Convert the thin into rigid ,
the decayed into eternal

THE ULTIMATE STRUCTURAL MATERIAL

BCORE SLAB

July 4, 2019

BROAD SUSTAINABLE BUILT
远大可建科技有限公司

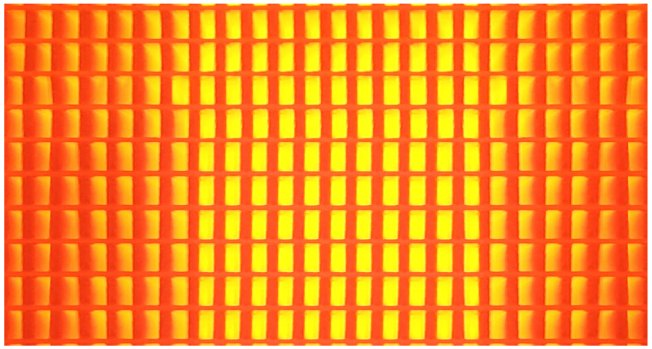
TABLE OF CONTENTS

1 DECISION MAKERS' ABSTRACT

BROAD CORE（BCORE）SLAB

Bcore slab 远大芯板

Core patent: Bcore Slab Structure



Core technology: 1100°C hot air copper brazing oven. During the past 3 years, BROAD has invested 1000+ R&D employees and underwent 100+ trials for the successful invention of the Bcore slab.

Historical success: BROAD factory-made steel building was honored by the Council on Tall Buildings & Urban Habitat with the Innovation Award 2013, and was the first winner in China's construction industry.

1. Bcore Slab is as efficient as honeycomb panels used for the outer shell of spacecraft: Ultra light and ultra strong

- The Bcore slab is composed of two steel plates held together with an array of extremely thin core tubes. The ends are brazed with the steel plates with a thin film of copper foil through a 1100°C copper brazing process. The mechanical performance of the Bcore slab is equivalent to that of the honeycomb panel used for the outer shell of spacecraft.
- The space in between the core tubes allows for a hot air copper brazing process that maintains heating uniformly. This permits the hot air brazing of huge-sized panels and a mirror-like surface of the material - flat and smooth. Traditional stainless-steel honeycomb panels are air-tight, the brazing can only be achieved by thermal radiation, which is a slow process that does not result in material uniformity. The cost of production is high, so it can only be used in spacecraft but not in aircraft.
- The Bcore slab dimensions are 10 times larger and the factory fabrication cost 20 times lower than that of the honeycomb panels. With this in mind, it is not hard to imagine that the Bcore slab is set to trigger a global and unprecedented structural material revolution.

2. The founder, Zhang Yue, is an Edison-like inventor and has been recognized by the UN as a "Champions of the Earth"

- Although often referred to as the "modern Da Vinci" or "China's Steve Jobs", Zhang Yue self-identifies more with the inventor Thomas Edison. Both have devoted their work to the creation of new and innovative solutions that respond to the most pressing needs of humanity.
- Zhang Yue patented 466 inventions, all of which are related to architecture and transport modes ranging from equipment to system, from structures to materials, from sensors to AI, from fabrication to installation, etc.
- For 30 years, Zhang Yue has devoted 90% of his time to research and development, which would seem to divert him from his duties as chairman and president, but he believes that absolute authority is the only way for absolute innovation.

3. BROAD group is a rare example of a company in China that only works on original innovations

- BROAD, established in 1988, has never copied or borrowed other companies' technologies. It has created and launched six product ranges, and sold hundreds of different products in over 80 countries, for instance: the pressure-free hot water boiler in 1989, the non-electric absorption chiller in 1992, the global internet monitoring system in 1996, the waste heat absorption chiller in 1999, the zero resistance packaged distribution system in 2003 , the clean fresh air machine in 2008, the phone-sized PM2.5 (particulate matters at 2.5 microns) detecting air monitor in 2009, the factory-made steel structure building in 2009, the factory-made high rise buildings in 2014, and Bcore slab and hot air copper brazing technology in 2017.
- All of BROAD's technologies are conceived and driven by a common theme of energy conservation, material conservation, clean purification, durability and AI. All of the products have obtained a level that no other enterprise can even hope to attain. From 1996 on, BROAD's non-electric air conditioning has taken the first place on the global market. The video of 3 floors/day building has amazed the whole world and the video of constructing a 57 - floor building in 19 days has been viewed over 500 million times.
- BROAD has made huge investments on innovation without ever disrupting its financial stability. Since 1995 and the following 20 years, it has had a loan-free operation, and in 2002 the Chinese government announced that BROAD was the No.1 tax payer among all Chinese private companies.

4. Bcore Slab is expected to completely replace building structures, vehicles, ships and aircraft' s outer shells and to become the biggest industry in the world

- The stainless steel Bcore building has an almost timeless lifespan, it can thus be passed down in humanity as a generational legacy, it also eliminates the need to fear for earthquakes
- The stainless steel (or carbon steel) Bcore bridge is ultra light, allowing the construction of a multi-level bridge with a long span at a low cost, enabling elevated roads to completely replace ground roads.
- Bcore buildings and bridges are prefabricated to reduce labor work and cost, the construction time is at least 10 times faster than that of traditional construction.
- The outer shell of Bcore vehicles, aircraft, ships, and wind turbine blades weigh 30~70% lighter than that made of traditional materials. It improves energy efficiency greatly, and has a long durability and lifespan.
- The Bcore slab is made by AI manufacturing, the yearly yield per capita is over 8000m^2. The work efficiency is extremely high, the assembly lines can be reproduced easily and can be fastly expanded globally.
- Such an unprecedented and innovative technology brings the opportunity to profoundly change the world, and will surely leave a highly significant mark on humanity's history.
- The Bcore slabs and the hot air copper brazing oven are BROAD patented and are globally protected, the key technology of the oven will be kept confidential forever – investment value is guaranteed by exempting vicious competition.

2 THE PAST AND THE FUTURE

2009-2015, SETTING THE HIGHEST STANDARDS OF CONSTRUCTION IN THE WORLD

Bcore slab 远大芯板

Dormitory (prototype) built in 1 day · BROAD Town (Hunan)

Company HQ built in 4 days · Shandong

Urban complex built in 19 days · Hunan

BROAD Pavilion at World Expo built in 1 day · Shanghai

Residential apartment built in 3 days · Hubei

Hotel built in 8 days · Hunan

COP16 Pavilion built in 1 day (the President cut the ribbon) · Mexico

Office building built in 9 days · Ningxia

Multi-function building built in 13 days · Shanxi

Business Innovation Center built in 3 days · Fujian

Hotel built in 7 days (the 58th building) · Shanxi

BROAD Sustainable Built Co.,Ltd

- BROAD Sustainable Built Co., Ltd is a wholly owned subsidiary of BROAD Group, with invested capital of approximately RMB 7 billion.
- Established in 2009, factory is located in Xiangyin, Hunan.
- Occupies an area of 1.3 km^2, workshop areas 230,000m^2, employees 1100.

Factory-made steel structure building

- In 2009, plagued by the Wenchuan earthquake and climate change deterioration, BROAD was determined to develop the factory-made super energy-efficient steel structure buildings
- From the very beginning, BROAD has formulated 6 standards of sustainable building development : magnitude 9 earthquake resistance, 5 times more energy efficiency, 10 times longer lifespan, 100 times cleaner air, 100% steel structure, only 1% construction waste.
- 58 buildings of various types were successively built, all have met the above-mentioned 6 standards of sustainable buildings, and have widely received praise and recognition.

