Castings Division
General Catalog

NIPPON CHUZO K.K.

Castings Division

NIPPON CHUZO K.K.

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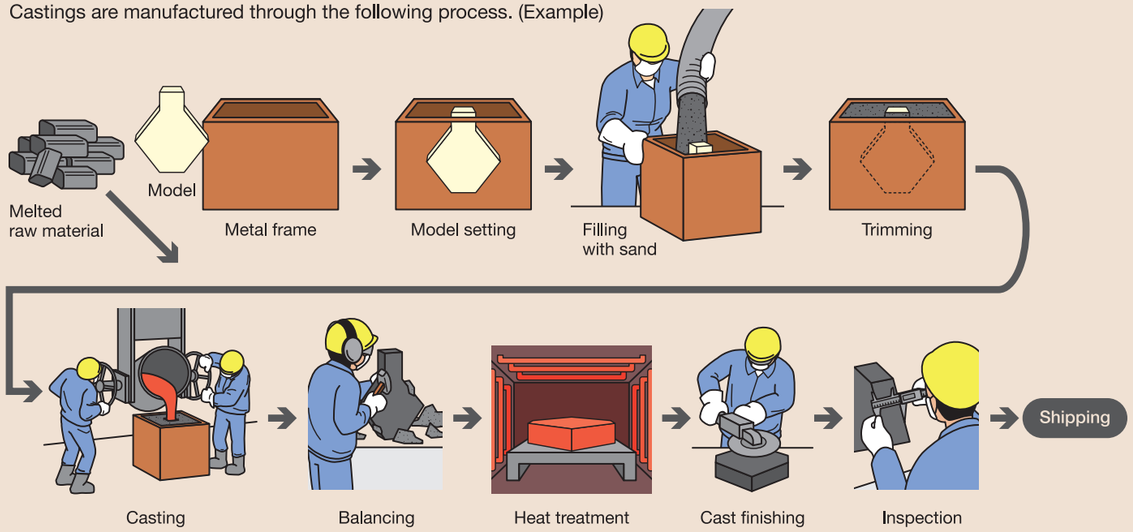
http://www.nipponchuzo.co.jp/en/

The foundation of NIPPON CHUZO responsible for all casting production

Cast and forged materials business that has been the cornerstone of NIPPON CHUZO since its founding in 1920.
The quality and performance of castings, which require a combination of skilled know-how and the latest technology, continue to be anticipated as reliable solutions.

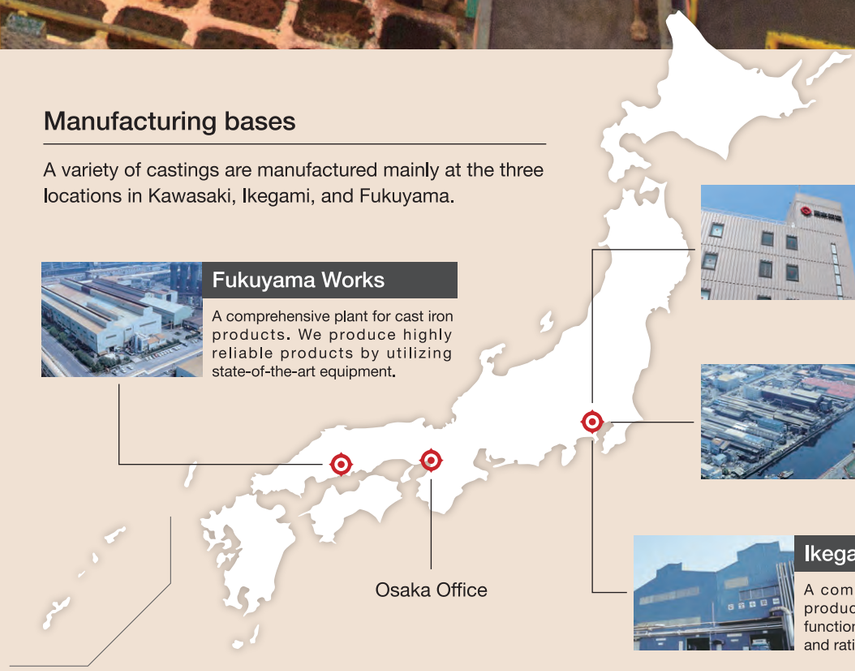
Manufacturing process

Castings are manufactured through the following process. (Example)



Manufacturing bases

A variety of castings are manufactured mainly at the three locations in Kawasaki, Ikegami, and Fukuyama.



Fukuyama Works

A comprehensive plant for cast iron products. We produce highly reliable products by utilizing state-of-the-art equipment.

Head Office / Technical Research Laboratory

We strive each day to further improve the added value of products by introducing the latest equipment and establishing a thorough research system.

Kawasaki Plant

A comprehensive plant that handles large cast steel products. Utilizing our unique know-how cultivated over many years, we create products that support key industries.

Ikegami Plant

A comprehensive plant for small cast steel products. We produce products with special functions by our proprietary cast steel technology and rational layout.

Kawasaki Plant

Manufacturing of a variety of large cast steel products from single items to mass products

Heavy electric machinery-related

We have a proven track record of delivering steam turbines, especially large types.

