

MODULAR STRUCTURAL SYSTEM

Based on an Original Idea
Protected by an International Patent



SETTIMIO CASTELLI
INVENTOR, PATENT OWNER
AND STRATEGIC ANALYST



Visione italiana



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Preface

1



”

While exploring the broad human landscape of the Art of Building, I noticed a particular detail which had until then been overlooked: in order to Build, Nature generates collaborative systems. Nature produced Sets.

This is how the Karthesia Project came to be: an “Italian Vision” to revive “Made in Italy” in the World.



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karthesia
MODULAR STRUCTURAL SYSTEM
The solution that enhances the material



MODULAR STRUCTURAL SYSTEM

What it is

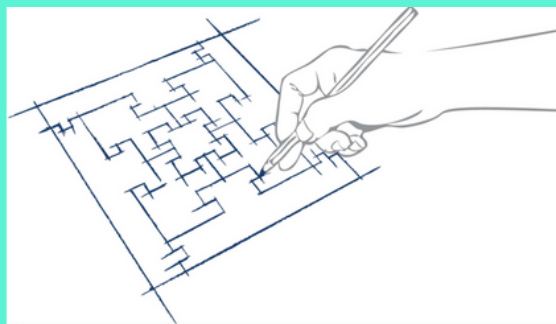
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The MODULAR STRUCTURAL SYSTEM is an Internationally Industrial Patented System based on an original invention:

3 different geometric types (A, B, C) generate a set of 9 elements ($1A + 4B + 4C$) that can be used and assembled together in a modular and collaborative way.

A “geometric figure that is not Mono but Multi” is the feature represented in the graphic representation which, together with the applicative advantages of using any material in any scale of size, offers a wide array of solutions to combine creative and manufacturing skills.



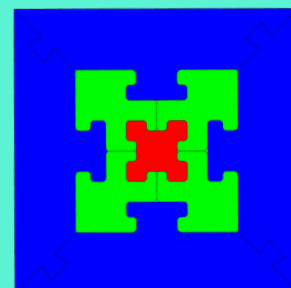
This gives rise to structures that are dynamic thanks to the relative peculiarities and behavioural characteristics of the system.

A NEW VISION

This Innovative System can be easily and quickly adopted and integrated into all industries using all currently-available technologies.

In today's Global Market, the technologies and resources necessary to produce Karthesia are already present and available in all major industries.

Therefore the adoption of the technology requires little investment to reap great benefits.





6 Key Values

3



THE VALUE OF EXCLUSIVE COMPETITIVENESS

Modular Structural System Enables the Development and Diffusion of "Made in Italy" INNOVATION with lasting COMPETITIVE ADVANTAGES due to the PATENT PROTECTION it enjoys, giving it an EXCLUSIVE EDGE in terms of performance and creativity.

ITALIAN VISION

Karthesia can increase the **PRODUCTIVITY** of Italian companies and their influence globally, developing Global Innovation with an "Italian Vision", a vision always synonymous with high added-value and an ability to attract capital.

3 STRENGTHS

The innovative Karthesia Modular Structural System is characterized by

- Flexibility
- Reversibility
- Reusability

A LIFE-CYCLE THINKING APPROACH

The application of KARTHESIA means an effective use of resources, techniques and materials both in the projection and construction phases enabling a life-cycle thinking approach which values economic, social and environmental factors throughout the entire value chain.

LIMITLESS APPLICATIONS AND INDUSTRIAL DEVELOPMENT

The Modular Structural System is suitable for every Company and Sector (see in-depth discussion in the Demonstration section).

SAFETY

In terms of **SAFETY**, the Karthesia Project is characterized by strong reductions in the work processes traditionally in use, thus the reducing companies' or States' risks and costs, while also contributing to a healthy and positive work environment.



Karthesia & Circular Economy

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The application of Karthesia allows for an effective use of resources in the life-cycle thinking approach.

Accelerating production and waste cycles, with forced reduction of the useful life of materials and components, increases the amount of WASTE generated and unsustainable use of RESOURCES.

Offering "a second life" to each material reduces waste and preserves the energy embedded in the materials themselves.

In this regard, KARTHESIA boasts the following ADVANTAGES:

- the complete integration and re-use of components in the projection and construction of elements / structures
- the possibility to adopt a complete eco-compatible strategy
- virtually endless life cycles, thus also limiting the material's energetic footprint



Karthesia & Circular Economy

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Life-cycle thinking approach as envisioned by Karthesia

KARTHESIA design maximizes the effectiveness of the relationship between

- durability of works/elements
- durability of components
- feasibility of total re-use of elements as part of an eco-compatibility strategy

TESTS & VALIDATION

Karthesia's Life-Cycle Thinking Approach has been tested and proven through environmental certification systems (e.g. LEED, ITACA, BREEAM, etc) specifically dedicated to Materials and Resources management which consider re-use rates, recycling, waste management and sourcing from local contexts as indicators of eco-efficiency.

KARTHESIA AND CAM (MINIMUM ENVIRONMENTAL CRITERIA)

The Karthesia System can be implemented according to CAM (Minimum Environmental Criteria) principles, especially considering how the Material can be endlessly combined and the unique way of building the system offers.



Demonstrative-Descriptive Section 1

Applications: Sectors

6



Applications



- Auto-composition
- Multiple compositions generated in scalar and fractal modes
- Realization of Structures/Infrastructures in any geographical and environmental context
- Integration for optimization
- Fast training for labour force
- On-site assembly
- Reduced transportation and logistics costs
- 100% reversibility
- Reduced environmental disruptions

- Construction and Infrastructure Engineering (numerous areas to be innovated)
- Securing Areas Affected by Natural Disasters
- Application of Innovative Technologies: 3D Printing Industry, Fibre Reinforced Polymer
- Furniture & Design
- Karthesia Toy Industry (TEKKA), unique in the world
- Educational, including in early-years school programs
- Medical, therapeutic, rehabilitative



Sectors



Demonstrative-Descriptive Section 1 Technical Visuals

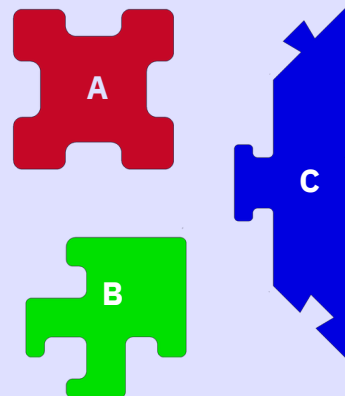
Description of the Modular Structural System