BSB was listed "the World's Top 25 Eco-Innovators" by FORTUNE, "the 40 Most Exciting Innovations of the Year" by BUSINESS WEEK, "Innovation Award 2013 " by CTBUH, and a case study named "BROAD Group: Sustainability in Action" was released by the University of Cambridge. In addition, "BROAD Sustainable Building-Bringing manufacturing principles to the construction of high-rise buildings" became an annual report at the World Economic Forum Davos 2016.

- Due to the high percentage of factory prefabrication, all 58 buildings were built at a rate of almost 3 floors/day, making BSB construction 9 times faster than the second fastest in the world. The videos of BSB construction rocked the whole world, and BSB was crowned by BBC, CNN and other media platforms as "China Speed".
- Within 7 years, BSB developed 5 generations of technologies. The 1st and 2nd generations are of a diagonal bracing style suitable for buildings at 100 meters and below. The 3rd generation is for super high rise building structure of which BSB's 202 floor building (highest in the world) was assessed and approved by China's Super High Rise Building Committee. The 4th and 5th generations are designed and fabricated by streamlining production and transported at a cost effective price.

The Council on Tall Buildings and Urban Habitat (CTBUH) Jury's comment on BROAD:

"Tall building designers have used prefabrication techniques on discrete elements for years, but never before has an entire prefabricated building system been developed to this degree. It is both a structural and mechanical engineering response to the demands of a rapidly urbanizing world. Integrating a bolted assembly technique with triple glazing, automatic blinds and air filtration systems.The BSB Method is a clear and innovative way of fundamentally rethinking tall building construction and has a great potential for the future."

- In order to accomplish its ultimate mission, BROAD decided to discontinue its business of steel structure buildings and launched the Bcore slab development in October 2015.

2016-2018, INVENTION OF THE ULTIMATE STRUCTURAL MATERIAL: BCORE SLAB

Bcore slab 远大芯板

The making of Bcore slabs – Inspired by the spacecraft outer shell

December 27, 1996 was a chilly day. In the aircraft city Wichita (USA), the founder of BROAD Group was closely inspecting Learjet's assembly lines. Being the first Chinese to purchase a private jet, Zhang Yue had the honor to be accompanied by the company's president and factory director for a visit.

During his meticulous inspection, Zhang Yue noticed that the outer shell of the aircraft was composed of only glued aluminium alloy honeycomb panel. That worried him, since he knew that the glue would eventually loosen up with age and wear.

Right at that moment, a piece of white and shiny material by the side of the assembly line caught Zhang Yue's attention: "What is that?" The factory director explained that it was the material used for the outer shell of a NASA spacecraft and added, "If you're interested, you can try lifting it." Zhang Yue, taking note of the material size (1.5m x 1.5m, 10 cm thickness) assumed the material to be very heavy so he lifted it up with his two hands, almost straining his back, and exclaimed, "Wow, it's so light!"

The factory director told him that it was stainless steel plates brazed in the form of honeycomb panels. He added that for its mechanical performance, it was the best material in the world. Zhang Yue asked "Why don't we use this material for the outershell of aircraft?" The factory director, with an apologetic voice responded with "it's too expensive, too expensive!" " How expensive exactly?" promptly asked Zhang Yue. It was only at dinner time that Zhang Yue got the answer. The Learjet's sales director quietly told him, "USD 30 thousand per m^2. It certainly can not be used for aircraft construction, you should stop thinking about it."

However, Zhang Yue kept on thinking about it for19 years. On October 10, 2015, which was close to his 55th birthday, Zhang Yue decided that he would do nothing other than reflect on the most critical issues humanity was currently facing. At 4am on that day, he wrote down a plan. His plan was to spend all of his time and energy to develop a more cost effective honeycomb-type panel like those used for spacecraft. He believed that if he dedicated his energy towards one goal, he was bound to find a low priced manufacturing method.

What happened in the following three years could be subject of several books. By looking at some figures, one could imagine the many ordeals BSB had to go through. BSB employed over 1000 employees, spent 3 entire years continously spending money without making even a cent of profit, and underwent more than 100 failures and losses, one of which costed over ten million RMB in one second.

In October 2018, BROAD successfully developed "Bcore slab" and the "hot air copper brazing oven" to manufacture Bcore slabs.

The Bcore slab and the honeycomb panel of the outer shell of a spacecraft are equally light. What sets Bcore slab apart is that instead of costing 30 thousand USD per m^2, it actually costs less than 2000 RMB per m^2.Interestingly enough, revolutionary technologies and sciences have always shared similarites: for example, the price of a micro chip has been reduced nearly by 100 within two decades.

Zhang Yue keeps thinking that if one day in every corner of the world there would be buildings, bridges, vehicles, aircraft made of Bcore slabs, he would have to thank the Learjet company for the inspiration.

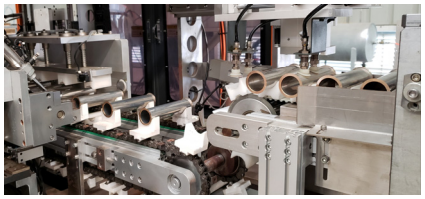
Technical difficulty: 1100°C hot air copper brazing, an unprecedented technology

- Research and development for this material was initiated on Oct 10, 2015. BROAD has spent 3 years, employed over 1000 employees and drew from its vast 30 years of experiences in mechanics, vacuum technology, thermal engineering, fluid mechanics, materials, sensors and monitoring devices to create the ultimate structural material.
- BROAD successfully developed the hot air copper brazing technology on April 30 2017 and later developed the equipment for hot air copper brazing and intelligent monitoring in October 2018.
- From beginning to end, BROAD has tested 5 different models of technology, developed10 types of brazing ovens, researched and invented over 100 heat resistant materials and overcame more than 100 failures and losses.
- At each failure, while the employees would be discouraged, Zhang Yue would feel optimistic, for him, another wrong path had been eliminated. Having a positive outlook on failures has been BROAD's secret to success for over 30 years.

Maybe in a century's time, when people look back into the most important inventions of the 21st century, they will first think of the Bcore slab and the hot air copper brazing technology.

Intelligent manufacturing system for Bcore slab is basically formed, with small batch production capacity.

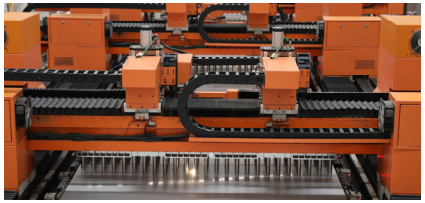
The hot air copper brazing oven: 36 m^3 of Bcore slab/oven, yearly yield: 400 thousand to 2 million m^2; only one technician is needed for each shift.
Note: Due to confidentiality, it is not authorized to take pictures of the oven.



Pre-brazing sheet metal processing line: 800 thousand m^2/line; intelligent manufacturing; three technicians for each shift.

Sheet metal process:

Core tube fabrication, copper foil fabrication, panel leveling
↓
Core tube assembly
↓
Slab stack up
↓
Brazing



Transportation: Bcore slab is transported by 40 feet containers, 500m^2/40HQ, low cost for global transportation

On June 5,2018, the first Bcore building in the world was built in just 1 day.

In August 2018, the first Bcore bridge in the world was built.

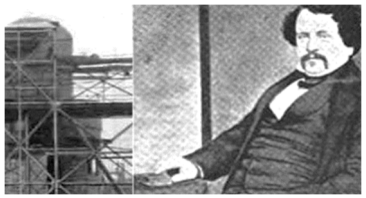
2019-2038, LAUNCHING THE WORLD'S BCORE SLAB REVOLUTION

Bcore slab 匠大芯板

For the past 150 years, technology has evolved at an astonishing pace, however structural material has not advanced accordingly.

