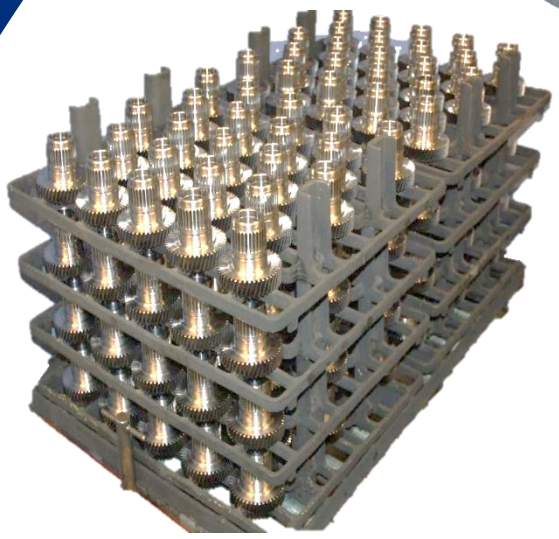
CASTALLOY®

Heat Resistant
Fixtures & Assemblies









www.castalloygroup.com

Castalloy – Heat Treatment Fixture

The Castalloy Group is a leading producer of High Alloy Castings and has Sales, Design and Manufacturing Facilities in the **USA**, the **UK** and **India.**

We have a proven track record and specialize in Heat Treatment products providing increased functionality, service life and energy efficiency. By using our castings and fabrications in your thermal processing applications, you will experience increased productivity that will impact your company's bottom line. Our products are expertly designed to offer energy savings, minimize fixture weights, maximize service life and improve furnace throughput.

Castalloy products provide the flexibility to handle multiple part numbers on common fixtures, reducing upfront alloy costs. Our fixtures can also be designed to help automate your part handling to reduce labor costs. Whether you choose our standard products or work with our engineers to customize fixtures for your application, Castalloy can take the heat. As a leader in the industry, Castalloy continues to offer quality products, at competitive prices and better value.









Environmental - We are committed to minimising negative impact on the environment and to managing the impact we do have. This means that we abide by all the applicable standards and laws and continue to monitor and improve our processes so far as is reasonably practicable.

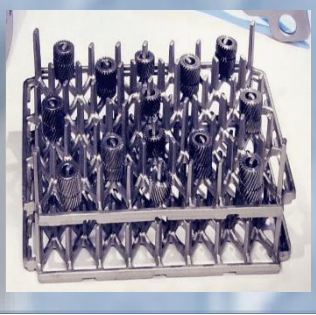
Quality – All our facilities are ISO 9001 certified. We are committed to providing total customer satisfaction and continually improving the effectiveness of our quality management system. We work closely with customers to ensure continuous improvement of products and processes.

Material Selection Criteria

Materials currently being used for parts in heat treatment furnaces and fixtures are made of heat-resistant materials. These materials need to be able to constantly operate at 1000-2200°F (540-1200°C).

It is important to understand that selecting appropriate alloys to use in furnace applications does not just depend on maximum temperature but may depend on a variety of other variables. At elevated temperatures the alloys are subject to greater stresses under given loads and are more susceptible to undergo changes in deformation.

Operating Variables for Alloy Selection	Criteria
1. Anticipated service and maximum temperature of operation	Short-time tensile properties Creep Strength Stress-rupture properties Hot Ductility properties Creep Strength Stress-rupture properties Hot Ductility Thermal fatigue properties
2. Size and orientation of load	
3. Temperature cycling and / or quench a. Range of temperature cycling b. Frequency of temperature cycling c. Rate of temperature change	
4. Type of atmosphere or other corrosive conditions	Oxidation resistance Carburization resistance Sulfidation resistance Surface stability Temperature gradients Fabrication data
5. Size and shape of part	
6. Further processing, such as welding and machining	
7. Abrasive or wear conditions -	
8. Cost –	
9. Ease of replacement –	



Furnace Types

It is crucial to consider the different types of heat treating furnaces, and heat treating processes to understand what material properties are of most importance and the type of atmospheres that alloys may encounter in their lifetime.

