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**Prefabricated Timber Solutions as an efficient alternative for construction in humanitarian context**

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**ES-KO** is an international leading provider of customized and integrated logistics support services in remote and challenging environments worldwide. The ES-KO Group consists of several companies operating in over 20 countries. ES-KO International Inc. is a registered vendor with the UNGM (registration no. 100900) and UNDP (Vendor ID number 2628).

**2000**  
*Employees  
Worldwide*

**50+ years**  
*Experience  
Worldwide*

**44**  
*Nationalities  
represented*

**30**  
*Key Clients*

**20**  
*Current Countries  
of Operation*

**4**  
*Quality ISO  
Certifications*

## Rations

Food Supply & Distribution

Procurement,  
transport, storage and  
distribution of food  
and non-food products

## Construction

Camps & Infrastructures

Camps / health care /  
educational facilities.  
Supply, transportation,  
equipping of  
prefabricated facilities

## Catering

Life Support Services

Customized food  
services, housekeeping,  
laundry and facilities  
management.

## Retail

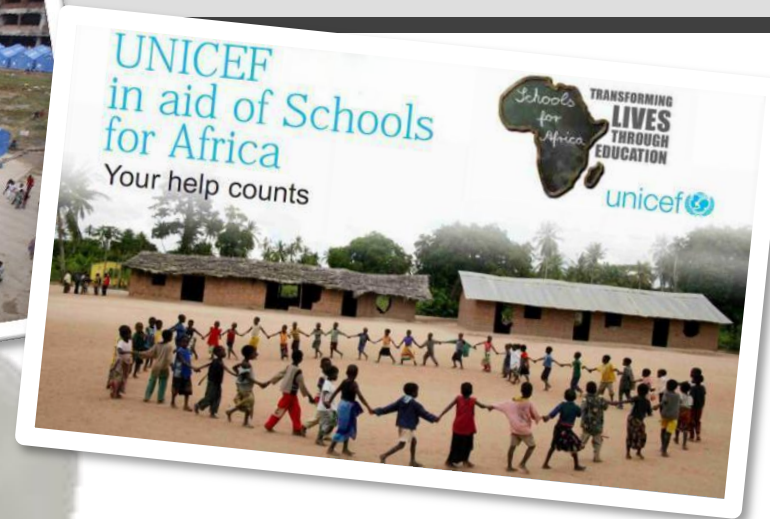
Duty-Free & Concessions

Providing PX/duty free,  
restaurants, cafeterias,  
bars, internet facilities,  
recreational services...

## ES-KO around the world



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Every year UN agencies and other NGOs/Humanitarian organizations invest considerable resources for the implementation of construction activities

Henffinck Report 2004-2005		
Region	Countries	Total
CEE/CIS	7	\$944,699
EAPRO	10	\$97,724,540
ESARO	11	\$8,774,629
MENARO	5	\$53,657,845
ROSA	5	\$58,257,261
TACRO	8	\$7,244,993
WCARO	13	\$8,076,951
<b>Total</b>	<b>59</b>	<b>\$234,680,918</b>

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.....However, despite this great effort, construction activities are still considered amongst the biggest headaches!

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## Some of the biggest headaches include:

- Heavy operational implications
- Complex technicalities required
- Wide range of contingencies-high risk
- Lack of qualified-trusted implementing entities
- Involvement of considerable amount of funds



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**As a result the outcome, despite the enormous effort, is typically:**

- Unable to ensure minimum requirements
- Badly delivered
- Cause of concern for beneficiaries and donors



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## Timber is:

THE NATURAL RAW MATERIAL WITH THE FASTEST REGENERATION CYCLE

Less than 20 year

A RENEWABLE CONSTRUCTION MATERIAL

By the use of sustainable forest management practices “FSC”