7

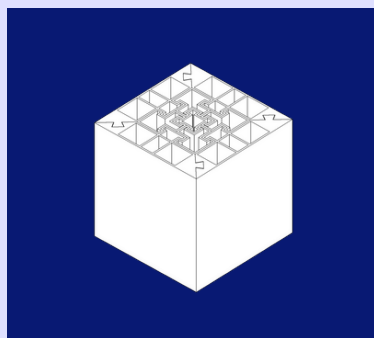
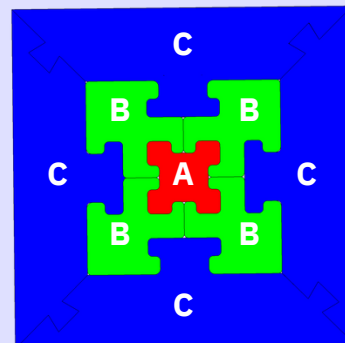


9 Elements

The System is built with 9
Base Elements
Type A, Type B, Type C
As seen here:



There is one Type A element,
four Type B elements,
and four Type C elements





Demonstrative-Descriptive Section 1 Technical Visuals

Description of the Modular Structural System

8



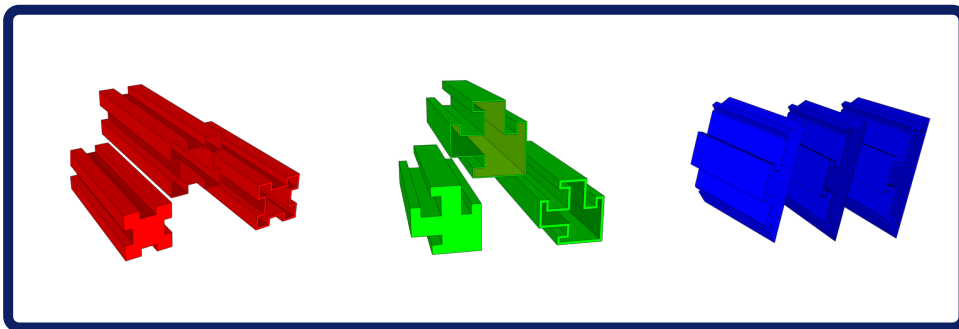
SECTIONS

Elements can be made with solid and/or hollow sections.

Elements can be assembled with either solid or hollow sections, but also with a mixed set of solid and hollow sections.

Hollow section elements can have a constant thickness or vary in thickness according to design requirements.

Variation of thicknesses is always applicable.

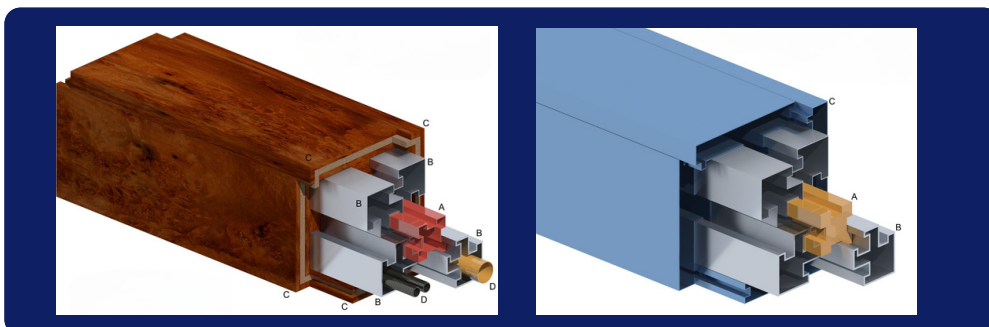


MATERIALS

The elements can be made of the same or different materials.

Materials may be selected according to different characteristics and properties in order to meet specific project requirements.

Differentiation of materials is always applicable.





Demonstrative-Descriptive
Section 2
Technical Visuals

9



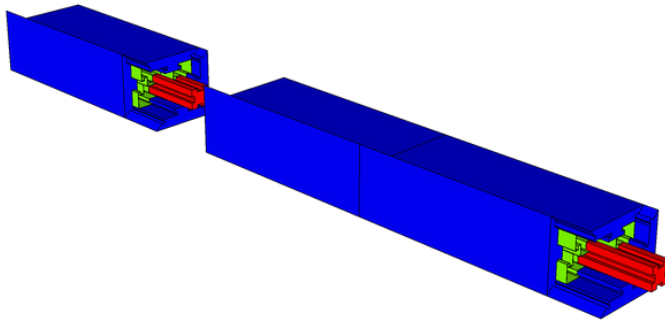
Implementation

- **Unidirectional and Multidirectional Construction Types**
- **Some Examples of Special Elements**
- **Honeycomb Compositions**
- **Scalability**
- **Various Karthesia Functions**
- **Support and Protection Structures**
- **Karthesia Containers & Tanks**
- **Karthesia in Wood**
- **Karthesia Pedestrian Bridge**
- **Tekka - Karthesia in the Toy Market**

