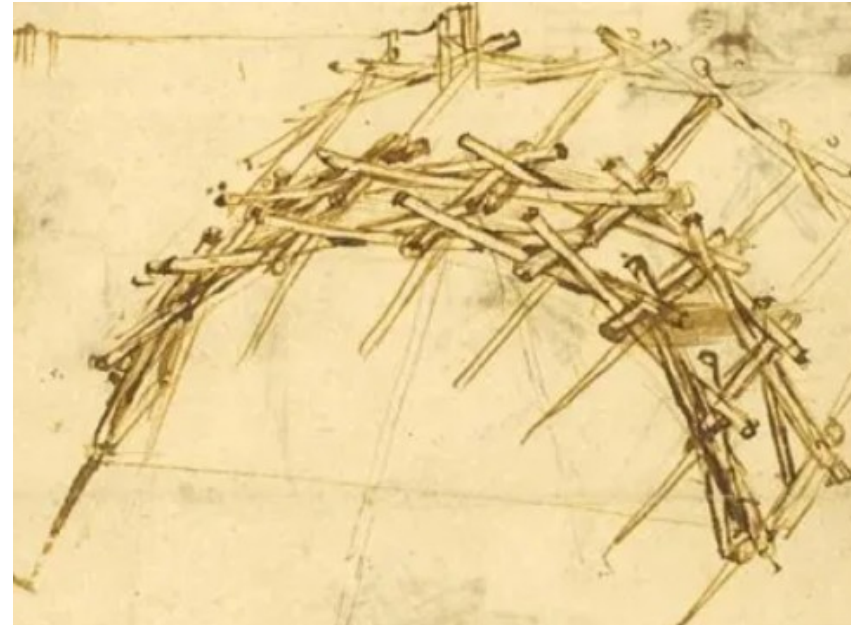
- 03 **THE ORIGINS** An ancient idea: the arch made of short members
- 04 **FROM CONCEPT TO PATENT** The concept works: the first patent is born
- 05 **MATURITY** Ten years of work: from the arch to the hyperstatic frame

An ancient idea: the arch made of short members

For centuries people have built self-supporting arches from short beams that hold each other up.



China: timber arch bridge made of short beams in a scroll painting, one of the earliest records of this technique.

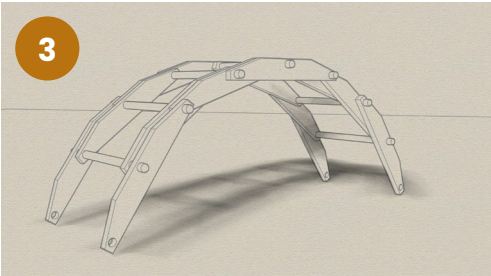
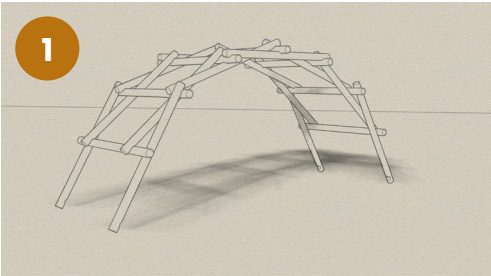


Leonardo da Vinci, around 1500: studies on the potential of the self-supporting arch of short beams.

A reciprocal structure: each member supports the adjacent ones. It is the same principle that, in the patent, makes the layers with staggered joints work together.

The concept works: the first patent is born

The idea deserved protection: the first filing in 2016. An evolution that continues today.



Evolution through three stages of refinement.



The full-scale prototype, deliberately pushed beyond expectations to test its potential. Built for the volunteer association PARIMPARI. (<https://www.parimpari.it/>)

Many modules, a single element. Although made of many modules, the arch behaves as a single element: it is assembled from the ground without working at height, then dismantled and taken away.

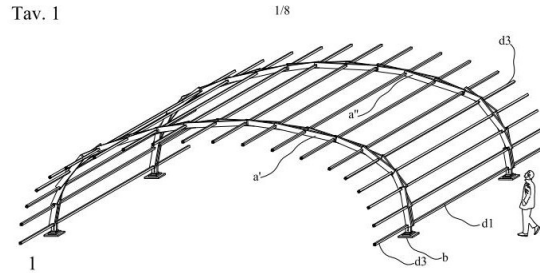


Model of the arch of short members.

9.60 m span	4 m maximum height	13 mm plywood boards
120 × 20 cm board size, approximately	6 bases simply resting on the grass	1 car to transport it dismantled

Ten years of work: from the arch to the hyperstatic frame

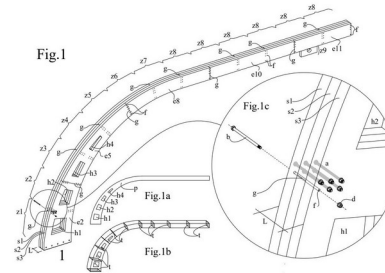
2016



Load-bearing arched vault with variable radius

IT 102016000085836 · filed 18/08/2016

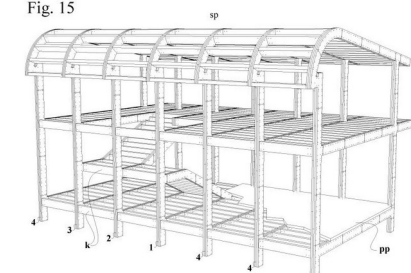
2018



Modular beam with staggered layers

IT 102018000008076 · filed 13/08/2018

2025-26



Interconnected load-bearing frame

Priority 13/03/2025 · WO 2026/190848

What exists

- Three titles from the same technology family
- Patent drawings and project renders
- Physical prototypes: arch (2016) and modules with reinforcement
- Model made by 3D printing



What remains to be organised and validated

- Deadline Sept. 2027: keeping the patent alive
- Structural tests on joint, node and grid continuity
- Redistribution of forces upon loss of a restraint
- Fire resistance and seismic behaviour
- Parametric design and analysis software
- Production, transport and assembly specification
- Certifications
- Training for designers and site workers

A natural space for the acquirer's R&D.