FURNACE TYPES

- Box Furnaces
- Pit Furnaces
- Continuous Pusher Furnaces
- Vacuum

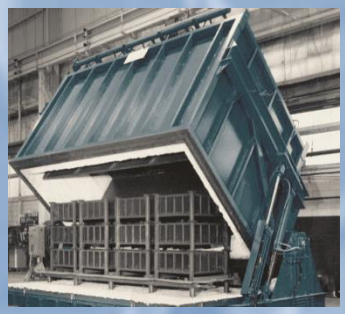
PROCESSES

- Annealing
- Normalizing
- Tempering
- Austempering
- Carburizing
- Gas carburizing
- Vacuum carburizing
- Nitriding
- Carbo-Nitriding
- Brazing









Ask the Right Questions; Make the Right Choices

Whether you are specifying permanent furnace components like a cast belt, roller tracks and fans or heat-treatment accessories like baskets, fixtures and trays, picking the right alloy and the optimal design is the best way to deliver maximum performance and lifetime at minimum cost.

An alloy and design tailored to your application can help you process more parts with higher throughput for a more efficient heat-treatment process. With fewer breakages, your baskets, fixtures and trays will have a longer working life and cost you less overall.

Our experienced metallurgists can pick exactly the right alloy and design combination that may not only offer significant process performance – lighter fixtures that can hold more parts – but, in the case of furnace components like cast belts or roller rails, also reduces the downtime often incurred during replacement.

Access to our in-depth expert consultancy gives you the best chance of improving your heat-treatment performance, cost-efficiency and sustainability. An optimized fixture or fitting will make your process more efficient, cutting overall energy use, while cast products can easily be recycled at end of life. When it's time to once again consider your options, that "cashback" will be very welcome.

- **How hot is the process?**
- **What is the furnace atmosphere, and how many daily thermal cycles must the fixture cope with?**
- **What are the size, shape and weight of the parts that each fixture has to support?**
- **How can a new fixture increase process performance?**
- **How do I get maximum value from my component?**

Material Applications

The ability of a material to resist undesired surface deterioration and distortion caused by application of direct or indirect heat.

ASTM A287	Wrought Equivalent	Applications
HA	A200 (T9)	
HC	446	Good high temperature stability in ore roasting furnaces, fuel oils, grate bars, baffle plates
HD	327	Good resistance to high temperature flue gases, where only moderate stresses exist. Furnace blowers, copper melting equipment.
HE	312	Excellent resistance to sulfur bearing flue gases; has good high temperature strength to 1800° F, radiant tubes, dampers, furnace parts, rabble arms.
HF	302B	Good high temperature properties up to 1400° F, industrial furnace parts, aluminum heat treat fixtures, oil still parts.
HH	309	Excellent strength up to 1800° F in moderate amounts of sulfur fuels. Furnace parts, radiant tubes, rails, shafts, and rollers.
HI	--	Similar to the HH material with better resistance to oxidation.
HK	310	Excellent strength and stability up to 2000° F, furnace parts, radiant tubes, carburizing fixtures, cement kiln parts, shafts and rails.
HL	--	Similar to the HH material with better resistance to oxidation.
HN	--	Similar to HT material with better ductility
HP	--	Higher stress rupture properties than HK and HN also increased resistance to carburization.
HT	330	A high strength alloy in the range of 1600-1800° F in carburizing atmospheres and furnace atmospheres without sulfur. Carburizing fixtures
HT + Cb	--	
HU	--	Greater strength and resistance to carburization than HT good thermal fatigue and high temperature oxidation properties commonly used for carburizing and oil quench
HU + Cb	--	
HW	--	Good resistance to oxidation, carburization, thermal fatigue and neutral salts.
HX	--	Excellent resistance to oxidation up to 2150° F; good resistance to thermal fatigue and severe quenching applications.