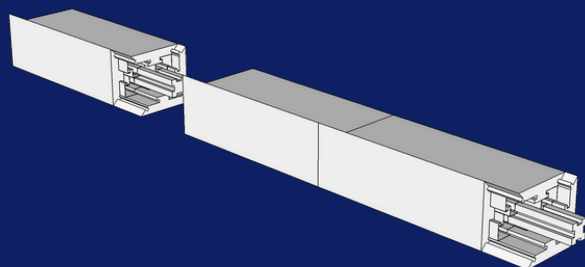


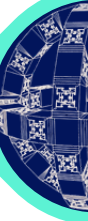
Implementation

CONSTRUCTION TYPE Unidirectional



Base elements A - B - C
are used in unidirectional
constructions



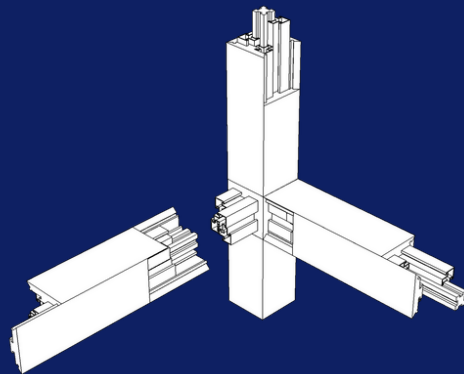
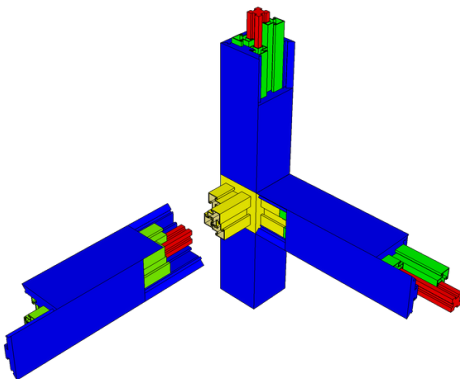
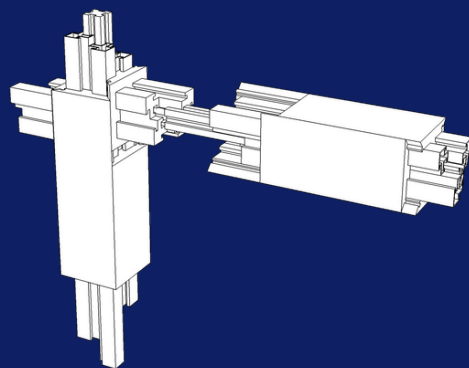
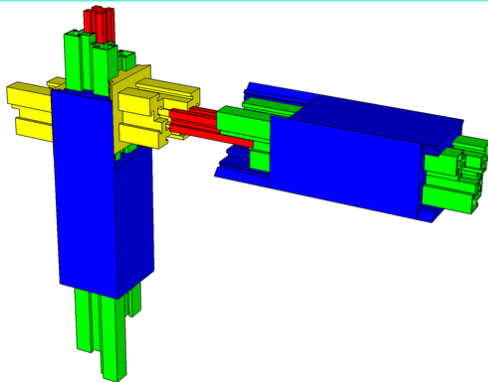


Implementation

CONSTRUCTION TYPE Multidirectional

In Multidirectional constructions, the Unidirectional elements are employed but with the integration of Special Elements in all of their variants.

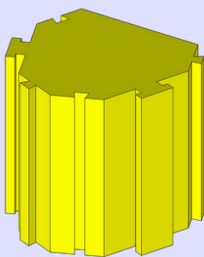
The Special Elements are the evolution of the Basic Elements and have the role of developing Multidirectional constructions.



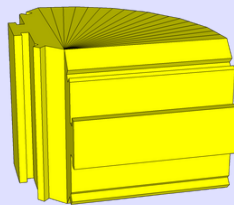


Implementation

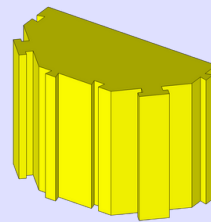
EXAMPLES OF SPECIAL ELEMENTS



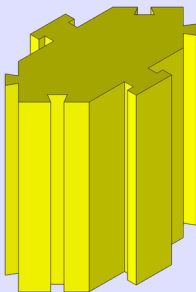
45° Angular



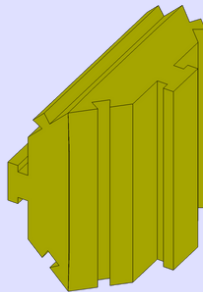
C double-orthogonal
90° Angle



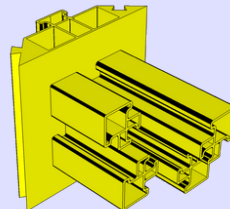
C double parallel
90° Angle



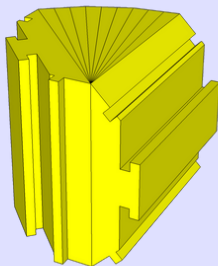
C double parallel



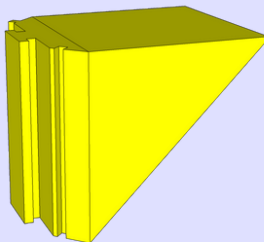
C orthogonal special



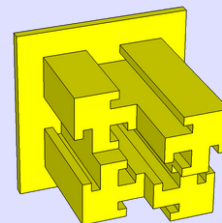
C special



double orthogonal
45 ° Angle



Special Support element

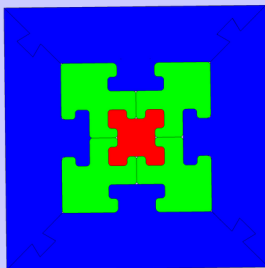


Special Element

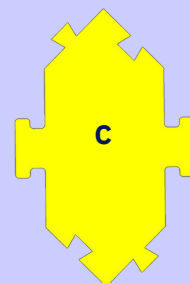
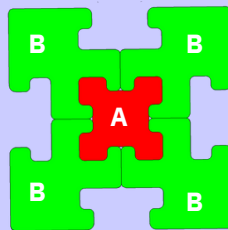


Implementation

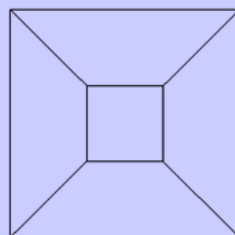
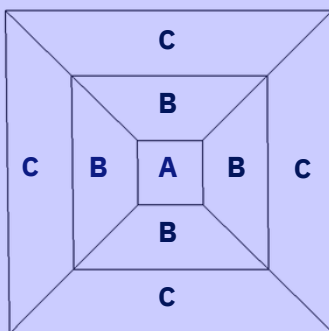
HONEYCOMB COMPOSITIONS



9 Elements



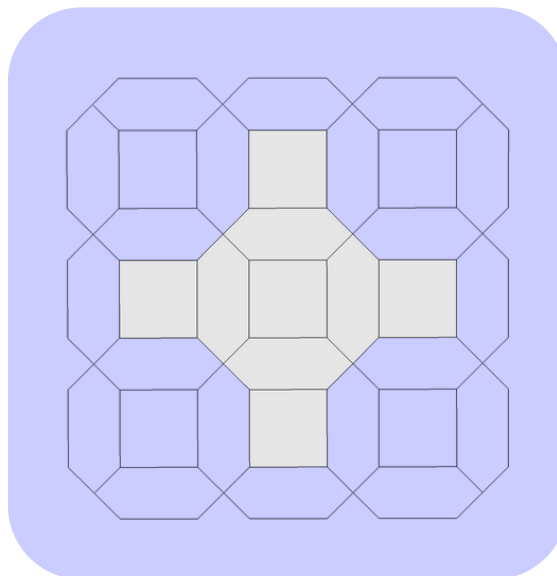
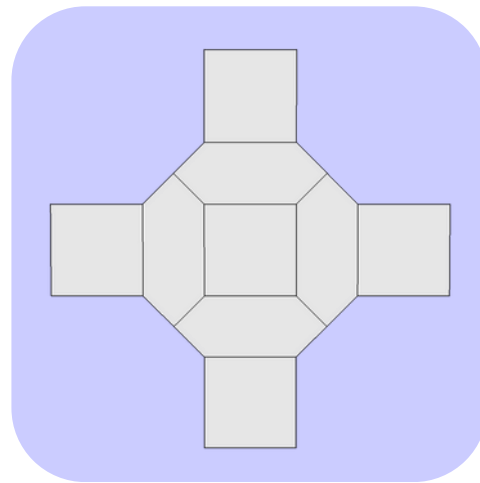
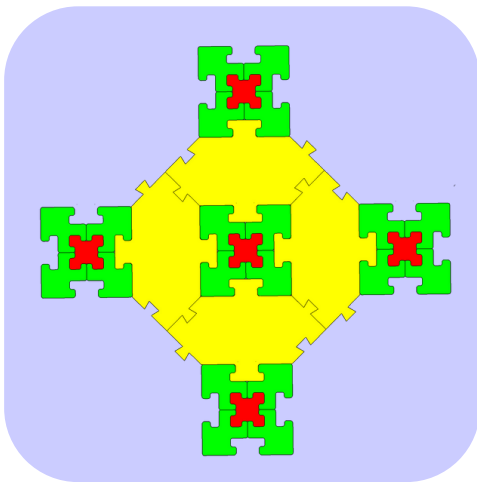
Double C