THE LOWEST POLLUTING CONSTRUCTION MATERIAL

Timber is used 100%, no waste, no residues

THE CONSTRUCTION MATERIAL WITH THE  
LOWEST ENERGY CONSUMPTION DURING ITS PRODUCTION PROCESS

Timber is approximately <10 times Cement; <20 times FE; <100 times AL

A CONSTRUCTION MATERIAL 100% RECYCLABLE

THE CONSTRUCTION MATERIAL WITH AN  
EXCELLENT RATIO RESISTANCE EFFICIENCY “E/f”

Aluminium 200; Timber: 470; Steel: 480; Reinforced concrete: 1250

**TIMBER** is a **E**co-**S**ustainable, **L**ow **E**nergy **C**onsumption  
CONSTRUCTION MATERIAL



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## ES-KO is already successfully promoting timber solutions in:

- Permanent housing for families affected by an earthquake



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- Schools



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- Retail facilities in challenging environments



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- And specifically in the humanitarian context ES-KO is proposing the BLOCKHAUS system as an alternative to transitional and permanent infrastructures...



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To go from this...



to this!

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from this...



to this!

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from this...



to this!

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## What is the BLOCKHAUS system?

It's a construction technology that uses timber elements (solid or laminated) that are overlapping horizontally and interlocking to create internal and external walls with self bearing capacity





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Timber is one of the oldest traditional construction technologies. It is today considered one of the most interesting and efficient construction system available



BLOCKHAUS built in 1838



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**Why is BLOCKHAUS system**  
considered an interesting alternative in  
the humanitarian sector?



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1. Because it has the advantages of a prefabricated system but provides the comfort and durability of a traditional construction system



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2. Easy to build, “**Lego System**”: no need for skilled personnel and suitable for local labour, 100 m<sup>2</sup> in three days

3. Lightweight 480 kg/m<sup>3</sup>: reduces foundation costs

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4. Easy to transport: inside ISO Box Sea containers with vacuum packaging to protect the timber during transport



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5. Assurance of quality in the required quantities: Automatic production process, certified product with CE Mark in accordance with EN-14080, DIN 10052

6. Short lead production time: 2500 m<sup>2</sup> per week

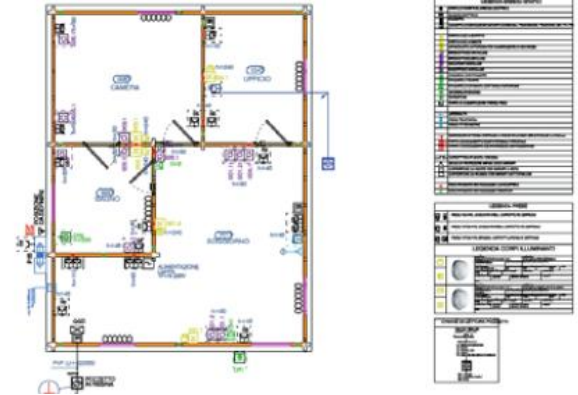
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7. Flexibility to adapt to a wide range of designs and solutions

8. Energy saving, solid timber provides a naturally high level of insulation in both hot and cold climates, giving a feeling of comfort and ambience

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9. Maximum size of a single timber element is 80 x 180 x 8000 mm. It means that the maximum weight of a single structural component is less than 60 kg, therefore no need for heavy equipment (e.g. cranes)



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## What about fire resistance?

For a thickness of between 80-100 mm the certified rating is REI 60

As timber elements are overlapped and interlocked, under a fire test, it was proven that flames took more than 6 hours to spread from one room to next room. While the temperature inside the burning room reached 500°C, the next room temperature was 20°C



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## What about thermal resistance?

Thermal conductivity:  $U = 1.2 \text{ W/m}^2\text{K}$

Same value as a 125 mm concrete aerated block wall



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## What about maintenance/durability?

