NIDA CORE®

STRUCTURAL HONEYCOMB MATERIALS

ABMACO
SAO PAULO
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2008

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1/ WHO IS NIDA-CORE?

Brief History and Overview of Nida-Core

- Company was created in 1987
- Main office located in Port St Lucie, Florida
    - Technical Staff
    - Sales Staff
    - Production
    - Administrative Staff
- Serving Marine, Transportation and Construction Industries

Product Line

Our Business

Nida-Core Corp. Specializes in Core Materials.

We supply customers with any kind of core (plain or kits):

- Honeycomb (Open Cell / With Film + Scrim)
- NidaFusion STO / STF (Foam with Fiber Triangulations)
- Balsa Wood
- Foams (PU, PET, …)

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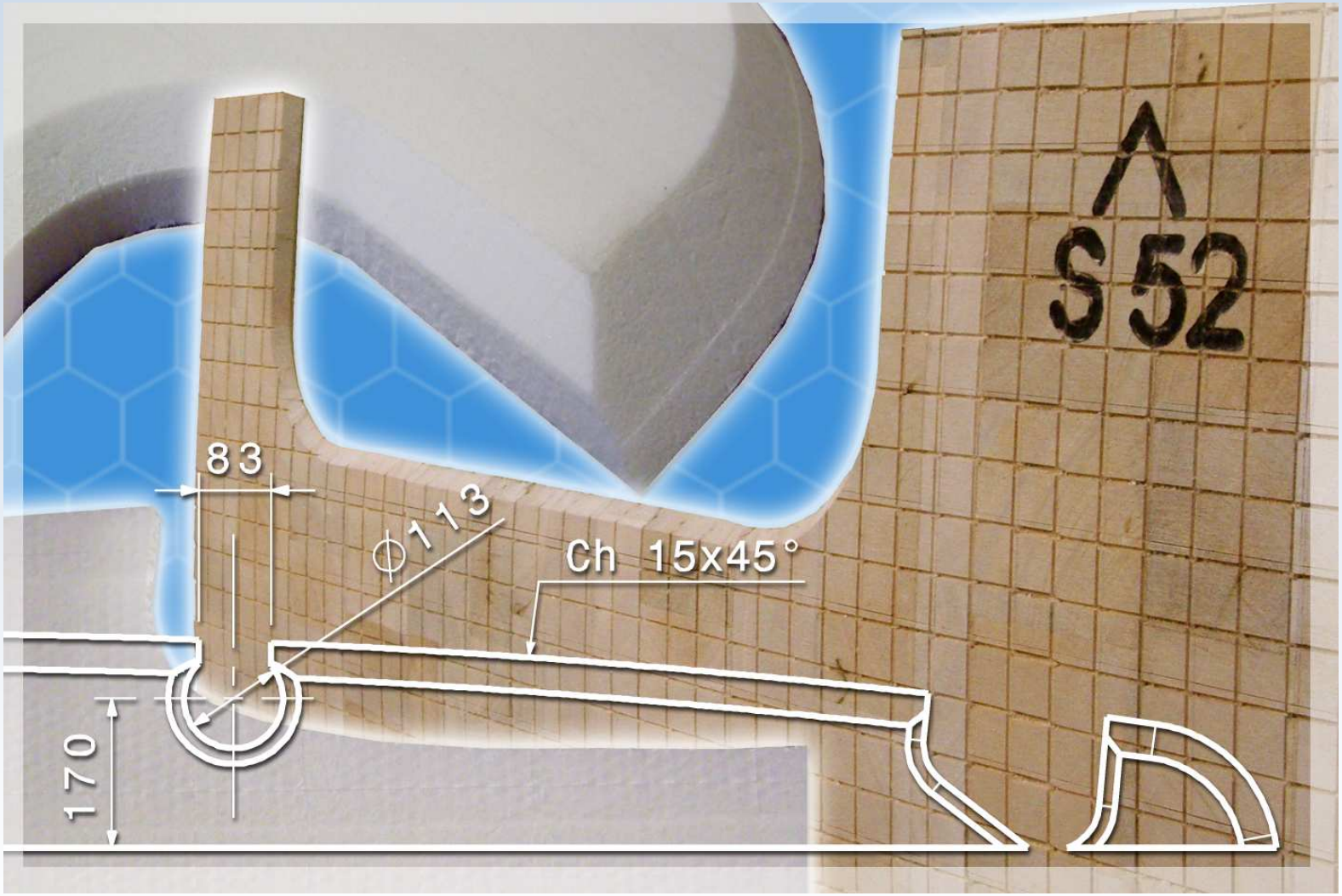
Our Business

Nida-Core Corp. Specializes in Core Materials.