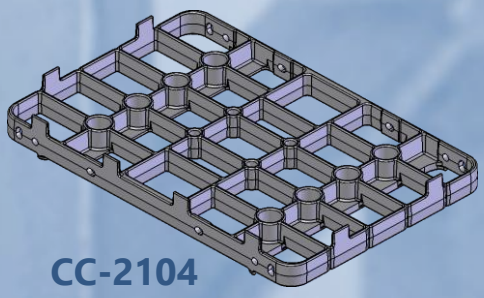
Super Alloys	Similar Materials	Applications
CC5	Hastalloy X	Exceptional oxidation and high strength characterisitics at temperatures up to 2100° F. Provides greater service life in severe applications. Used for trays, furnace rolls, etc.
CC52	Supertherm®	Provides exceptional strength in high temperature applications up to 2150° F. Used for radiant tubes, walking beams, and furnace parts where high temperature strength is required.
CC435	Super 22H®	Extreme high temperature applications up to 2200° F with excellent oxidation and carburization resistance.
CC535	22H®	Similar to CC435; but without Cobalt
CC1735	MO-RE® 2	High creep strength and oxidation reisistance in application temperatures of 2100-2400°F
Inconel 600 MOD	Inconel 600	Exceptional resistance to severe quenching applications Highly resistant to thermal fatigue and oxidation

Product Types

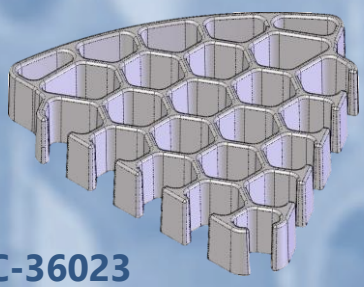
Often cast and wrought compositions are similar. In general, the specifications of the wrought grades have carbon contents below 0.25%, and many are nominally near 0.05% C. In contrast, the cast alloys have from 0.25 to 0.50% C, this difference has a significant effect on **Oxidation Resistance**, **Hot Strength** and **Creep resistance**.

- **Initial cost:** A casting is essentially a finished product as-cast; its cost per pound is frequently less than that of a fabricated item
- **Strength:** Similar alloy compositions are inherently stronger at elevated temperatures than are wrought alloys
- **Shape:** Some designs can be cast that may not be available in wrought form; also, even if wrought material is available, it may not be able to be fabricated economically
- **Composition:** Some alloy compositions are available only in castings; they may lack sufficient ductility to be worked into wrought material configurations

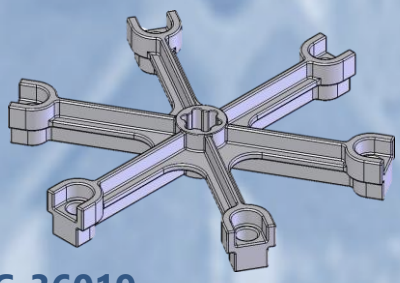
PRODUCT BULLETIN	SERIES	SECTION CONTENTS
1	100	SMALL PARTS SERIES
10	1000	ROLLERS SERIES
20	2000	TRAYS & GRIDS
30	3000	RAILS & CARRIERS PARTS SERIES
40	4000	CAST BASKET SERIES & CRUCIFORM BARS
45	4500	CAST BASKET ASSEMBLIES
50	5000	CHAIN PARTS SERIES
60	6000	CAST BELT LINKS SERIES
65	6500	DRIVE DRUM SERIES
70	7000	FIXTURES SERIES
72	7200	FAN / FAN BLADE SERIES
80	8000	MISC SERIES, Return bends, reducers
90	9000	MISC SERIES, GVRT TRAY, SHOES, BAR
110	11000	MISC SERIES
360	36000	ROUND TRAYS & GRIDS SERIES
C10	C-1000	INSERTS



CC-2104



CC-36023



CC-36019

Trays & Grids

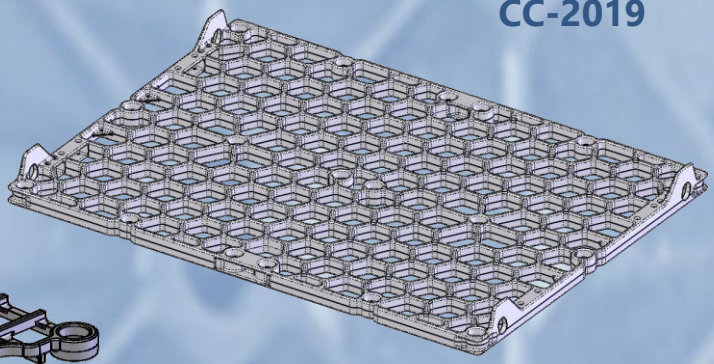
- Inherent strength of cast structure
- Assortment of trays and grids in various sizes and styles available
- Perfect for severe applications such as Water Quenching
- Improved efficiency with stackable designs
- Castalloy owned patterns available, short orders accepted
- Selected items held in stock for immediate delivery to customers worldwide