Providing basic maintenance with water paint to the external walls every three years a life expectancy: 30 years guaranteed

**LIFE SPAN:** minimum of 50 years. With accurate maintenance life span could be unlimited.

The oldest timber building in the world is the Horinji Temple in Japan, constructed during year 607 d.C; which is still preserved in excellent condition. There is a similar example in Hereford, England, i.e. Lower Brockhampton Gatehouse, (sec XV)



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## What about earthquake and cyclone resistance?

Wind speed of reference : 160 up to 210 km/h;

Seismic load capacity : 8.0 on the Richter Scale;

In Europe and Japan, timber construction systems are employed in earthquake zones due to the excellent natural mechanical characteristic of timber (elasticity) and the fact that it is light weight. Additionally, the BLOCKHAUS technology fixing system, interlocking timber elements, facilitates the dispersion of pressure and forces guaranteeing the stability of the building at a very reasonable cost.

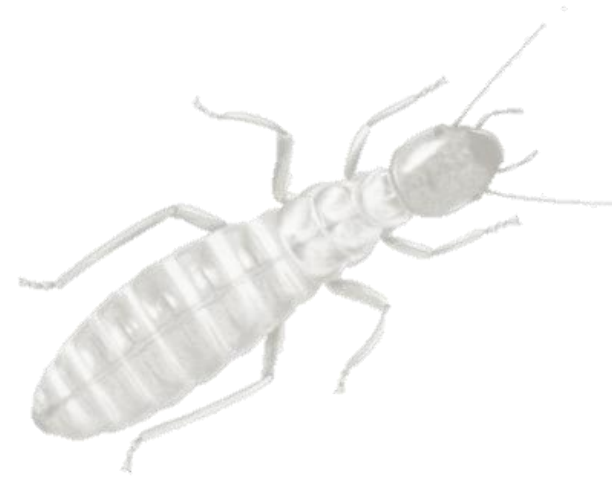


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## What about insects and termites?

All timber elements are treated in an autoclave and subsequently saturated with non toxic coating to ensure resistance to insects and fungal attacks  
In rural environments, where insect attacks are prevalent galvanized steel frames are installed beneath the walls at basement level



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## What about the environmental impact?

Environmentally friendly: in accordance with the principles of the ECOSUSTAINABILITY

ES-KO's production process and the wood used are certified by ICILA Srl, (member of IMQ Group) which guarantees that the maintenance of the Chain of Custody (C.O.C) is respected and follows the Forest Steward Council International rules (FSC) based on FSC-STD-40-004 Version 2.0 and PEFC rules based on ST 2003-2012 standards



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## Monaco makes a commitment against deforestation

ES-KO signed the Wood Charter of the Principality and promotes sustainably managed forests.

The best means to fight against deforestation is to promote sustainable forestry practice.

All the players in Monaco united around this program to make the Principality an example for other countries :

- Prince Albert II of Monaco Foundation
- Princely Government
- NGO such as MC2D
- Companies

This program involves actions in the major forested areas of the planet, as well as at the consumer level.