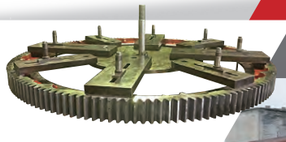
Delivery example	Thermal power generation
Product name	Casing
Weight	Approximately 25,000kg

Construction machinery-related

NIPPON CHUZO utilizes patented wear-resistant material that has been well received.

Delivery example	Extra-large mining
Product name	Shoe
Weight	Approximately 1,500kg

Industrial machinery-related



NIPPON CHUZO specializes in cast steel products and boasts the top quality in Japan.

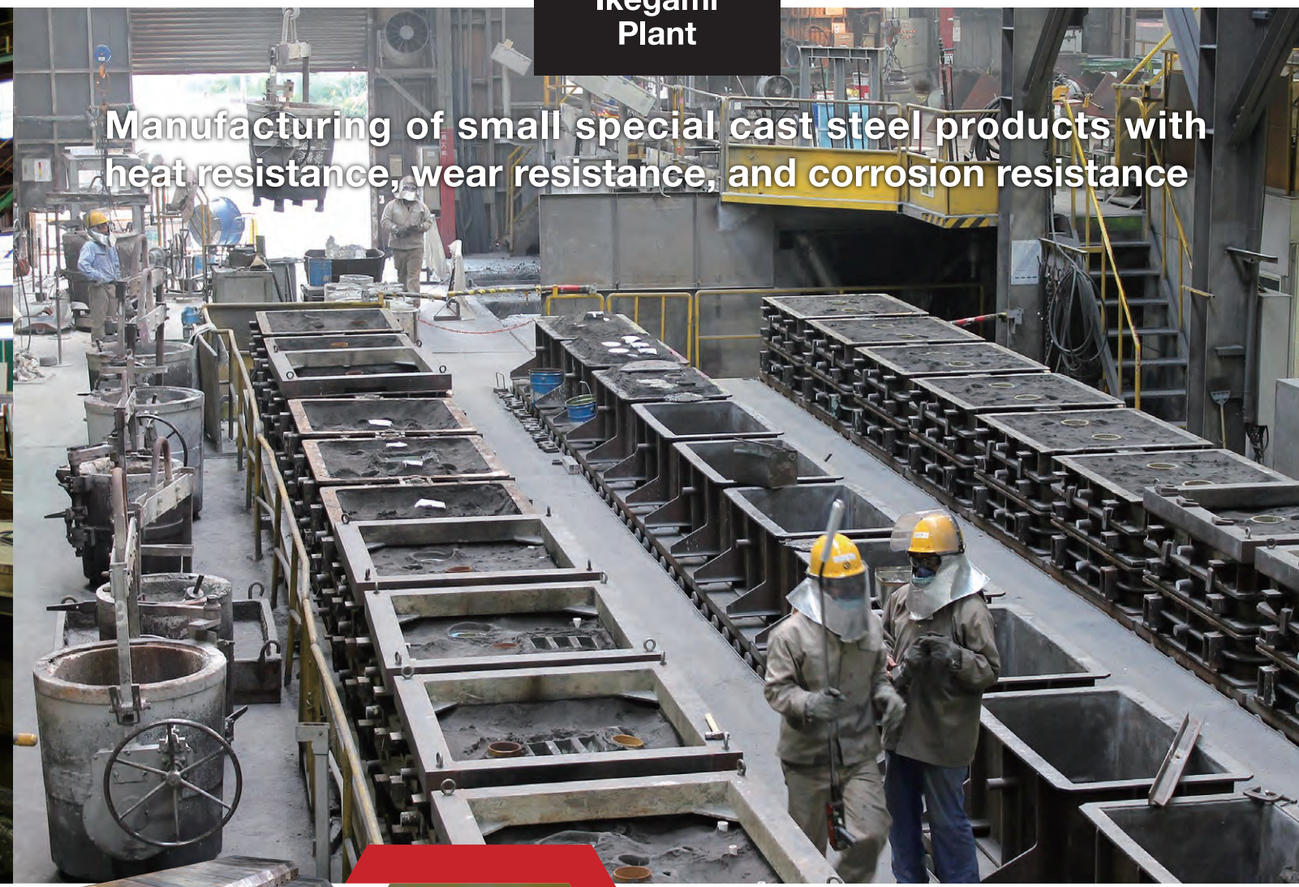
Delivery example	Rotary kiln
Product name	Gears
Weight	Approximately 10,000kg

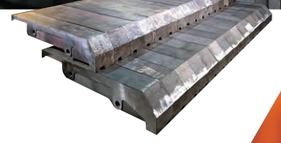
Maximum scale

Maximum size of gold frame for handling	W9,000mm×D7,000mm×H400mm (Up to 3 levels)
Maximum size of gold frame for handling	□2,300mm×H400mm (up to H1,200mm)
Maximum weight (Past achievement)	Approximately 40,000kg

Ikegami Plant

Manufacturing of small special cast steel products with heat resistance, wear resistance, and corrosion resistance



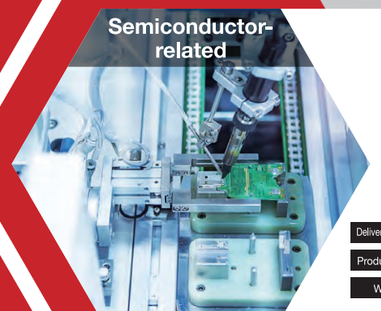


Plant-related

Heat-resistant materials that function even under extremely high temperatures are utilized, and we have a long track record of delivery.