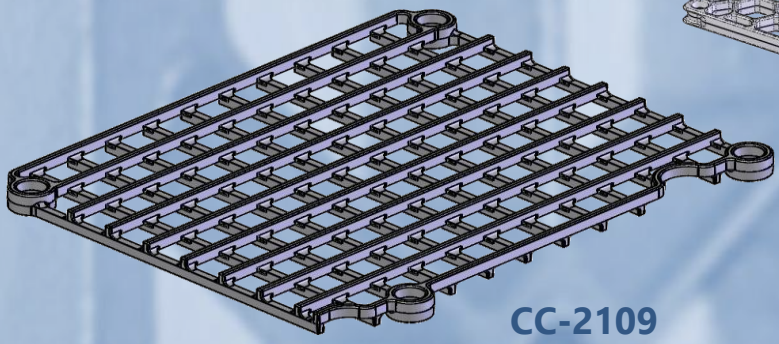
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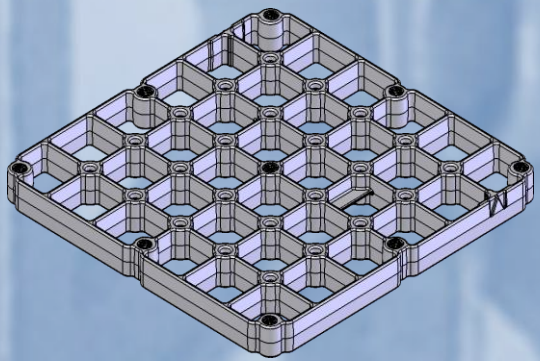
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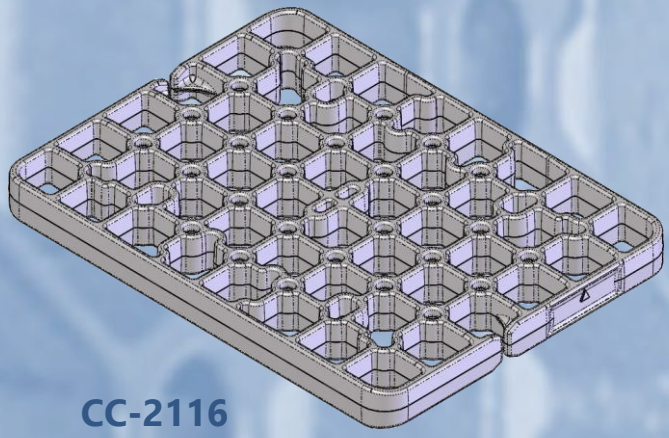
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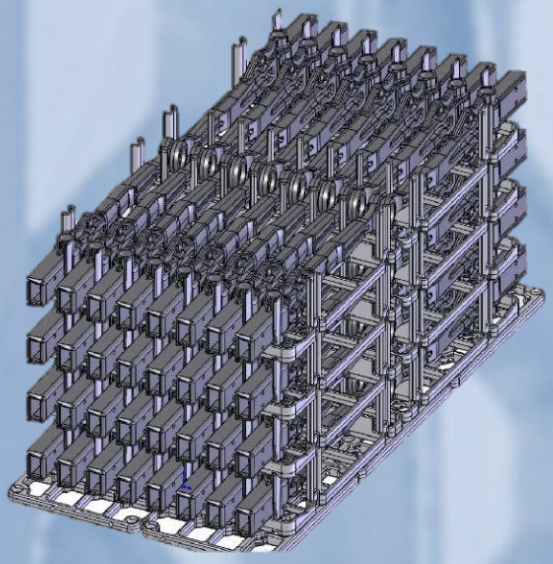
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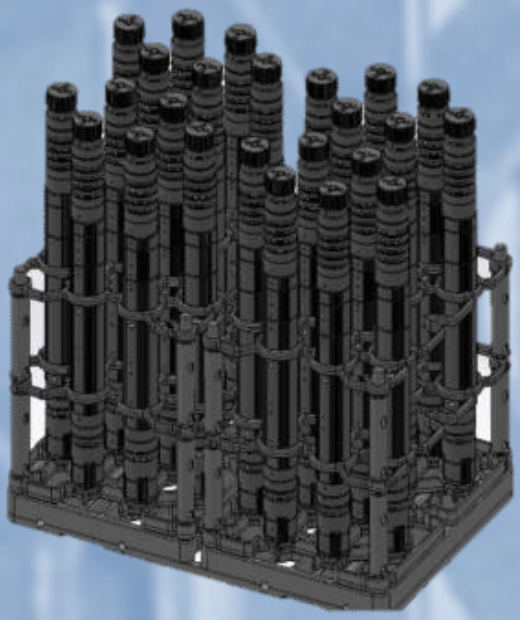