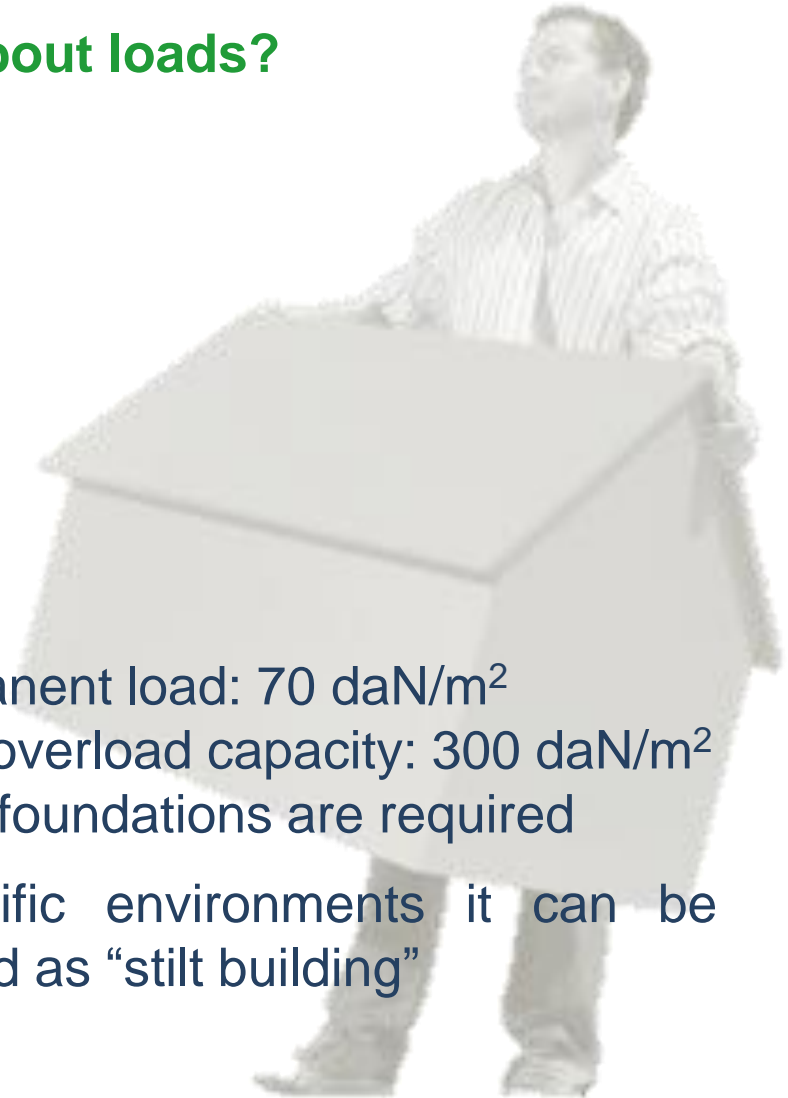
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## What about loads?

- Permanent load: 70 daN/m<sup>2</sup>
- Floor overload capacity: 300 daN/m<sup>2</sup>
- Basic foundations are required

In specific environments it can be designed as “stilt building”





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Auditorium built in L'Aquila, Italy