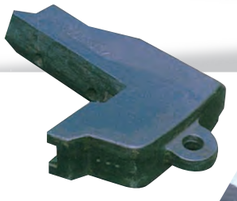
Delivery example	Waste incinerator
Product name	Fire grate
Weight	Approximately 20kg

Semiconductor-related



We have adopted the ultimate low thermal expansion material "LEX®", which is utilized in ultra precision machines.

Delivery example	Vacuum pump
Product name	Rotor screw
Weight	Approximately 15kg



Steelworks-related

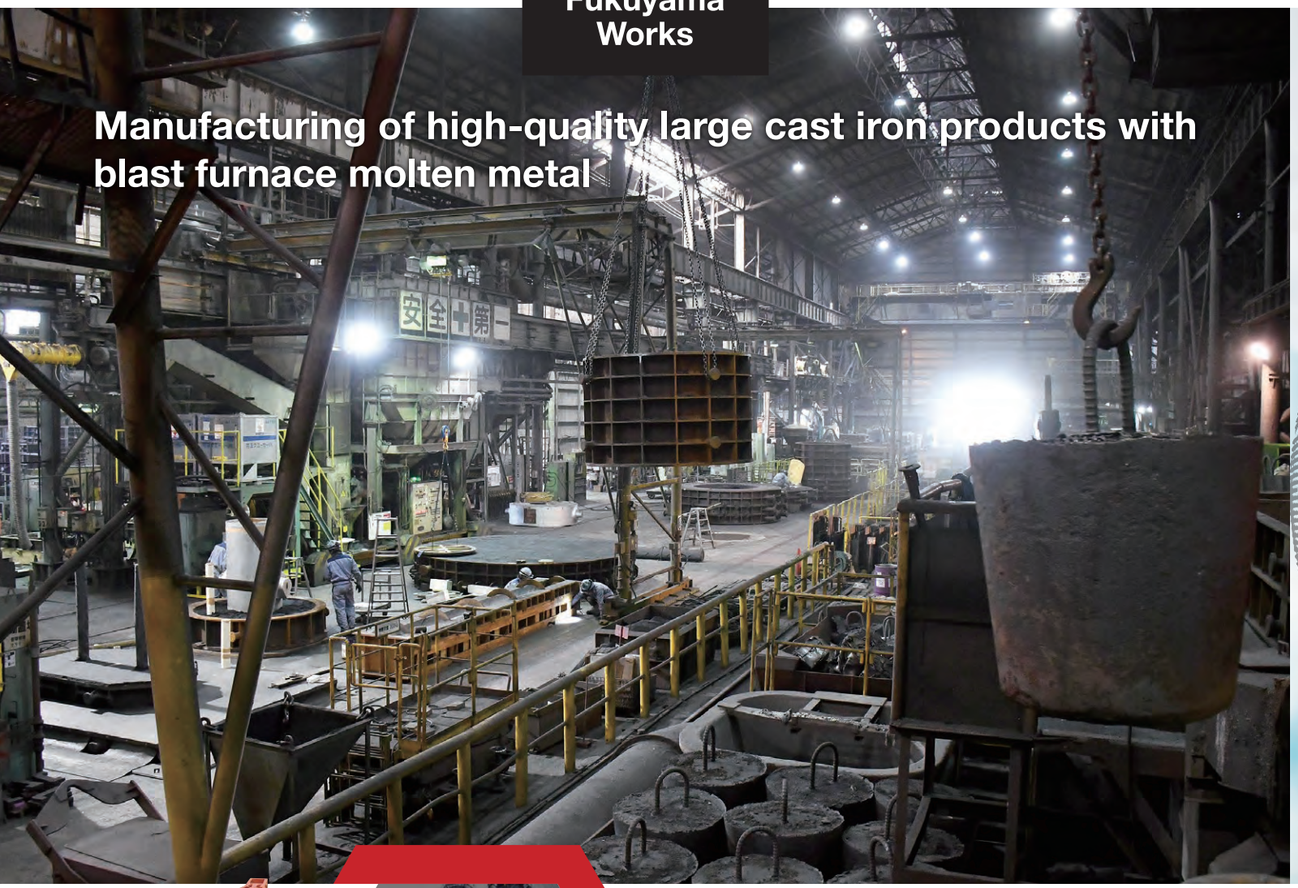
Utilizing the heat-resistant and wear-resistant materials developed by NIPPON CHUZO, long life in harsh environments can be realized.

Delivery example	Raw materials/sintering equipment
Product name	Large crusher tooth
Weight	Approximately 100kg

Maximum scale

Maximum size of VRH gold frame	W1,310mm×D1,060mm×H400mm (up to H1,100mm)
Maximum weight (Past achievement)	Approximately 600kg

Fukuyama Works



Manufacturing of high-quality large cast iron products with blast furnace molten metal

Heavy electric machinery-related

We provide support to clear strict inspection standards and implement the safe operation of thermal and nuclear power plants.