And derivate products:

- Finish Panels (Cores with Customized Skins)
- Putties for cores assembly or local fixation
- Tooling Resin
- Matline
- CNC Kits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83
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170

Our facilities

- Port St Lucie, Florida Research and Technology Center, Production Facility and Main Warehouse

- Nida-Core Structiso in Aniche, France Production Facility, Warehouse
- Canada, Distribution Center
- International web for technical information and sale

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2/ CONCEPT OF SANDWICH CONSTRUCTION

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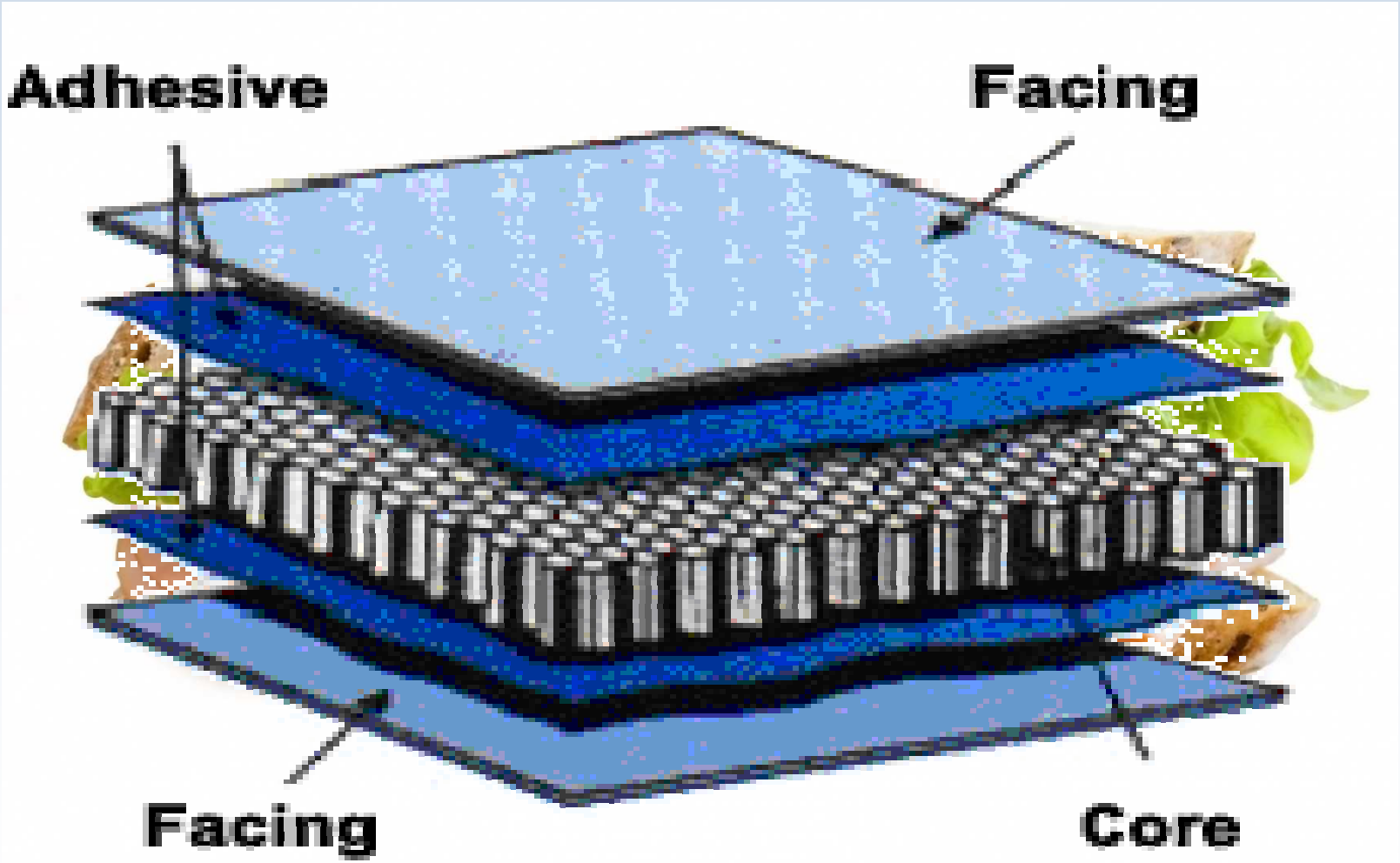
WHAT IS A SANDWICH?