## What about noise?

Average noise reduction: 30 dB

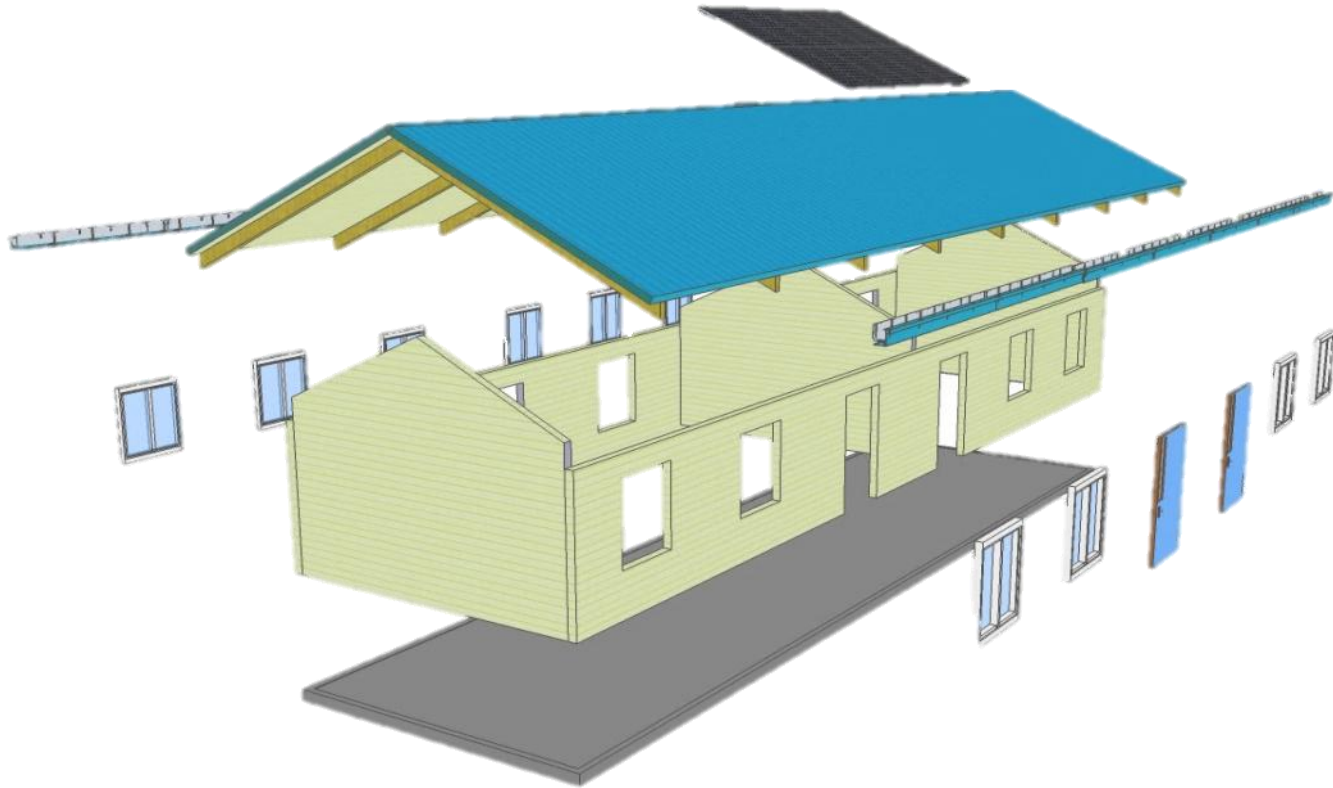
With substantial coating on the roof, there will be no more reverberating effect from heavy rain

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With these benefits, ES-KO developed a Kit system designed as turnkey solution able to fit in a 40' ISO Box Sea container

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One ISO Box Sea container = 20 x 5 m, two classroom block fully equipped with hard and soft components

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Able to build in a short period of time (e.g. Max 6 working days) a Child and Eco Friendly Transitional Learning Space with certified standards.

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The content of the KIT system can be flexible to adapt to different project designs according to different climates and cultural context

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## Comparative Scenario in the African region

As for 100 m <sup>2</sup> solution	Transitional	BLOCKHAUS (TIMBER)	Permanent
Construction Time	15 / 60 days	5 / 9 days	90 / 180 days
Life Expectancy	3 / 5 years	30 years guarantee	Uncertain
Fire resistance	Low	REI-60 certified	Uncertain
Seismic resistance	Low	8.0 on the Richter Scale	Uncertain
Wind speed of reference	Low	160 up to 210 km/h	Uncertain
Participatory process	Uncertain	Simple	Uncertain
Construction Cost	300/600 \$/m <sup>2</sup>	700/800 \$/m <sup>2</sup>	700/1500 \$/m <sup>2</sup>
Norms compliance	Uncertain	PEFC / European Standard	Local regulation/Uncertain
Final Result	Uncertain	Predefined Standard "Sears" solution	Uncertain

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For the above mentioned reasons the **BLOCKHAUS** system is considered an interesting solution for transitional construction in Humanitarian context.

### Final Result Guaranteed

- Design
- Tech. Specif.
- Production
- Delivery Time
- Maintenance
- Cost



Beneficiaries know what they get

Donors know what they offer

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ES-KO has been successfully providing  
TRANSITIONAL solutions worldwide for more than 40 years







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# Thank You!

### ES-KO is an ISO Certified Group



- ES-KO's Headquarters and all field operations are ISO 9001:2008 certified;
- ES-KO has maintained and utilized an internationally certified Quality Management System under ISO 9002 since 2001;
- ES-KO was certified SA8000 (Ethical Management) and ISO 14001 (Environmental Management) in 2011.