Delivery example	Thermal power generation
Product name	Loading frame
Weight	Approximately 20,000kg

Steelworks-related

We respond to diverse needs by utilizing our advanced know-how that we have cultivated over a long record of achievement. In particular, we have a record of many deliveries for electric furnace manufacturers and special steel manufacturers.

Delivery example	Casting equipment
Product name	Direct casting mold
Weight	Approximately 3,000–40,000kg

Papermaker-related

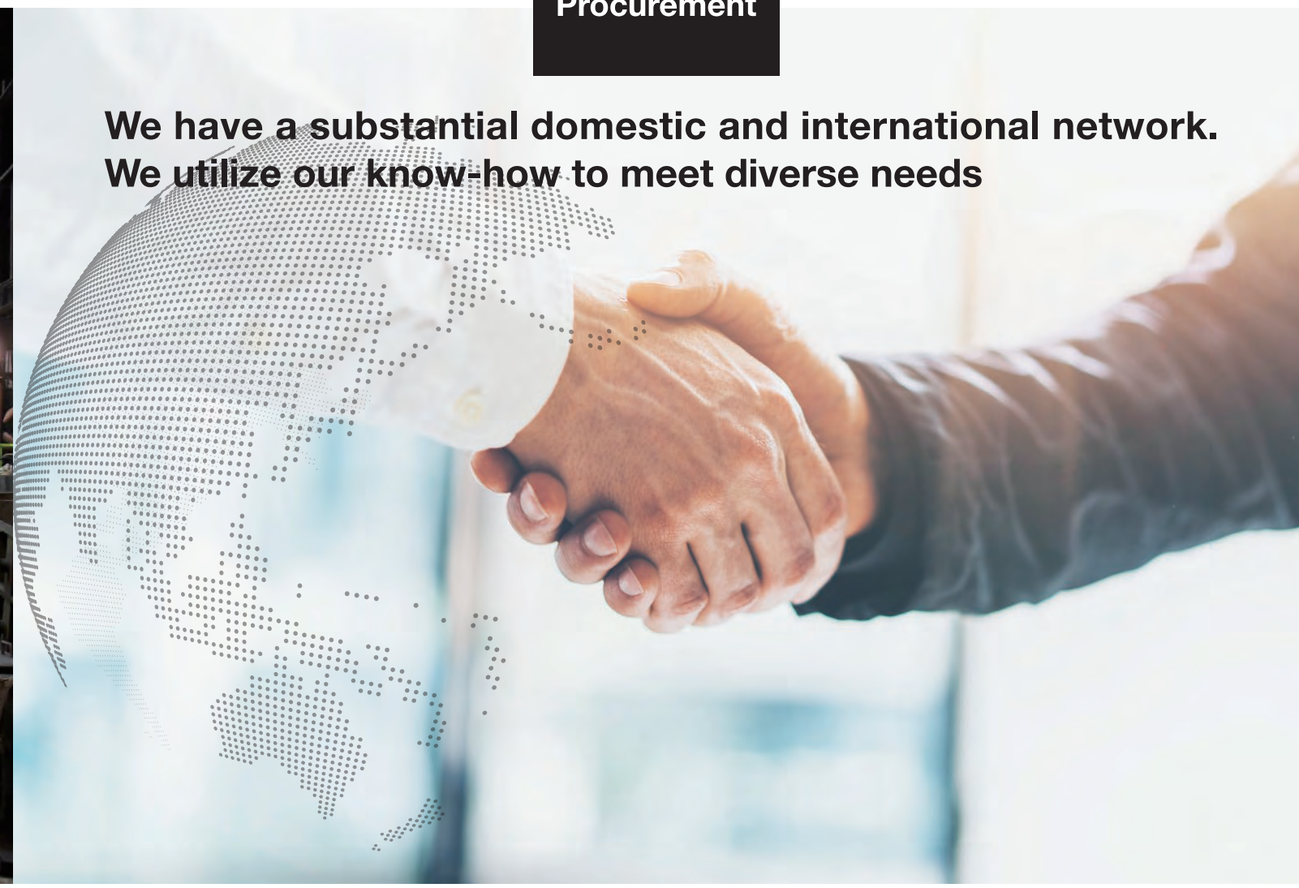
Contributes to the production of high-quality paper through unique metal structure and unique alloy design.