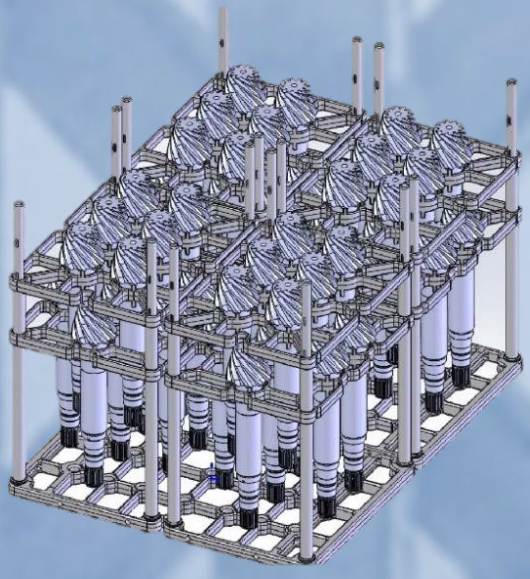
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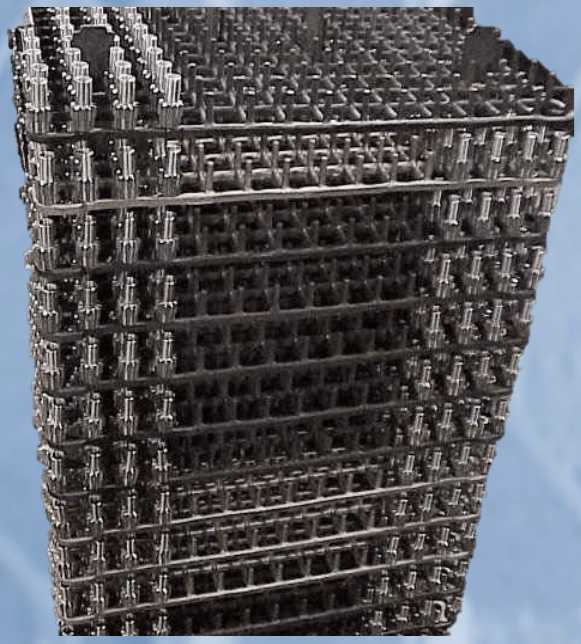
Custom Grids & Fixturing

- Inherent strength of cast structure
- Stackable designs
- Choice of alloys
- Minimize gear and shaft distortion in integral quench processes
- Utilize stackable designs to increase loading and improve productivity