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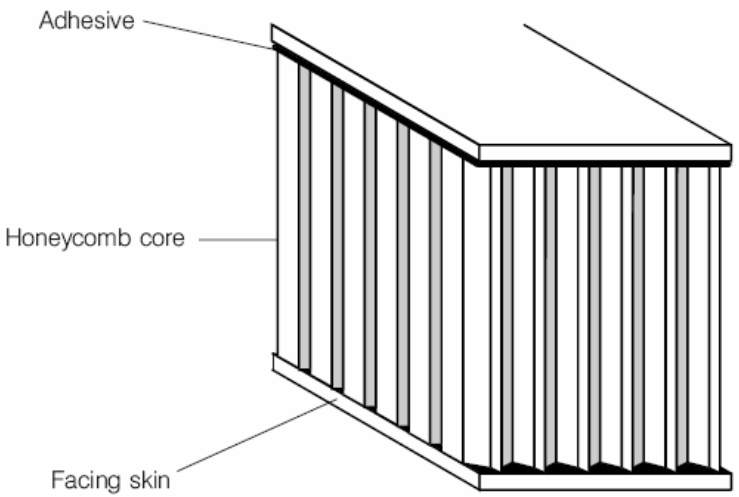
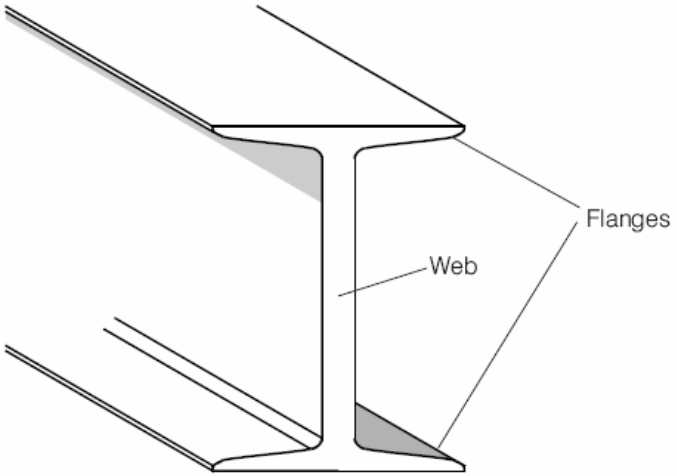
CONCEPT OF SANDWICH CONSTRUCTION