Delivery example	Papermaking machine
Product name	Yankee dryer
Weight	Approximately 40,000kg

Maximum scale

Maximum size of gold frame for handling	W6,800mm×D6,400mm×H500mm (Up to 2 levels)
Maximum weight (Past achievement)	100,000kg

Procurement



We have a substantial domestic and international network. We utilize our know-how to meet diverse needs

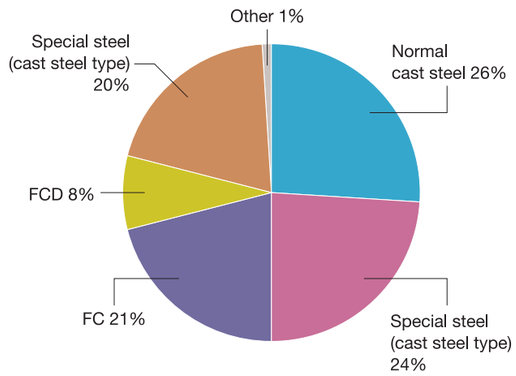
Results* Mean value from 2016 to 2018

Delivery record	55 companies
Domestic OEM	Approximately 1,000t
International OEM	Approximately 950t
Total	Approximately 1,950t

- Slag pans for steel makers ... 23 units
- Heat and wear resistant products for plant manufacturers ... Approximately 9,500 types

In addition, we have a long record of achievements for machine tool and industrial machine manufacturers.

Ratio by material* 2016–2018



Concerning quality

1. NIPPON CHUZO guarantees quality
2. Response by resident inspectors at international affiliated companies
3. Response to trouble as soon as possible

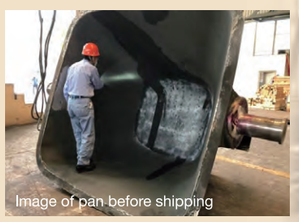


Image of pan before shipping

Image before mass production

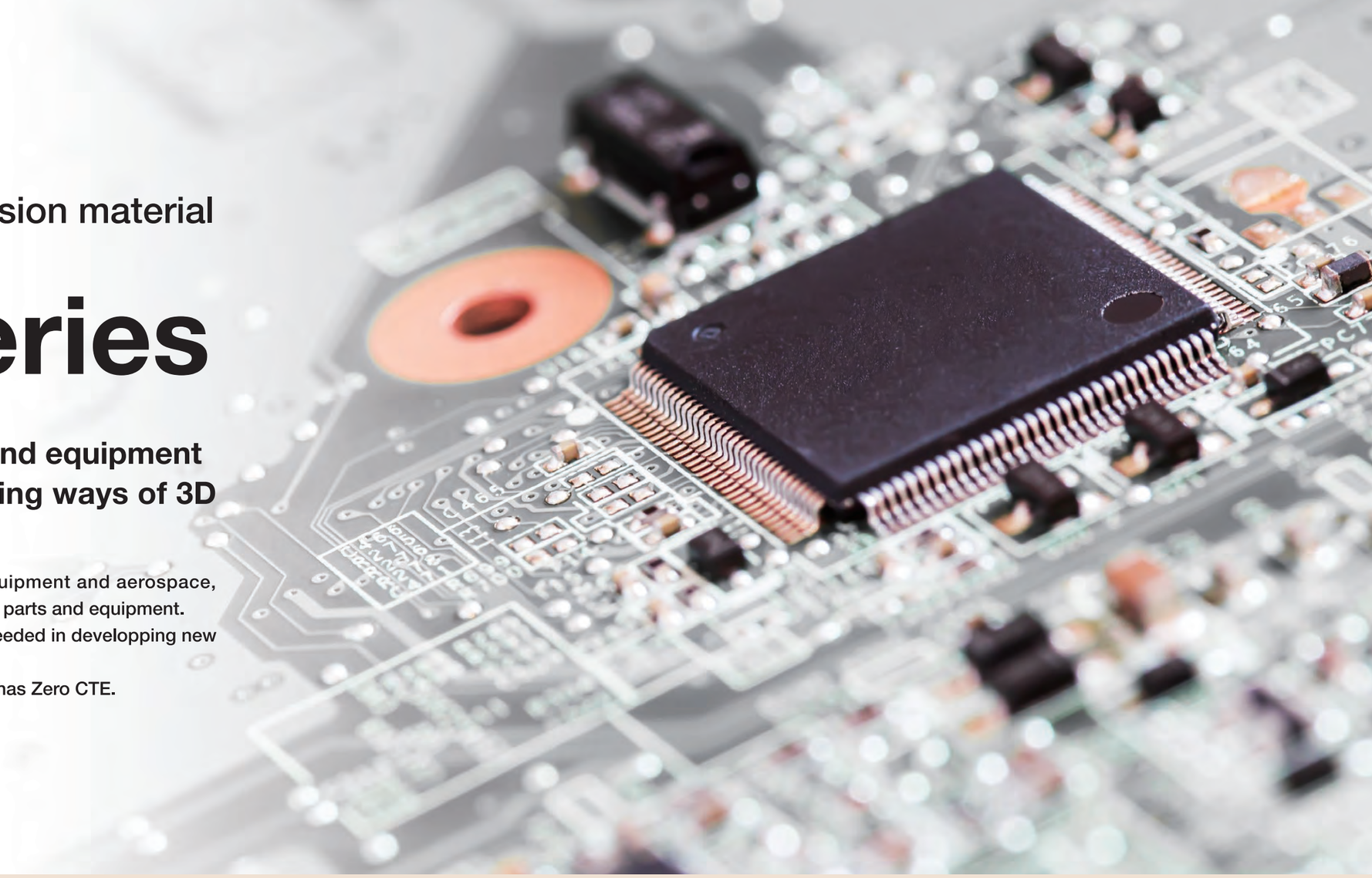
Ultimate low thermal expansion material

LEX® Series

For high performance of parts and equipment Offering innovation manufacturing ways of 3D additive manufacturing

In advanced technology fields such as precision equipment and aerospace, there is constant and severe demand for high precision parts and equipment.
In response to the demand, NIPPON CHUZO has succeeded in developping new materials of "LEX®" through long R&D process.
"LEX®" has the characteristic of low CTE, ultimate one has Zero CTE.