Implementation

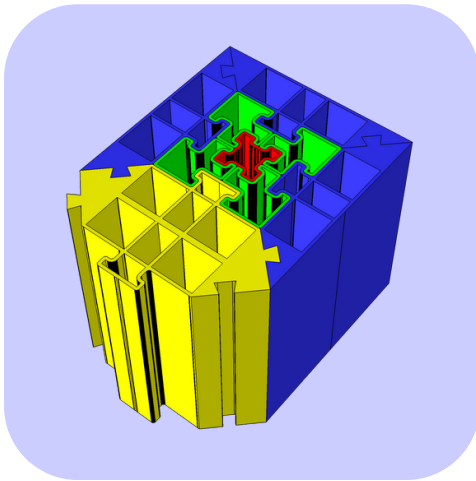
HONEYCOMB COMPOSITIONS



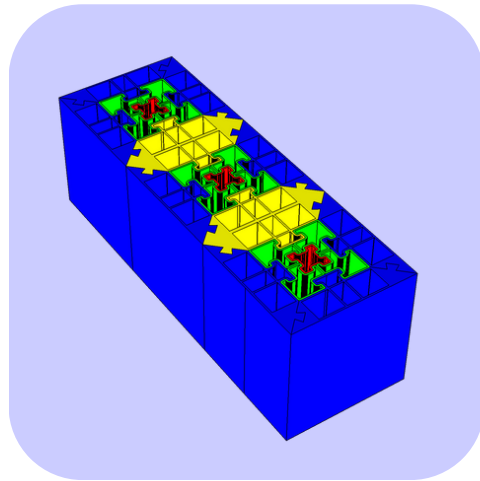


Implementation

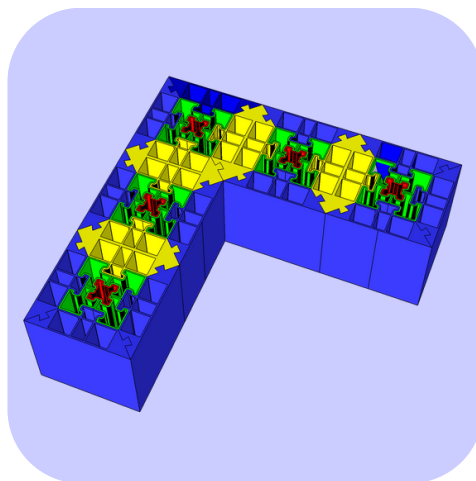
HONEYCOMB COMPOSITIONS



Elements with
Double C



Connecting Elements
Using a Double C

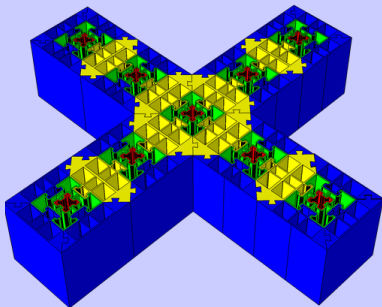


Connecting at an angle

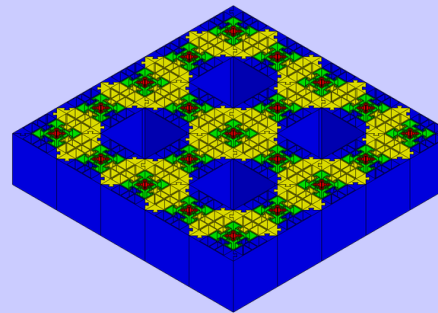


Implementation

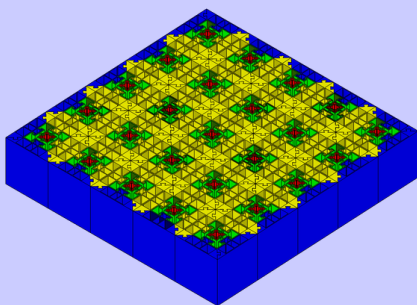
HONEYCOMB COMPOSITIONS



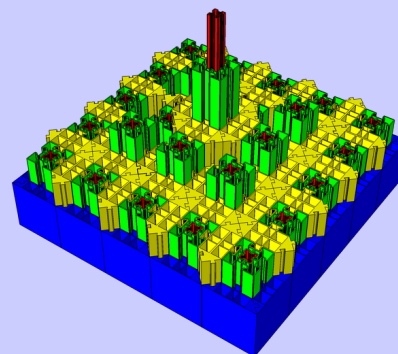
Cross Connection



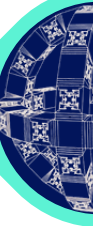
Platform with Gaps



Full Platform

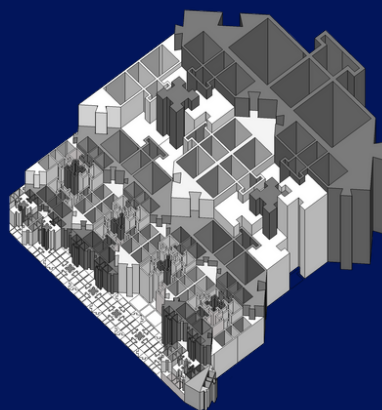
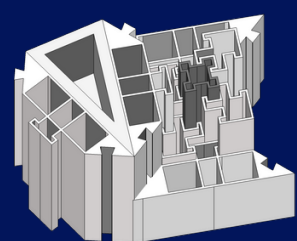
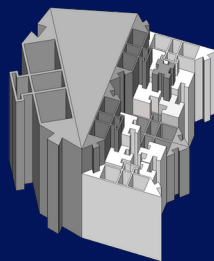
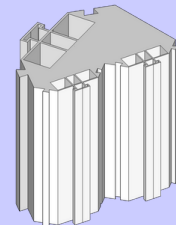
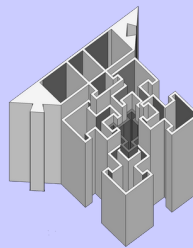
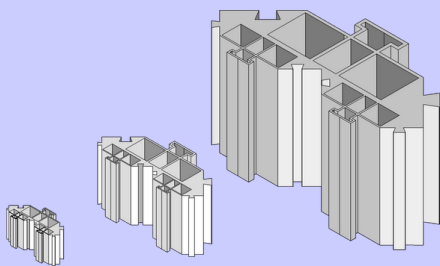