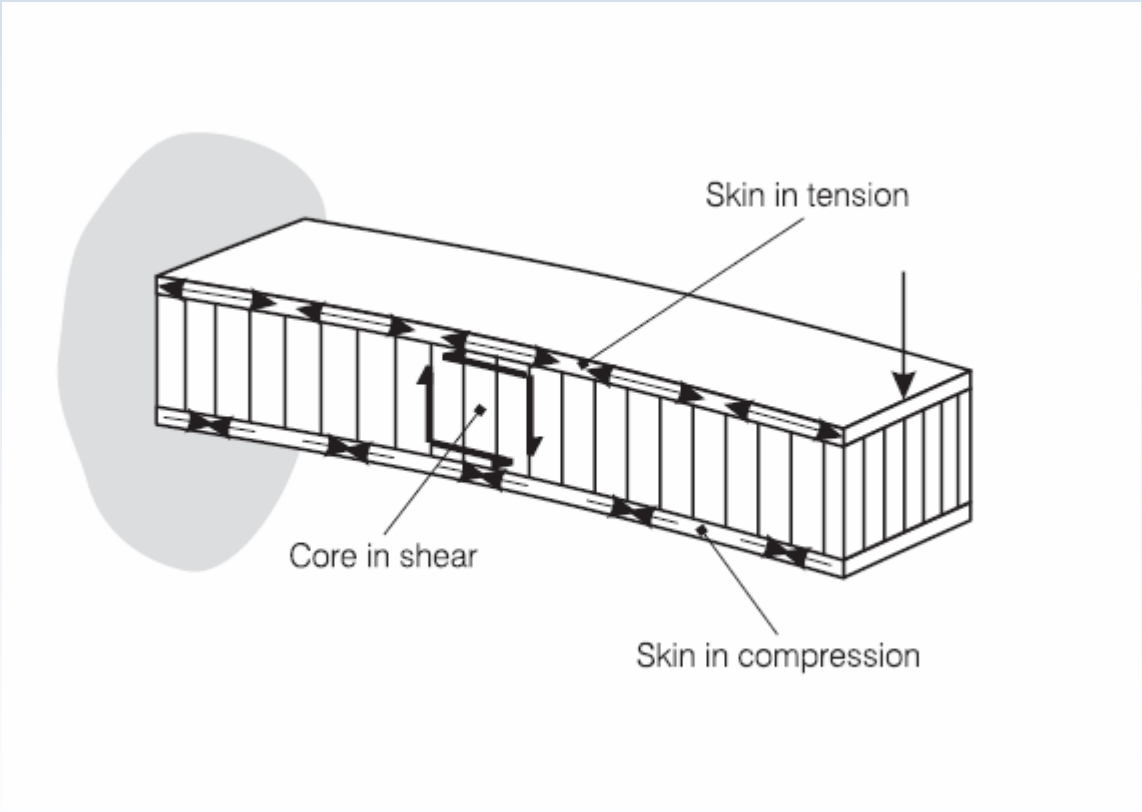


Sandwich panel



I-beam

HOW SANDWICH WORKS ?



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3/ WHY SANDWICH CONSTRUCTION ?

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WHY SANDWICH CONSTRUCTION?

I-Beam Principle

Reduced weight

Increased stiffness, impact strength, resiliency

Insulation, puncture resistance

Reduced operating costs

Higher payloads, better fuel economy

Noise & vibration dampening, thermal insulation

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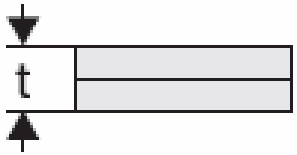
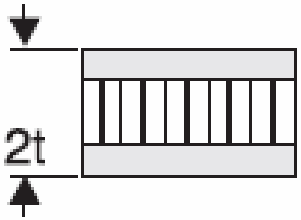
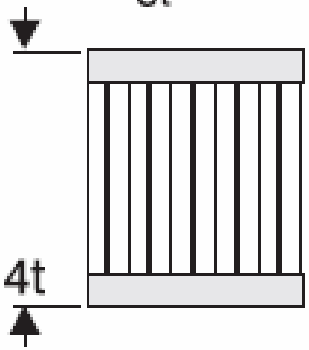
SANDWICH BEHAVIOUR

	Solid Material	Core Thickness t	Core Thickness 3t
			
Stiffness	1.0	7.0	37.0
Flexural Strength	1.0	3.5	9.2
Weight	1.0	1.03	1.06

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4/ DIFFERENT KIND OF SANDWICH CONSTRUCTION

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DIFFERENT KIND OF SANDWICH CONSTRUCTION

CORE MATERIALS AVAILABLE

- Balsa
- Plywood
- Polyurethane-polyisocyanurate foams
- PVC Linear foams and PVC Cross-linked foams
- SAN foams
- PET foams
- Paper honeycomb
- Aluminum honeycomb
- Plastic honeycomb
- Tri-dimensional core reinforced with fiberglass
- PMI foam

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DIFFERENT KIND OF SANDWICH CONSTRUCTION

SKIN MATERIALS AVAILABLE

- Fiberglass
- Carbon, Aramide
- Wood
- Aluminium
- Steel
- Plastic
- High Pressure Laminate (HPL)
- Stone (marble, Granite, Solid surface)…

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BALSA

POSITIVE

- **Good mechanical properties**
- **Relatively inexpensive**

NEGATIVE

- **Subject to rot**
- **Unsatisfactory impact strength**
- **Potential problem with moisture**
- **Catastrophic core failure past ultimate stress point**

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PVC FOAM

POSITIVE

- **Good impact resistance**
- **Easily conforms to intricate shapes**
- **Good insulator**

NEGATIVE

- **Expensive**
- **Thermal resistance to 190 Degrees Fahrenheit**
- **Difficult to process**
- **Catastrophic core failure past ultimate stress point.**
- **Outgassing**