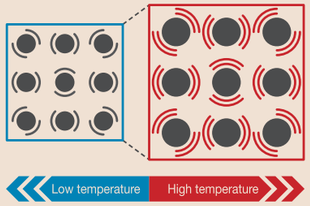
CTE: Coefficient of Thermal Expansion



What is low thermal expansion material?

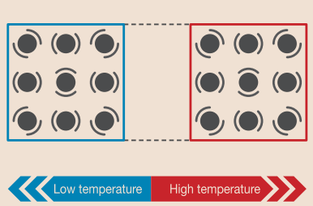
It is the material with low CTE. The material size remains almost same even though it is heated.

In the case of general metals



Expands as the temperature rises.

In the case of LEX®



The shrinkage and expansion cancel each other out, resulting in low thermal expansion.

Comparison of coefficient of thermal expansion between "LEX® Series" and steel

Solutions provided by LEX®

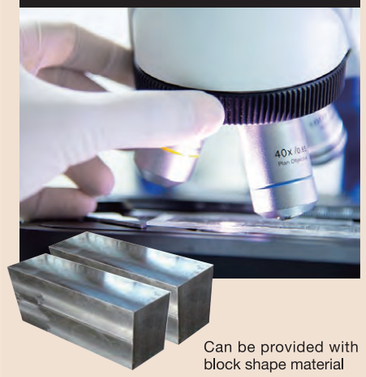
- Easy engineering and designing process
- Ensuring accuracy of ultra-high performance products

Response to various needs with various sizes and materials

We support a wide range of sizes, including large products manufactured by casting, small products provided by block, and ultra-small products formed by 3D printer.

Large products

Small products



Can be provided with block shape material

*Please consult us regarding sizes.

3D Additive Manufacturing

Manufactured with 3D printer
(maximum size: □250mm X H280 mm)

LEX® Series lineup

High temperature
400°C
Medium temperature
100°C
Room temperature
0°C
Low temperature
-196°C
Ultra low temperature

LEX 40K

Automotive parts

❶Stable in high temperature range. Best performance at 350°C

❷Application: Production line of automotive parts, semiconductor manufacturing tools and molds for aerospace

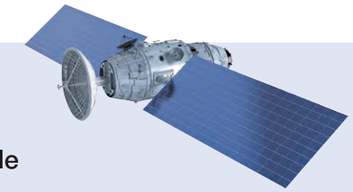
LEX-ZERO®

Semiconductor & FPD manufacturing tools

❶Ultimate Zero CTE material

❷Application：Semiconductor & FPD manufacturing tools

LEX-IF2



Aerospace-related parts

❶Stable in low temperature. Applicable from -196°C

❷Application：Semiconductor manufacturing tool and aerospace parts

List of Material Properties (Measurement example)

Classification	Low carbon-type LEX				High carbon-type LEX			
Features	Low thermal expansion/Forging possible				Castability/Machinability			
	Zero expansion	Super invar (equivalent)	Low temperature stability	Co 1% or less	Super invar (equivalent)	Invar (equivalent)	Low temperature stability	High temperature compatibility
Material/physical properties	LEX-ZERO®	LEX-SF1	LEX-IF1	LEX-IF2	LEX5	LEX15	LEX25	LEX40K
Mean coefficient of thermal expansion x 10-6/°C (10–40°C)	0±0.19	≦0.8	≦1.5	≦1.5	≦1.0	1.0-2.0	2.0-3.0	3.5-4.5*
Lower limit temperature (°C)	-30	-50	-196	-196	0	-196	-250	-30
0.2% yield strength (N/mm²)	264	227	212	198	300	260	250	260
Tensile strength (N/mm²)	378	372	357	340	470	440	430	440
Elongation (%)	28	30	32	29	15	15	15	15
Hardness (HB)	137	133	—	—	145	135	135	135
Young's modulus (GPa)	133	128	125	125	130	130	130	135
Thermal conductivity W/(m･K)	13.8	13.1	13.5	—	13.5	14.0	14.5	13.0

*Data other than the mean coefficient of thermal expansion are measurement examples, and the values are not guaranteed.
*The measurement methods of Young's modulus are as follows: low carbon system: bending resonance method and high carbon system: ultrasonic pulse method.
*The content is subject to change without notice.
*The temperature range of mean coefficient of thermal expansion of LEX40K is 20–350°C.