1867

The French invented reinforced concrete for building construction.
Today this method is still used globally for building construction.



1883

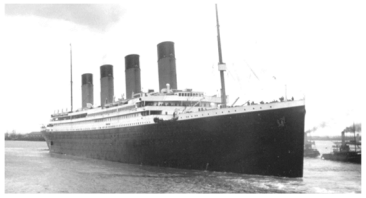
New York's Brooklyn Bridge was built with angle steel, steel channel, I steel and thick steel plates.
Today this method is still used globally for bridge construction.

1908

Ford manufactured the T type vehicle using pressurized steel for its outer shell.
Today this method is still used globally for car manufacturing.

1912

The United Kingdom built the Titanic using thick steel plates for its outer shell.
Today this method is still used globally for ship construction.

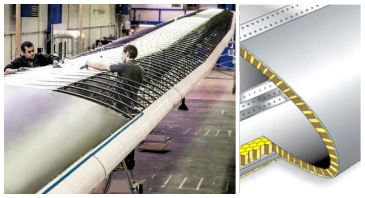


1931

The Soviets manufactured the first fiber glass spiral wind turbine in the world.
Today this method is still used globally for wind turbine fabrication.

1958

The Boeing 707 was created, its shell and wing were made by using a combination of a metal keel structure and aluminum alloy honeycomb panels.
Today, this method is still used globally for aircraft production.



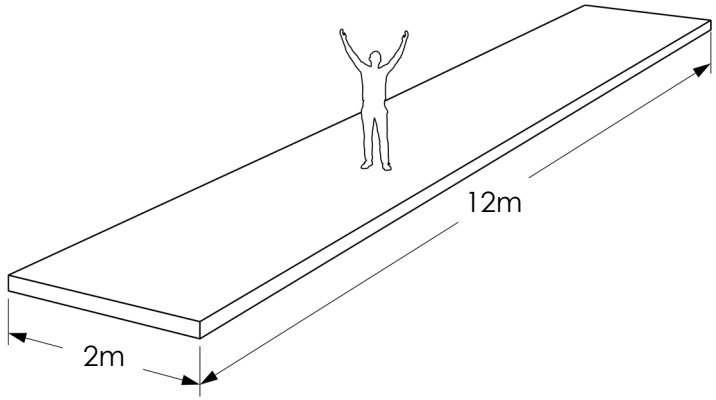
In the coming 20 years, BROAD will launch global Bcore slab revolutions together with leaders in various industries

	2023 Annual productivity Market share	2028 Annual productivity Market share	2038 Annual productivity Market share
Bcore Building Revolution - Prevents cities from falling into decay, turns buildings into generational legacy	20 million m^2 /	200 million m^2 5%	2 billion m^2 50%
Bcore Road & Bridge Revolution - Lowers the cost of bridge, turns roads into bridges	200 km /	2,000 km 5%	20,000 km 50%
Bcore Vehicle Revolution - Makes cars as light as planes, reduces transport pollution	10,000 vehicles /	500,000 vehicles 1%	10 million vehicles 20%
Bcore Marine Revolution - Builds unsinkable ships , permits large ships to navigate inland rivers	200,000 DWT /	5 million DWT 7%	50 million DWT 70%
Bcore Power Revolution - Erects wind turbines on mountains and in the countryside, bids farewell to coal consumption	50 MW /	10,000 MW 5%	100,000 MW 50%
Bcore Aviation Revolution - Builds lighter and stronger aircraft , ensures low carbon and safe flights	Test flight (large aircraft) /	10 aircraft 1%	300 aircraft 30%

3 BCORE SLAB TECHNOLOGY

THE BCORE SLAB STRUCTURE

Bcore slab
匠大芯板



The origin of the Bcore slab can be traced back to the law of the universe: structures in mechanics must be circular for ultimate resilience

- The Bcore slab is a integral and solid structure composed of two top and bottom steel plates brazed together with an array of thin core tubes by a procedure of copper brazing.
- The circle is the ultimate shape in mechanics. As such, core tubes, of circular shape, can be extremely thin and light.
- The Bcore slab structure seems to be overly simple, but it has fulfilled humanity's wish for material optimization (making the best use of everything). Indeed BSB has successfully managed to use the least amount of material to achieve the maximum strength. This reflects the mantra of Albert Einstein, $E=mc^2$'s founder : "science is simple."

Superior brazing performance, huge dimension allowance: a simple but important innovation

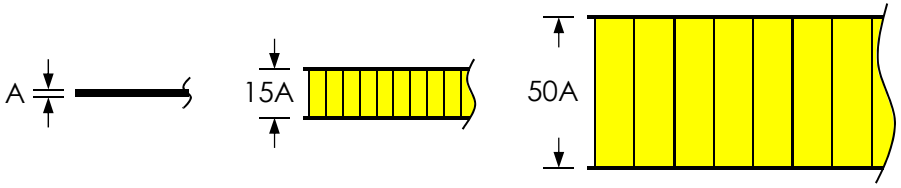
- The ends of Bcore tubes are flanged, making the brazing surface 10 times larger to fuse Bcore slabs and plates solidly, so that even if a tube snaps, the brazed parts do not separate.
- Most importantly, the space between the Bcore tubes allows for the hot air to melt the copper during the brazing process.
- Declared on October 31, 2016 as a PCT international patent, the Bcore slab, seemingly the simplest of innovations, has nonetheless the potential to be a milestone in the course of the world's inventions.

STRUCTURAL STRENGTH COMPARISON

Bcore slab 远大芯板

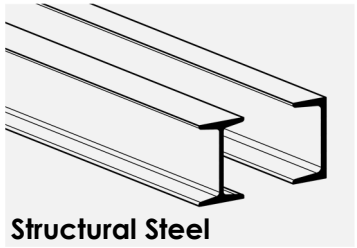
Astonishing strength: when placed 12 metres on stilts, the Bcore slab does not bend under the weight of 20 adults (on-site demonstration photo)

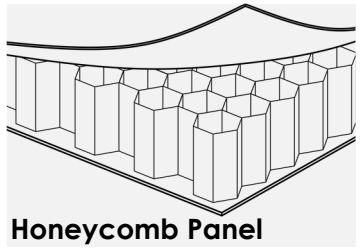
Comparison with steel plates

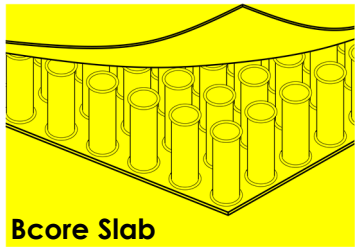


Weight:	1	1.16	1.29
Strength:	1	630	7350

Comparison with other structural materials (under the same weight)