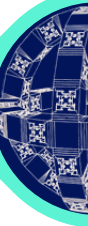
Pyramid



Implementation

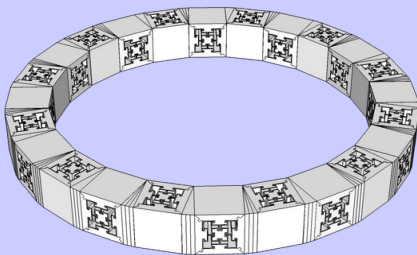
SCALABILITY



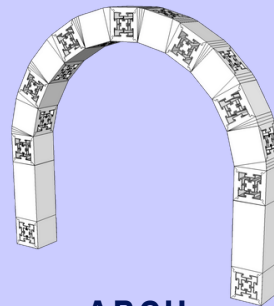


Implementation

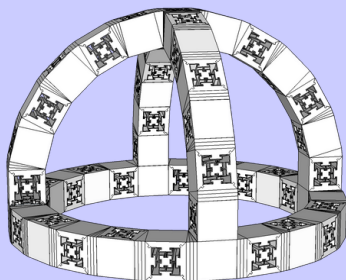
VARIOUS KARTHESIA FUNCTIONS



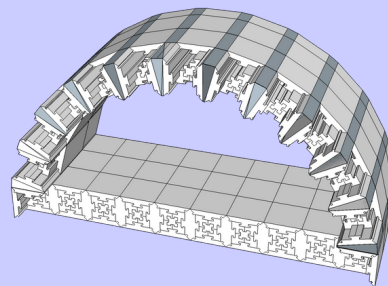
RING



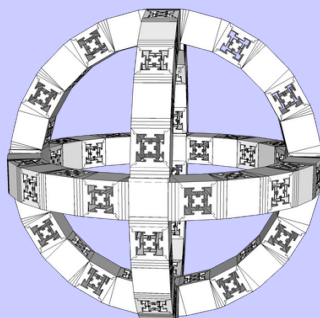
ARCH



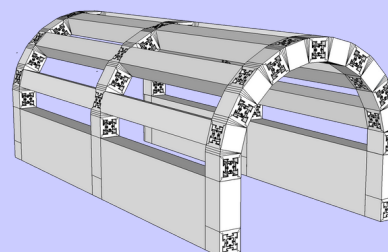
DOME



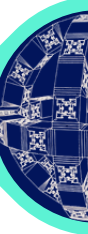
GALLERY



SPHERE

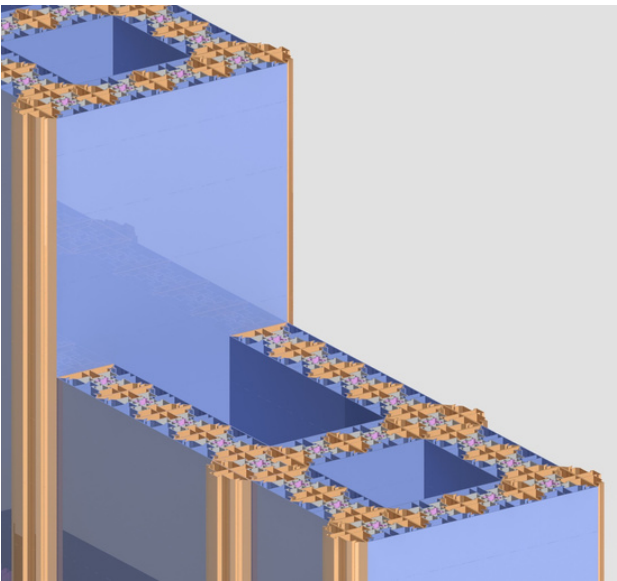


TUNNEL



Implementation

SUPPORT AND PROTECTION STRUCTURES



Structural Detail

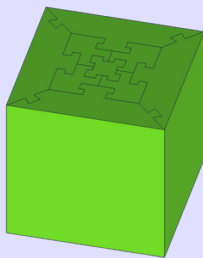
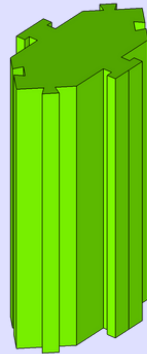
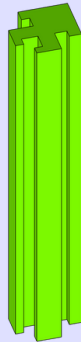
Example of
a Finished Structure



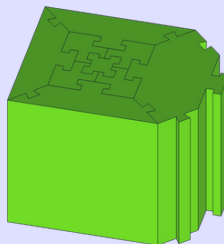


Implementation

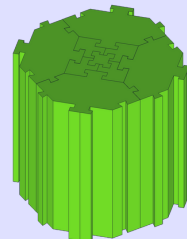
KARTHESIA CONTAINERS & TANKS



**Complete
Single Block**



Block for Double



Multiple Block



Demonstrative-Descriptive Section 2 Technical Visuals

21



Implementation

KARTHESIA CONTAINERS & TANKS

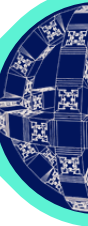
For buildings:

- water reserves
- fire prevention systems



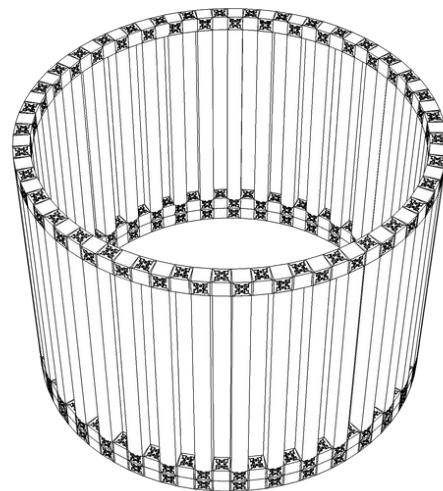
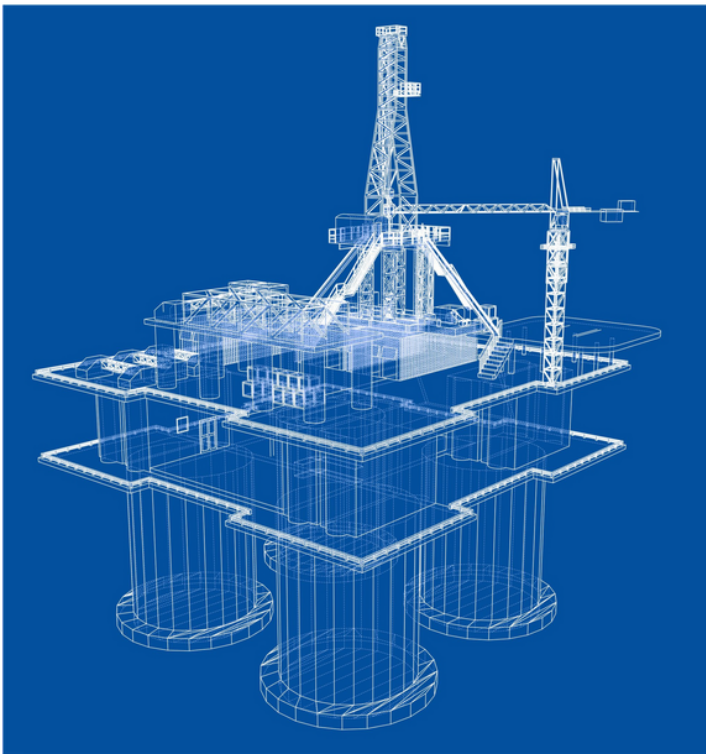
Storage Areas





Implementation

OIL PLATFORMS





Implementation

KARTHESIA IN WOOD

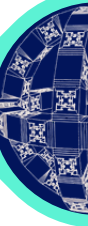




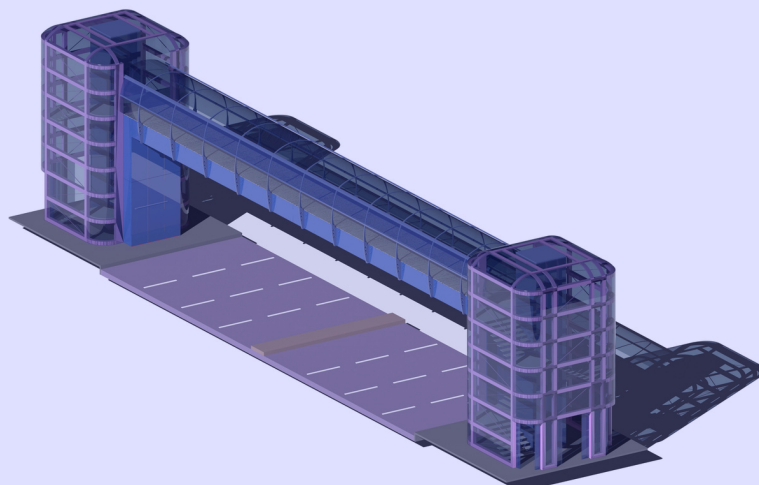
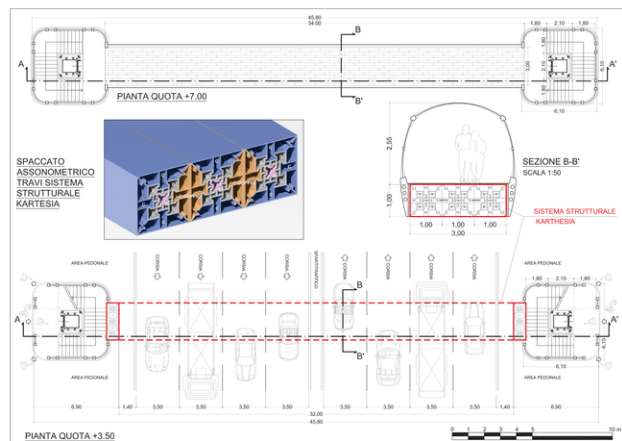
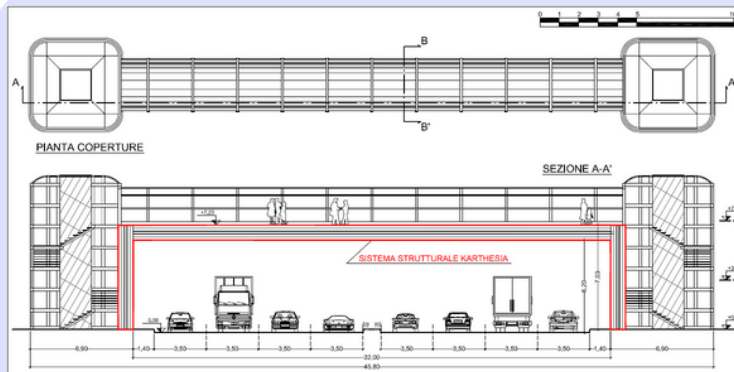
Demonstrative-Descriptive Section 2 Technical Visuals

24

Implementation



KARTHESIA PEDESTRIAN BRIDGE





Demonstrative-Descriptive
Section 2
Technical Visuals

25



Implementation



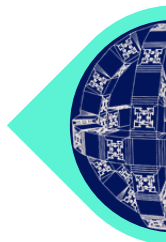
Karthesia in the Toy Market





TEKKA®
LIBERA IL TUO TALENTO

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**An innovative game developed with Karthesia,
the Internationally Patented Modular Structural System.**

TEKKA®
LIBERA IL TUO TALENTO

**TEKKA is a one-of-a-kind toy with interlocking pieces
that offer endless possibilities
for customization, learning and fun.**

**For all explorers:
Children and Evergreen Explores of all ages.**

**Creativity and Talent take
centre stage with TEKKA, a
toy that encourages fun,
learning and personal
development.**

**Tekka stimulates children
to improve their cognitive
and problem-solving skills,
encouraging them to share
their progress with others.**

**Not only a toy, but a
special experience.**

**TEKKA is based on the
Karthesia Modular
Structural System and
promises young users a
cognitive and educational
experience in a STEM
context.**