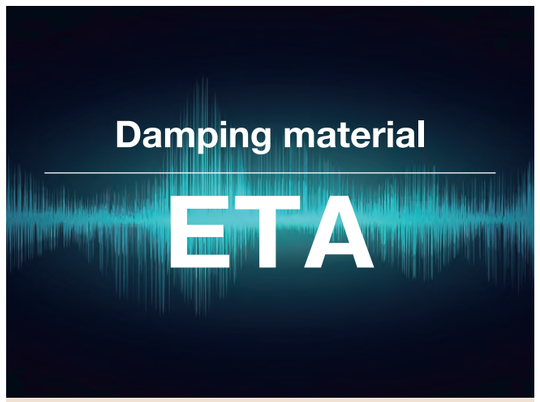
LEX-ZERO® × 3D Printer

NIPPON CHUZO has succeeded in developing not only "LEX-ZERO®" powder but also 3D additive manufacturing with its powder. 3D Additive Manufacturing can provide us flexibility in inovative manufacturing beyond casting.

Features of 3D printers

- No sand / metal molds required
- High dimensional accuracy
- High-mix low volume
- Unification of multiple parts
- Stable quality
- Lightweight solution

High-performance materials in addition to LEX® Series



Features

❶Cast steel product with superior damping

❷Favorable corrosion resistance and machinability

Features

❶High strength, hardness, and toughness

❷Better low-temperature toughness

❸High temperature strength

Horizontal continuous casting iron materials **Mighty bar**

Improved product quality and shortened delivery lead-time

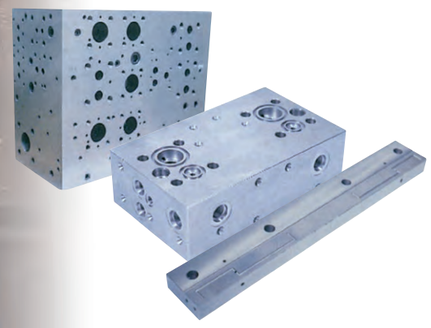
Mighty bar is a highly versatile component material. Because it is made by continuous casting, in addition to having few internal defects and exhibiting excellent strength against tension and compression, the structure is dense and the hardness is uniform. As a result, the machinability is extremely favorable, and the dimensional accuracy required for each part can be reliably achieved. Moreover, regular inventory can be secured, enabling immediate delivery.

Product characteristics of normal cast iron (FC material) mighty bar

Product specifications

Material description		M	MA
JIS specification-equivalent product		FC200,250,300	FC200,250
Heat treatment		Raw casting	annealing
Mechanical properties	Tensile strength (N/mm^2)	≧220	≧200
	Hardness (HB)	150-220	140-210

Note) The measurement site for mechanical properties is D/4 of the product (substance). ⊗



Standard dimensional tolerance, bending, and machining allowance (Unit: mm)

Form	nominal dimensions	Standard dimensional tolerance	Bending per meter	Machining allowance to eliminate defects
Round	φ20-	0–+1.0	≦5.0	Thickness deviation 0.5
	φ30-		≦3.0	Thickness deviation 0.8
	φ50-	0–+1.5	≦2.0	Thickness deviation 1.5
	φ100-	0–+2.0		Thickness deviation 2.0
	φ150-	0–+3.0		Thickness deviation 2.5
	φ200-	0–+4.0		
	φ250-	0–+5.0		Thickness deviation 3.0
	φ300-	0–+6.0		Thickness deviation 3.5
Square/ flat square	Thickness 20t-	0–+1.5	≦5.0	Thickness deviation 1.5
	Thickness 30t-		≦4.0	Thickness deviation 2.0
	Thickness 45t-	0–+2.0		
	Thickness 55t-		≦3.0	Thickness deviation 2.5
	Thickness 100t-	0–+3.0		Thickness deviation 3.0
	Thickness 150t-	0–+4.0		Thickness deviation 3.5
	Thickness 200t-	0–+5.0		Thickness deviation 4.0
	Thickness 300t-	0–+7.0		Thickness deviation 5.0
Semi-round	Width 55w-	0–+5.0	≦3.0	Flat portion thickness deviation 1.5
	Width 100–144w	0–+7.0		Peripheral thickness deviation 2.5

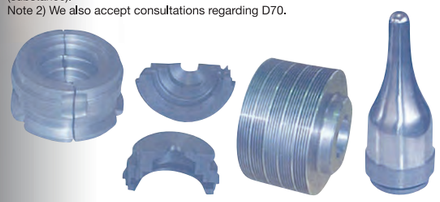
Note 1) The standards apply to the long side dimensions for flat square material.
Note 2) The product to be annealed does not guarantee the curvature of the surface.

Product characteristics of ductile cast iron (FCD material) Mighty bar

Product specifications

Material description		D40	D45	D50	D60
JIS specification-equivalent product		FCD400	FCD450	FCD500	FCD600
Mechanical properties	Tensile strength (N/mm^2)	≧400	≧450	≧500	≧600
	Elongation (%)	≧12*	≧10	≧7	≧2
	Hardness (HB)	130-180	140-210	150-230	170-270

*The small diameter size satisfies the elongation (15% or higher) of JIS FCD400-15A.
Note 1) The measurement site for mechanical properties is D/4 of the product (substance).
Note 2) We also accept consultations regarding D70.