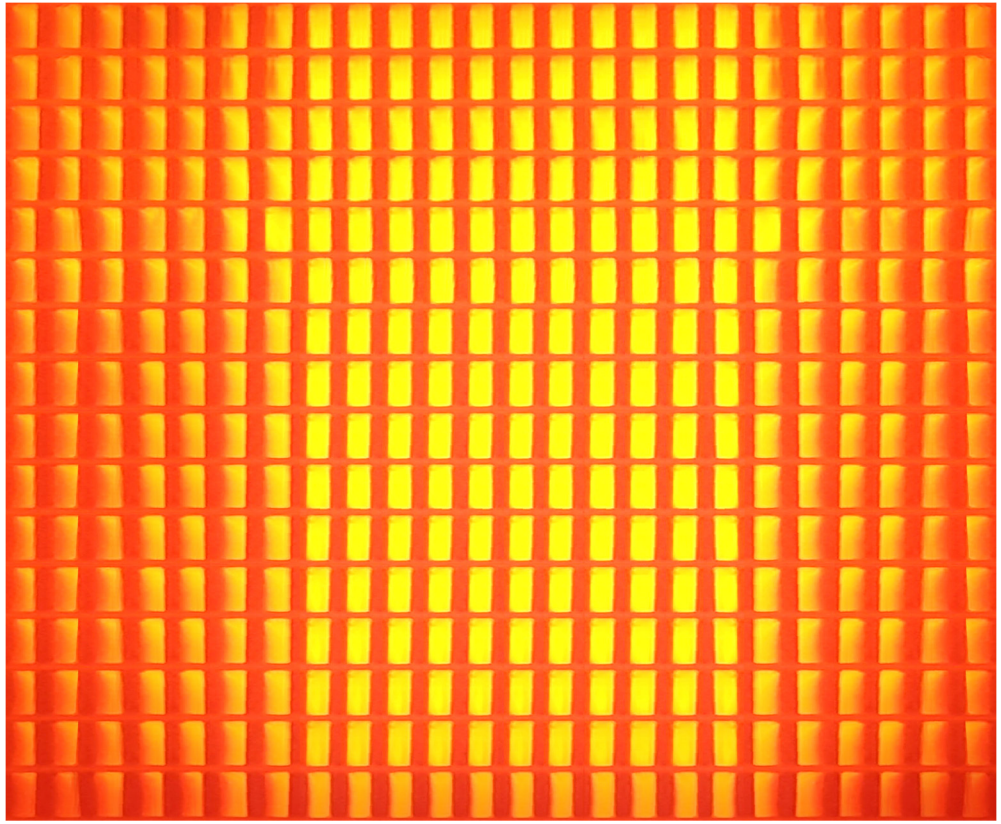




Strength:	1	4.5	5

CORE TECHNOLOGY: COPPER BRAZING

Bcore slab 远大芯板



Bcore slab brazing technology: two steel plates are fused to each other by an array of extremely thin core tubes with copper foil at a 1100°C brazing process.

- The Bcore slab copper brazing's uniqueness is its hot air treatment, rather than thermal radiation used in conventional brazing.
- The core tubes are disposed in a way that leaves gaps in between them. The blower blows hot air at a speed of 100m per second into the oven to heat the Bcore slabs evenly.
- As they are heated evenly, the brazed Bcore slabs are manufactured as huge mirror like plates – flat and smooth, preventing stress deformation from ever occurring.

Comparison of Different Brazings

Compared Item:	Brazing Method	Brazing Piece Dimensions	Oven Capacity	Brazing Time (estimated)	Brazing Cost (estimated)
Conventional honeycomb panel:	1100°C Heat Radiation	Length/Width < 1.5m	<2m^2	>12hours	>100RMB/kg
Bcore Slab:	1100°C Hot Air	Lenght 12m, Width 2m	≥240m^2	≤4hours	<5RMB/kg

Note:
Brazing refers to a brazing process in which the melting point of the brazing material is lower than that of base material. For example, for the Bcore slab, the melting point of its brazing material (copper) is 1,083 °C whereas the melting point of base material (steel) is 1454~1600°C.

WHY IS BCORE SLAB THE "ULTIMATE STRUCTURAL MATERIAL" ?

Bcore slab 匠大芯板

Type	Traditional Material		Bcore Slab	
Building	Reinforced steel and concrete structure	1. Reinforced concrete has poor seismic resistance performance, resulting 69,000 people perished during the Wenchuan earthquake in 2008. 2. Reinforced steel rusts easily, the building lifespan is less than 60 years, and what was supposed to be a legacy for future generation becomes a pile of rubbish, resulting in cities to fall into decay.	Stainless steel bcore slab structure	1. Bcore slab is ultra light, its elongation is more than 40% and will not collapse in an earthquake 2. Stainless steel is resistant to corrosion, its life span can be thousands of years (can be verified by the salt mist accelerated corrosion test)
	Reinforced structure	1. Uses angle steel, channel steel, I steel, pipes and other heavy materials, high consumption of steel. 2. Manual welding, high construction cost. 3. Extra materials and labor resources needed.	Carbon steel bcore slab structure	1. The mechanics of the Bcore slab are superior, reducing the consumption of steel by 30~60% from the traditional structure 2. 100% made in factory, low construction cost, 10 times faster in terms of construction period 3. The surface of the Bcore slab is smooth and flat, no need for additional modifications
	Foaming materials Wall insulation	1. Inflammable, can not be used for 6 floors and above. 2. Organic material has a lifespan of less than 60 years and becomes toxic waste after being discarded. 3. Small dimensions, easily cracks and leaks.	Bcore slab thermal insulation wall	1. Bcore slab is filled with rock wool, which has an extremely long lifespan and a low thermal conductivity (approximately 1/20 of that of concrete) 2. Huge size with little seam. Weatherproof silicone gel is applied at the seam for weather fastness 3. Prefabricated in factory, easy for installation 4. Suitable for new buildings and energy-saving retrofitting of existing buildings
	Rock wool for wall insulation	Need to cover with a metal plate, high processing cost, troublesome construction		
Bridge	Reinforced concrete bridge	1. Heavy weight, high construction cost, long construction period, poor seismic resistance 2. Reinforced steel rusts, its service life is short and building maintenance becomes a problem at the end of its lifespan. In 2018 in Genoa, Italy, a 51 year old bridge collapsed, over 50 people perished.	Carbon steel or stainless steel bcore bridge	1. Stainless steel Bcore bridge has a similar cost as traditional for bridge, while carbon steel Bcore bridge costs much less than that of traditional bridge. 2. The prefabrication in factory reduces the time of construction (10 times quicker), and has little disturbance to surroundings 3. Metal material has a high tenacity. In case of earthquake or subsidence, it will only deform, not collapse. 4. The weight is extremely light due to the lack of concrete usage, making it easy to make multi-level bridges. Its large span allows a 120m-interval between piers in a double deck bridge, bringing the possibility to replace ground roads by elevated road to protect land and environment
	Full-reinforced bridge	1. Usage of structural steel and thick steel plate for bridge structure, high steel consumption and long construction period 2. Reinforced concrete bridge deck, heavy weight		
	Lightweight suspension bridge deck	Usage of steel instead of reinforced concrete to lower the bridge's weight, usage of I steel and channel steel stuck to steel plates to solidify the bridge. Due to one side brazing, the bridge is susceptible to fatigue, over 3000 bridges in China unweld every 1 to 3 years.	Bcore Bridge Deck	1. Copper brazing is applied for Bcore slab and the brazing surface is 10 times bigger than that of the base material so that it won't break apart even if the core tubes are damaged 2. The Bcore slab is ultra strong, a 6-meter span bridge has been tested with a 36-ton single-wheel load (two times higher than the international standard) and showed no sign of plastic deformation
Light-weight Casing for Aircraft and Vehicle	Stainless steel honeycomb panel	1. Good mechanical property, but thermal radiation copper brazing is extremely costly 2. Small dimensions, high splicing cost	Stainless Steel Bcore Slab	1. The mechanics of the Bcore slab are similar to that of the honeycomb panel, while the brazing cost of the former is 20 times lower. 2. Huge dimension leads to low splicing cost.
	Aluminium honeycomb panel	1. The ductability of high-strength aluminium alloy is less than 5% ; not resistant to impact or fatigue 2. Only adhesive glue can be used which is not sturdy, not durable and is affected by moisture	Stainless Steel Bcore Slab	1. The Bcore slab can be directly used for structures without keel, realizing the ultimate goal for lightweight 2. The elongation of the Bcore slab is more than 40% and will only be deformed under impact without breaking. 3. The seam is electrically brazed, which makes it as strong and durable as the base material 4. Its cost is only 10~20% of copper fiber.
	Carbon fibre plate	1. Carbon fibre's ductibility is close to zero ; cracks occur when impacted ; need higher safe coefficient ; heavy weight 2. Only adhesive glue can be used		
Ship	Carbon steel plate for ship hull	1. The ship will sink if the hull is heavily damaged or if the ship capsizes 2. Carbon steel has a low tolerance of corrosion and a short lifespan, corrosion prevention is costly 3. The ship hull is composed of heavy steel plates and thick reinforcement, resulting in heavy weight, high energy consumption and deep draft during transportation (a 100,000 DWT ship has a draught above 5 meters, making it impossible to navigate inland rivers)	Bcore Slab for Ship Hull	1. The density of the Bcore slab is less than half of water's, its weight is 15 times lighter than steel, and it won't sink even in case of capsizing 2. The ship hull is made of stainless steel which guarantees an extremely long lifespan 3. The superior mechanics of the Bcore slab makes it possible to consume less steel and even if the ship is made with stainless steel, the cost will not be higher than that of conventional carbon steel ship 4. Due to its light weight, the ship has a shallow draft, which can expand the navigation scope to inland rivers and drastically reduce energy consumption
Wind Turbine	Fiberglass blade	1. The fiberglass shell needs to be supported by a steel truss, resulting in heavy blade 2. The blades as a whole has a very large dimension, for a 5MW wind turbine, the length of its blade could be as long as 90m. The transportation cost is extremely high, and it can not be transported up mountains (however the mountain top has the strongest wind) 3. Fiberglass easily ages and breaks, its life span is less than 30 years. After being discarded, it becomes toxic waste. Due to its short life, some wind turbines have to retire before realizing carbon balance	Stainless Steel Bcore Slab Blade	1. The light weight of the Bcore slab allows for energy production with a light wind, which could significantly increase annual electricity generation. 2. As Bcore slab is a composite structure itself, each joint has an identical strength, which makes it possible for blades split transportation and on-site bolted installation. This leads to a low cost wind turbine transportation and easy transportation up to mountains 3. Stainless steel has an almost infinite life span and can be applied in power demand terminals with poor wind power, achieving excellent return on investment and huge carbon reduction. It has the potential to be the ultimate solution for the protection of the environment