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SAN FOAM

POSITIVE

- Improved impact resistance
- Moderate temperature tolerance(200 Degrees)
- Chemical resistance
- Good processability

NEGATIVE

- Expensive
- Catastrophic core failure beyond ultimate stress point
- Crack propagation

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PET FOAM (Polyethylene teraphthalate)

POSITIVE

- Improved impact resistance
- GREAT temperature tolerance (347 Degrees F)
- Chemical resistance
- Thermo formable
- Environmentally friendly manufacture of foam

NEGATIVE

- Expensive
- Catastrophic core failure beyond ultimate stress point
- Crack propagation
- Unisotropic
- Loses mechanical properties when heated
- Available in 24X48 sheets only
- Available only in 6.3 Lb/ft3 and 9.4 Lb/ft3 densities

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PLASTIC STRUCTURAL HONEYCOMB

POSITIVE

- Inexpensive
- NO catastrophic failure
- Excellent impact, chemical, fatigue resistance
- Excellent sound attenuation (natural harmonic150 Hz) – up to 22dB reduction
- Thermo formable
- Excellent processabilty
- Good temperature resistance up to 230 F

NEGATIVE

- Moderate insulator R=3.3 per 1 inch
- Beveled edge processing
- Inserts required for screw retention

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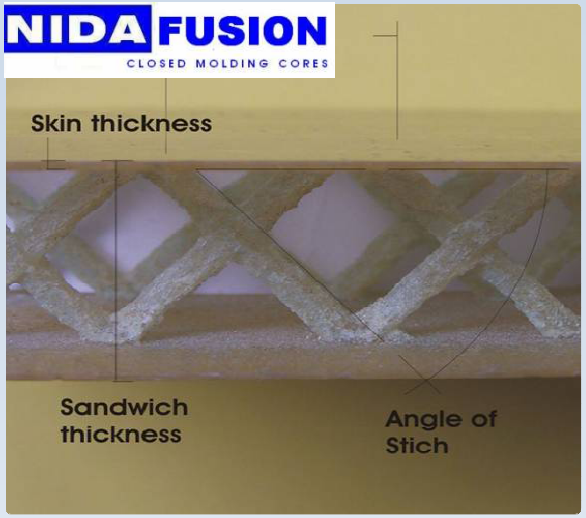
TRI-DIMENSIONAL REINFORCED CORE



POSITIVE

* **Easily changeable for each parameter**
  - Skins
  - Step
  - Core thickness
  - Angle of stitch
  - **Foam:**
    - Flat Parts: PU
    - Shaped Parts, Varying Thickness: PE, PP …
    - Good Fire rate: Phenolic, PIR
* **High mechanical strenghts**
* **Impossible to delaminate**

NEGATIVE

- **Oriented fiberglass stitched**
- **Inserts required for screw retention**
- **Possible print through**

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5/ APPLICATIONS

TRANSPORT

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SAN DIEGO
MTS


PROTOTYPE


Nida-Core & Mattine
used in sides & interiors


1120 - W - 28


Nida-Core used in roof
-"HUMMER" or "HUMM-VEE" (HMMWV) -
AUTOMOBILES - OFF-ROAD


Millenium Ambulance
SIEMENS

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CONSTRUCTION

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INDUSTRIAL PARTS

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SPORT AND LEISURE

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6/ TRENDS

TRENDS

We have seen in the past years a strong trend to use more and more core materials in sandwich structure, and not only in the traditional composite industry like transportation but also in other applications like construction, furniture, protective clothing, soil stabilization…

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The origin of this growing use of core material is due to several important reasons:

1/ Weight reduction and increase of stiffness with sandwich parts mean:

- Cost reduction in transport (gasoline and freight)
- Cost reduction in fixing accesories (construction, automotive, furnitures…).
- Less energy necesary. Less pollution. Environment friendly

2/ Possibility to make « Smarter parts » :

- Combine more fonctions in a sandwich part than a single skin part which require much more labor before its use.

- Possibility to make parts faster, of better quality, stronger and, at the end , at a lower cost.

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Agradeço à todos, pela atenção e à Abmaco y su presidente, Gilmar, pela organização deste Seminario que nos oferece uma excelente oportunidade para compartilharmos conhecimentos e idéias