**The beginning of new
explorations.**

**Stimulate creativity
and talent**

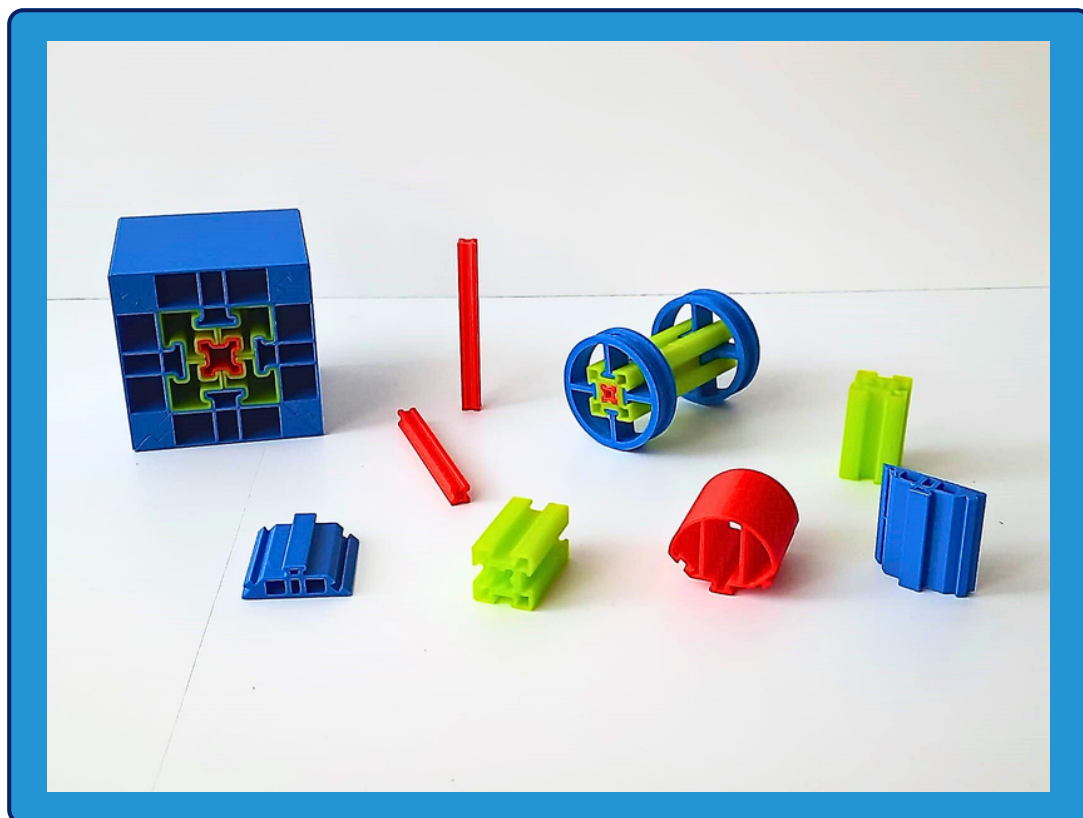


TEKKA®
LIBERA IL TUO TALENTO

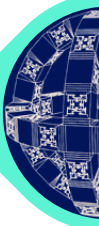
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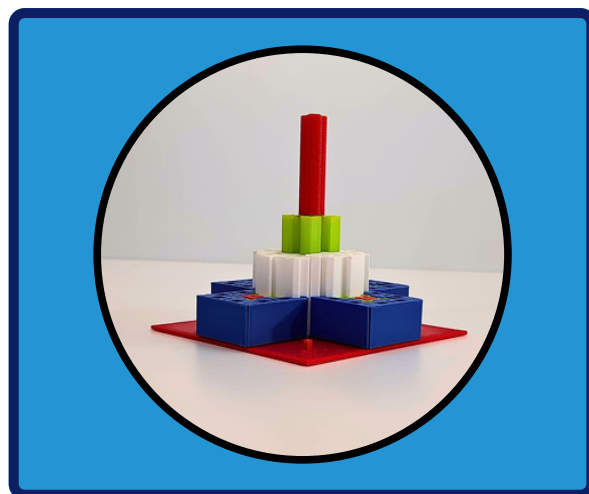
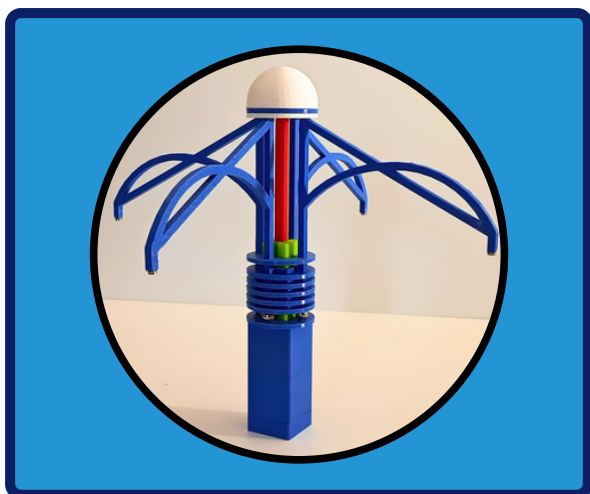
**...discover
the creative side of technology.**