SPECIFICATIONS OF BCORE SLAB

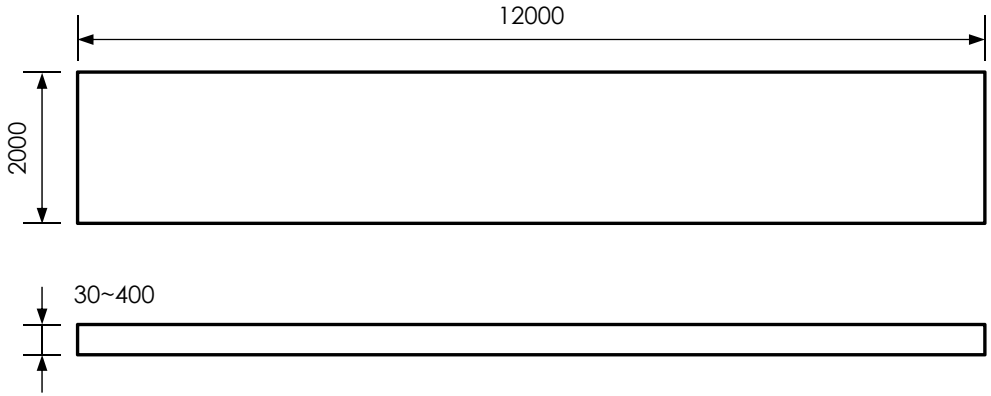
Bcore slab 远大芯板

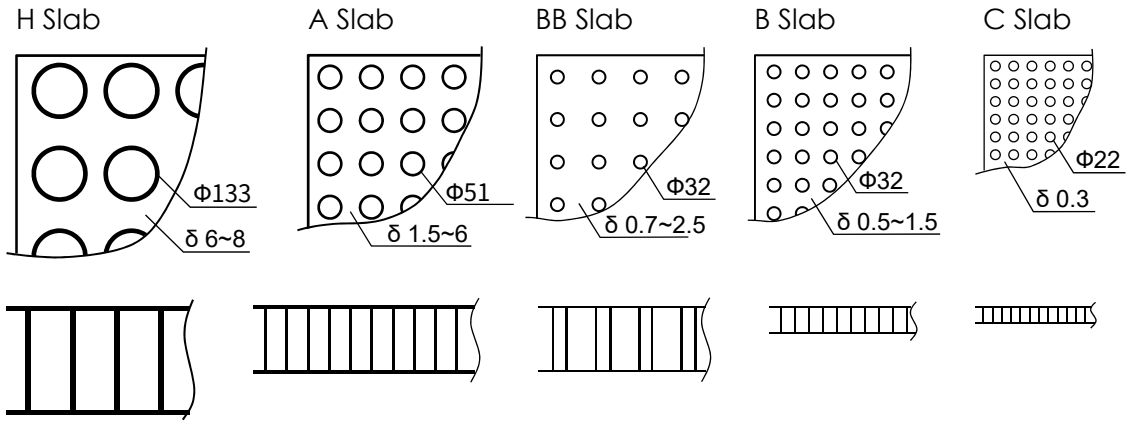
Unit: mm

Key Application	Code	Core Tube	Tube Qty/m^2	Plate Thickness	Slab Thickness	Weight kg/m^2
Building column, crossbeam, floor slab	A	Φ51×0.3/0.5	100	1.5、2.5、4、6	150	32~108.5
Exterior thermal insulation wall & structural wall	BB	Φ32×0.22	100	0.7、1、1.5、2.5	150	20~43.4
Outer shell of large vehicle and aircraft, building interior wall	B	Φ32×0.22	272	0.5、0.7、1、1.5	40、60、100	10.9~30
Outer shell of car and aircraft	C	Φ22×0.15	573	0.3	30、40	7.2~7.8
Bridge, large ship	H	Φ133×1.5	20	6、8	300、400	136~181

Note: stainless steel code SUS304L is the default material. Other non-standard material can also be customized

Standard Bcore slab size





Note: 1. Size for Bcore slab with a thickness less than 40mm: 4880mmx1220mm
2. Non-standard size can be customized as required