Standard dimensional tolerance, bending, and machining allowance (Unit: mm)

Form	nominal dimensions	Standard dimensional tolerance	Bending per meter	Machining allowance to eliminate defects
Round	φ40-	0–+2.0	≦5.0	Thickness deviation 2.0
	φ50-	0–+2.5	≦4.0	
	φ100-	0–+3.0	≦3.0	Thickness deviation 2.5
	φ150-	0–+4.0		Thickness deviation 3.0
	φ200-	0–+5.0		
	φ250-300	0–+6.0		Thickness deviation 4.0
角	Thickness 40t-	0–+3.0	≦3.0	Thickness deviation 2.5
	Thickness 50t-			Thickness deviation 3.0
	Thickness 100t-	0–+4.0		Thickness deviation 4.0
	Thickness 150t-200t			Thickness deviation 5.0

Note 1) The product to be annealed does not guarantee the curvature of the surface.

Fukuyama Works

Affiliated company (Hengong Machinery Technology Co., Ltd.)

NIPPON CHUZO and Hengong Machinery Technology Co., Ltd. have an OEM contract, and products manufactured under strict management and inspection of Japanese casting are sold in Japan as the Mighty bar brand.

Hengong Machinery Technology Co., Ltd.

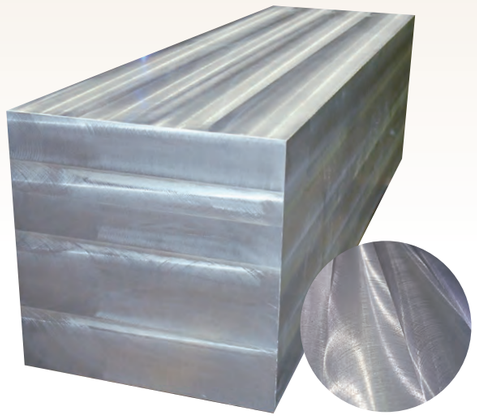
Hengong Machinery Technology Co., Ltd. is a specialized manufacturer of Horizontal continuous cast iron materials (continuous cast bars) and is engaged in design development, manufacturing and sales, machining, and after-sales service.
Boasting a continuous cast bar production capacity of 100,000 tons annually and a machining capacity of 30,000 tons a year, we are one of the world's largest cast iron horizontal continuous casting manufacturers (the largest in Asia) and provide products to more than 40 countries such as in Asia, Africa, Europe, and North America.

Mighty bar cast iron casting bar

Super Ductile

We have realized a significant reduction in costs regarding material conversion from steel!
Ideal for
ultra-large manifold block materials

As a result of our unique know-how, we have realized nearly zero casting defects



S-FCD450 (D45)

Specification	Equivalent to FCD450
Structure	Fine spherical graphite and over 90% ferrite matrix structure
Characteristics	Because it features fine crystal grains/graphite grains, stable structure up to the center, and favorable machinability characteristic of spheroidal graphite cast iron, it is suitable for high pressure and large manifold block materials.

S-FCD550 (D55)

Specification	Equivalent to FCD550
Structure	Fine spherical graphite and ferrite mixed with pearlite
Characteristics	High strength due to the presence of pearlite in ferrite.

Features of Super Ductile

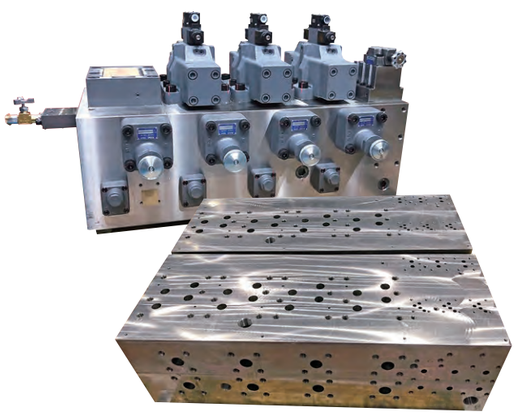
Weight reduction + **Processing cost reduction** ⇒ **Cost performance**

Quality characteristics

- Dense metal structure even in the center of ultra-thick products
- Stable mechanical properties at any location
- Superior machinability
- Quality assurance using all test pieces (production blocks, etc.)

Original manufacturing methods

- Manufactured by special casting method
- Using blast furnace molten iron as the main raw material, we have realized stable low P and low S
- We have set the optimal chemical composition and succeeded in our proprietary graphite spheroidization



Foundry sand recycling machine series

Utilizing the experience and record of achievements over many years as a casting company, we provide reliable quality to customers, respond to their various needs, and continue to support sites for casting sand recycling.

Expertise with proven track record

Favorable recycling quality

For various types of sand

Dry casting sand recycling device
Hybrid sand master

Features

❶Favorable recycling quality

- As polishing and classification are performed simultaneously, possesses superior ability to perform removal of fine powder
- Reduced crushing and high recovery rate due to optimization of polishing conditions

❷Low maintenance costs

- Long lifetime of consumable parts by the use of ceramic rotary drum
- High polishing efficiency and energy saving

Dry casting sand recycling equipment
Rotary reclaimer

Features

❶Favorable recycling quality

- The use of sliding friction polishing improves crushing reduction and spheroidization, realizing favorable sand recycling

❷Low maintenance costs

- Easy maintenance with simple structure
- Long lifetime of consumable parts by the use of wear-resistant materials

We will offer best solution for you with using our test facilities.