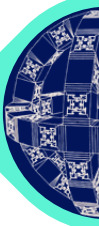


**TEKKA: acquire soft-skills useful
for the future, from analytical thinking
to problem-solving skills.**

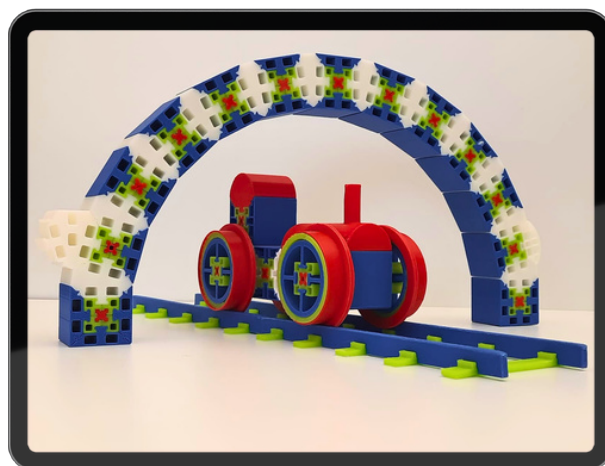
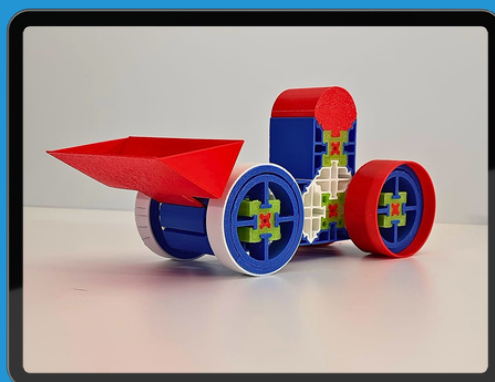
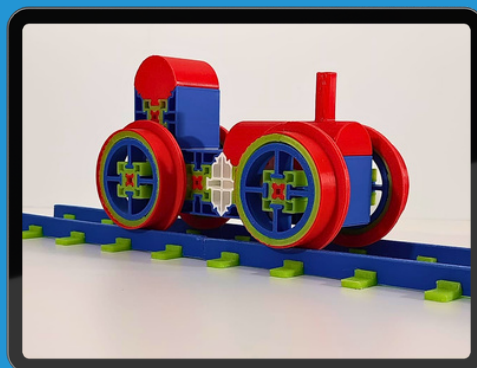
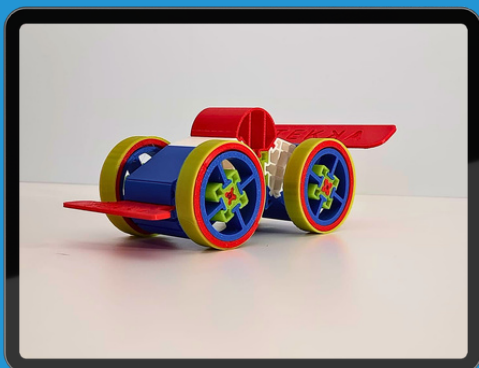


...Learn to transform an idea into reality



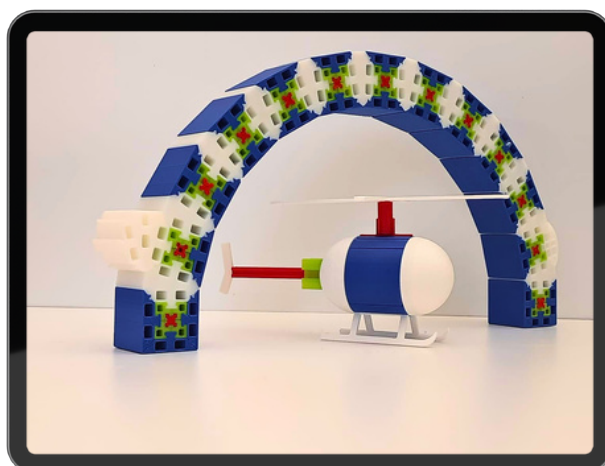
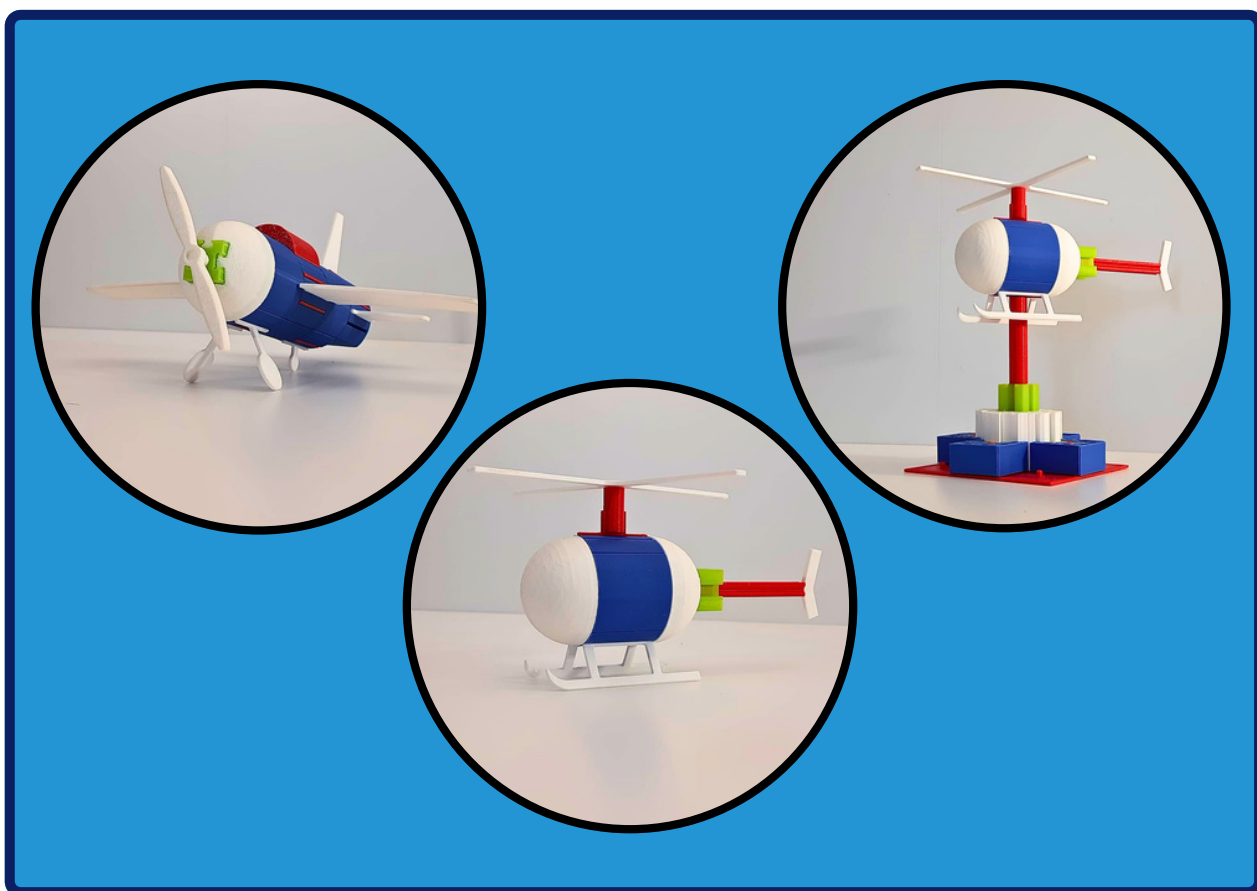


Car - Bulldozer - Train





Airplane - Helicopter - Support





Certifications

31



International Patent

**23 Patents recognized
in the following geographical areas:**

- Europe
- Americas
- Asia
- Middle East
- Africa
- Oceania



Certifications

Some Patents

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Interactive

33



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Via di Pacciano 24/28
00065 Fiano Romano (Rm) Italia

+39 0765 45 59 82

info@karthesia.com
www.karthesia.com



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