BCORE SLAB TYPE SELECTION

Bcore slab 匠大芯板

No.	Code	Tubular Core mm	Core weight kg/m²	Total weight kg/m²	Building type selection							Bridge type selection			Transportation tool type selection					Wind Turbine blade
					Exterior wall	Interior wall	Main beam	Secondary beam	Ceiling base	Floor slab vi 1.5m	Floor slab vi 2.5m	Floor slab vi 4.5m	Bridge deck	Main girder	Secondary girder	Car shell	Truck shell	Bus shell	Aircraft shell	Big ship hull	
1	C0.3-30	Φ22×0.15	1.6	7.2		√○∗										√	√	√	√		
2	C0.3-40	〃	2.1	7.8		√○∗										√	√	√	√		√
3	B0.5-40	Φ32×0.22	2.1	10.9		√○∗										√	√	√	√		√
4	B0.7-40	〃	〃	14		√○										√	√	√	√		√
5	B0.5-60	〃	3	12.1		√○∗										√	√	√	√		√
6	B0.7-60	〃	〃	15.2		√○		√○								√	√	√	√		√
7	B1-60	〃	〃	19.9		√○		√○									√	√	√		
8	B1.5-60	〃	〃	27.8		√○		√○											√		
9	B0.7-100	〃	4.9	18						√○							√	√	√		√
10	B1-100	〃	〃	22.7						√○							√	√	√		√
11	B1.5-100	〃	〃	30.5													√	√	√		√
12	BB0.7-150	〃	2.7	15.3	√∗																
13	BB1-150	〃	〃	20	√∗				√		√○								√		
14	BB1.5-150	〃	〃	27.8	√				√										√		
15	BB2.5-150	〃	〃	43.4	√○																
16	A1.5-150	Φ51×0.3	6	32			√○					√○					√		√		√
17	A2.5-150	Φ51×0.5	9.9	53.3			√○										√				
18	A4-150	〃	〃	77			√○							○√						√	
19	A6-150	〃	〃	108.5			√○							○√	○√					√	
20	H6-300	Φ133×1.5	30.7	136.4									○√	○√	○√					√	
21	H6-400	〃	40.5	149.4									○√							√	
22	H8-400	〃	〃	180.8									○√		○√					√	

Note: √ refers to stainless steel SUS304, ○ refers to carbon steel Q345, ∗ refers to non-bearing walls, doors and furniture.

4 APPLICATION PROSPECTS

THE BCORE BUILDING

Bcore slab 远大芯板


Rendering for The Sound of Nature (300F)


Office Building To Be Built

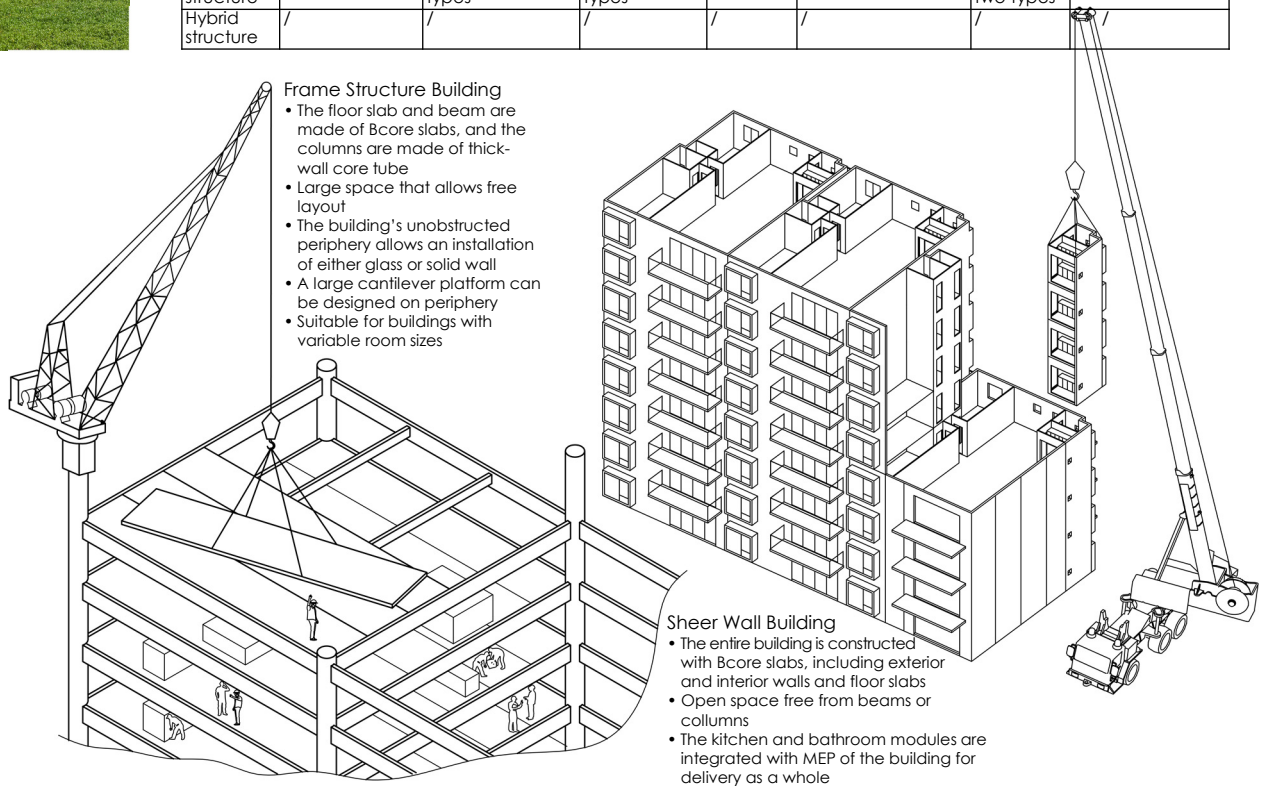

Sky Garden Rendering

Prevents cities from falling into decay, turns buildings into generational legacy

- Buildings will be as light and solid as aircraft, able to withstand stress, and resistant to earthquakes.
- Buildings will be prefabricated in factory as cars with high quality, and built at a speed of 3 floors per day.
- Buildings will be everlasting treasures like value-added jewelry that can be passed down to future generations.
- The walls are stuffed with rock wool, whose thermal insulation is 20 times more efficient than that of reinforced concrete, saving a considerable amount of energy.
- Possibility to lower the construction cost of highrise buldings and huge cantilever platforms, realizing the architects' life-long dream.

Bcore Building Structure System

Structure	Recommended Building Height	Exterior wall (K value 0.5)	Interior Wall	Beam Feature	Column Feature	Floor Slab	Application
Shear wall structure	≤192m	Bcore slab bearing wall thickness: 150mm	Bcore slab bearing wall thickness: 60mm	No beam	No column exterior and interior walls bearing the load	Bcore floor slab thickness: 60-150mm	Residential Apartment Hotel /Hospital
Frame structure	≤900m	Non-bearing wall	Non-bearing wall	Bcore slab beam	Circular column, square column outer diameter 950mm	Bcore floor slab Thickness: 150mm	Office building School Conference room Shopping mall
Spire structure	≤1500m	As above two types	As above two types	Hybrid	Giant column	As above two types	Mixed function
Hybrid structure	/	/	/	/	/	/	/



Frame Structure Building
- The floor slab and beam are made of Bcore slabs, and the columns are made of thick-wall core tube
- Large space that allows free layout
- The building's unobstructed periphery allows an installation of either glass or solid wall
- A large cantilever platform can be designed on periphery
- Suitable for buildings with variable room sizes

Sheer Wall Building
- The entire building is constructed with Bcore slabs, including exterior and interior walls and floor slabs
- Open space free from beams or columns
- The kitchen and bathroom modules are integrated with MEP of the building for delivery as a whole
- Suitable for buildings with fixed room sizes

THE BCORE BRIDGE

Bcore slab 远大芯板

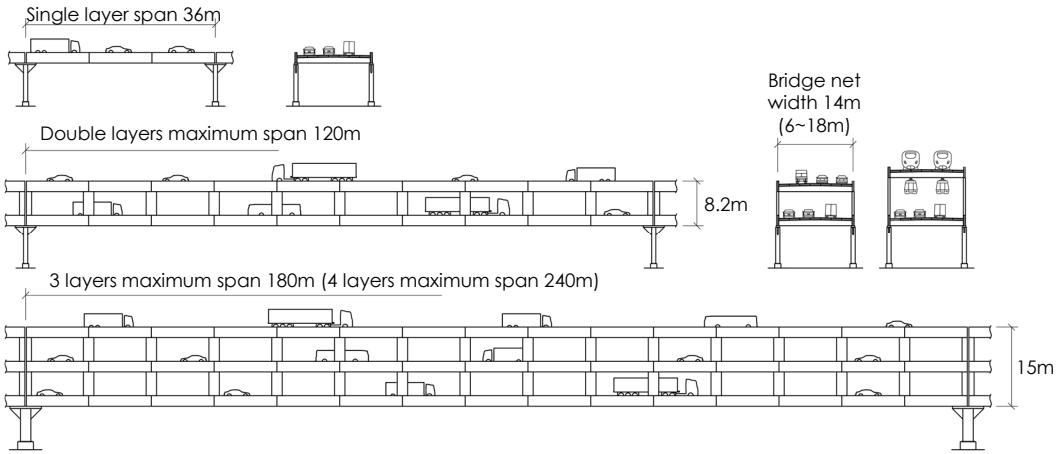
Lowers the cost of bridge, turns roads into bridges

- Low cost: the cost of carbon steel Bcore bridge is 30~60% lower than that of traditional bridges, and is expected to fully replace ground roads and protect the environment.
- Long lifespan: stainless steel Bcore slab has an extremely long lifespan, with no need for rust-proof maintenance.
- Light weight: bridge body weighs 0.4~0.5t/m^2, only 10~20% of the traditional concrete bridge weight.
- Short construction period: factory prefabricated bridge components and on-site robot trolley welding makes construction period 10 times shorter.
- Anti-overload : Bcore bridge remains intact when ran through by 150-ton overloaded trucks
- Multi-layer possibility : the light weight of the bridge allows for a multi-layered bridge structure and post-construction build (if needed), which can be performed during the night to avoid interfering with traffic and hopefully solves the worldwide problem of road congestion.

Design Selection Recommendation Form

Unit: mm

Code	Bridge	Lanes	36m Standard Span Pier	Bridge Deck Thickness	Main Girder (height x thickness)	Secondary Girder (height x thickness)	Secondary Girder Span	Structure Dead Load (calculated by deck area)
Q10 Q10-2 Q10-3	Single layer 10m Double layers 10m Three layers 10m	One-way two lanes Top and bottom each two lanes Top, middle and bottom each two lanes	Φ800x16 Φ800x16 Φ800x20	400	2000x 300	500x 150	6000	0.48t/m^2 0.46t/m^2 0.42t/m^2
Q14 Q14-2 Q14-3	Single layer 14m Double layers 14m Three layers 14m	One-way three lanes Top and bottom each three lanes Top, middle and bottom each three lanes	Φ1000x16 Φ1000x20 Φ1000x30	400	2000x 300	800x 300	6000	0.48t/m^2 0.40t/m^2 0.36t/m^2



Technology Standards

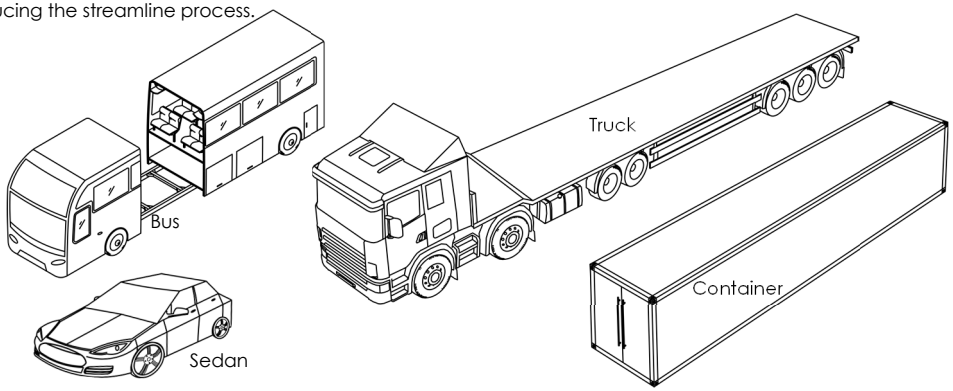
- Applied standards: designed, constructed and approved according to local standards.
- Road grade: express way, first-grade highway.
- Seismic resistance grade: designed to resist 9 magnitude earthquakes.
- Overload test: sustains 36t single wheel, 150t vehicle.
- Turns and ascents: designed according to local codes and site feasibility.
- Hoisting method: traditional cantilever will be equipped with an electric wheel that proceed to push forward the already existing bridge. The bridge slabs do not contact the ground during the entire hoisting procedure.
- Construction method: factory prefabrication and on-site robot trolley welding enables all work to be performed on the deck

THE BCORE VEHICLE

Bcore slab
远大芯板

Makes cars as light as planes, reduces transport pollution

- Light weighting: the vehicle's body is made of stainless steel Bcore slab, which is expected to be 40~60% lighter than traditional car body, greatly saves energy.
- Stable driving: the light weight of the car body lowers car's gravity centre, making it more stable and safer than traditional cars.
- Non-transformative car doors: the Bcore slab is fabricated at a 1100°C temperature (whereas traditional car doors are cold pressed), car doors will not be deformed and will stay sealed.
- Durable and reduces waste: the car's body is made of rust-free stainless steel and thus reduces automobile waste on a global scale.
- Low cost of fabrication: the Bcore slab do not require keel, lining or molding for reinforcement, significantly reducing the streamline process.



Note: BROAD will only serve as a material supplier, providing Bcore slabs for vehicle manufacturers

THE BCORE SHIP

Bcore slab 匠大芯板

A Panamax container ship composed of 4 modules

Builds unsinkable ships, permits large ships to navigate inland rivers

- Safe: the density of the Bcore slab is less than half that of water, the weight is 15 times lighter than steel, so it won't sink even in case of capsizing.
- Durable: the ship hull is made of stainless steel, which has a low maintanence cost and guarantees an extremely long lifespan.
- Low price: the superior mechanics of the Bcore slab makes it possible to consume less steel and even if built with stainless steel, its cost will not be higher than that of a conventional carbon steel ship.
- Light weight: the ship has a light weight and flat bottom, its shallow draft expands the navigation scope to inland rivers and drastically lowers energy consumption.
- Expansion: permits a large number of ships to gather and form a large offshore platform (a truss is to be erected on the platform for rigidity purposes)

Modular Ship Main Statistics

Dimension	Length 182m, width 24.6m，height10m	Ship hull material	Sea water contacting material：2304，others 304
Draft	6 m (maximum 7m, no lower limit)	Speed	≤20 knots (depending on supplied power)
Rated load	25,000 t	Panamax ship	Composed of 4 modular ships, length 364m, width 49.2 m, height 10 m, deadweight 100,000 t
Ship weight	2430 t		

A 25,000 DWT ship

A 2912m x 394m marine mobile city composed of 256 modular ships, covering an area of 1.15km²

Note: BROAD will only serve as a material supplier, providing Bcore slabs for ship manufacturers

THE BCORE WIND TURBINE

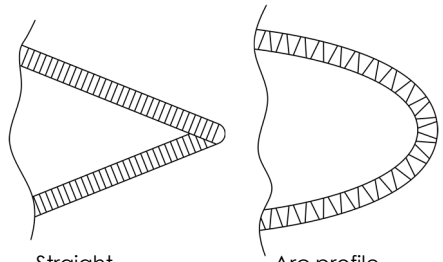
Bcore slab 匠大芯板

Erects wind turbines on mountains and in the countryside, reduces coal consumption

- As Bcore slab is a composite structure itself, each joint has an identical strength, which makes it possible for blades split transportation and on-site bolted installation. This leads to a low cost wind turbine transportation and easy transportation up to mountains.
- Resistant to bird collisions: Bcore slab has an extremely high tenacity (elongation ≥40%), and is hard to be damaged in case of strong wind or bird collisions.
- Light wind power generation: Bcore slab is expected to be twice as light as fiberglass, making light wind power generation possible and increasing the annual power generation hours by more than 40%.
- Ultimate carbon reduction: stainless steel's lifespan is almost limitless, wind power generation will no longer need to be in the sea or in the desert to be cost efficient, even in areas with light wind such as rural or hilly areas, it can still produce considerable energy and reduce carbon emission. It has the potential to become the utimate solution for the protection of the environment.

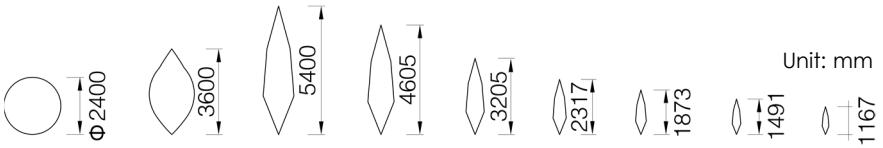
Main parameters for wind turbine blade (7MW model)

- Blade size:
  length 84m, maximum width 5.4m.
- Blade weight:
  14.2t (35t for traditional fiberglass).
- Biggest split part:
  length 12m, weight 4.5t

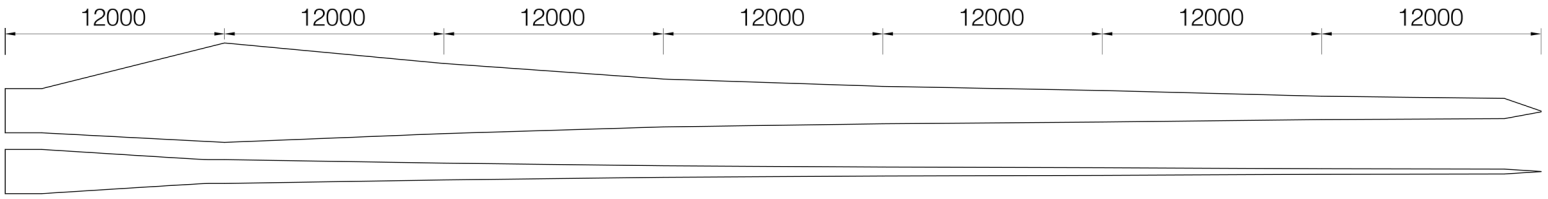


Straight profile blade (standard)

Arc profile blade (optional)



Tradional transportation for fiberglass blade



Note: BROAD will only serve as a material supplier, providing Bcore slabs for wind turbine manufacturers

THE BCORE SLAB AIRCRAFT

Bcore slab 匠大芯板

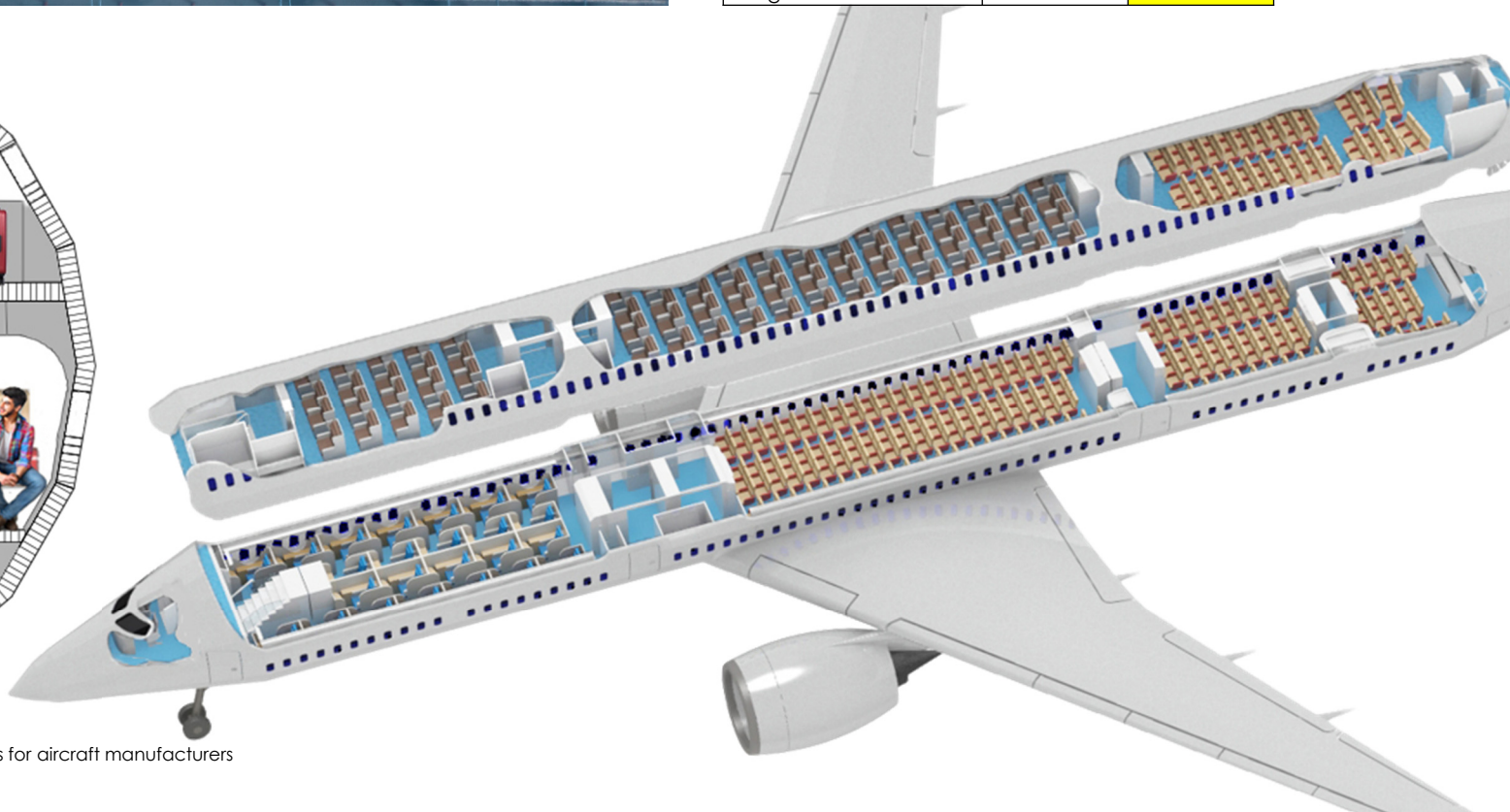
Builds lighter and stronger aircraft , ensures low carbon and safe flights

- Lighter: Bcore slab is directly used for the aircraft's body and wing without adding extra metal frame or keel. It is expected to achieve extreme light weight, and to reduce energy consumption by several times.
- Stronger: Bcore slab yield strength rate is more than 40%, at least 8 times higher than high-strength aluminum alloy and carbon fiber. It is impact and fatigue resistant.

Example: Comparison on Boeing 787-10 (estimated)

Item	Existing Technology	Bcore Slab
Empty Weight	119 tons	82 tons
Passenger Capacity	330 people	500 people
Total Capacity of Passenger and Cargo	28 tons	65 tons
Oil Capacity	107 tons	107 tons
Maximum Take-off Weight	254 tons	254 tons

Note: Aircraft trial-fabrication has not started yet, and the content of this page is only a theoretical analysis, tests are yet to be conducted.



Note: BROAD will only serve as a material supplier, providing Bcore slabs for aircraft manufacturers