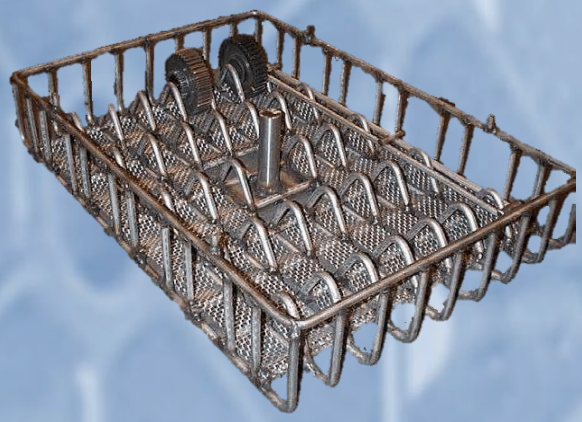




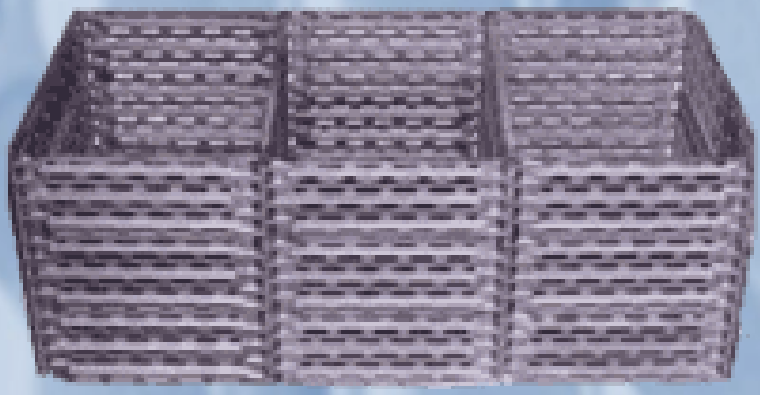


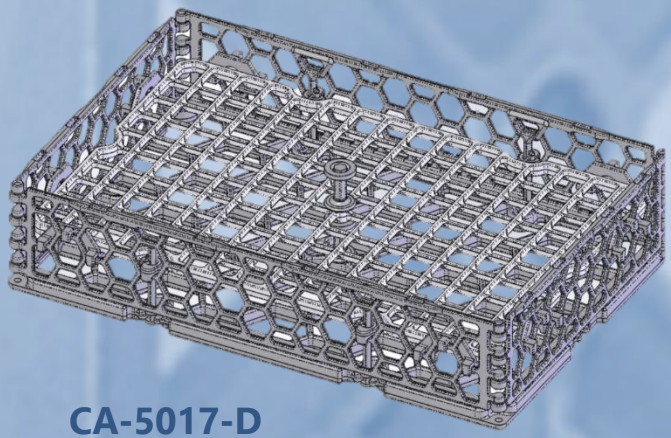
Cast Basket Assemblies

- Custom engineering available
- Extensive variety of standard and heavy duty cast baskets designed
- Multiple base designs and accessories
- Inherent strength of cast structure
- Choice of alloys
- Improved efficiency with light weight stackable designs



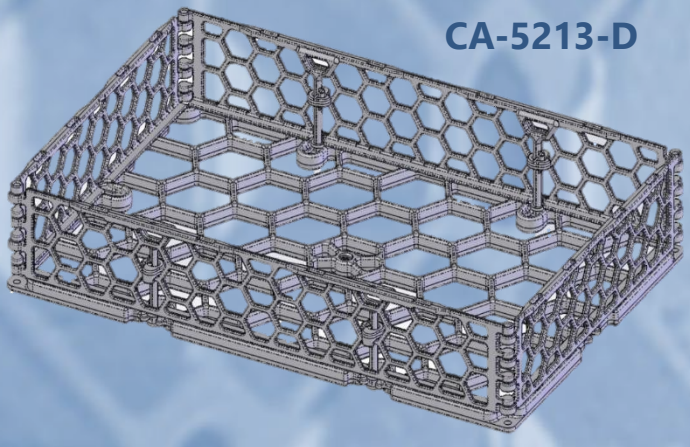






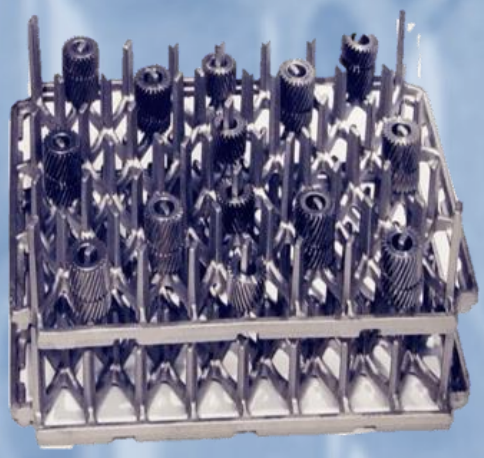
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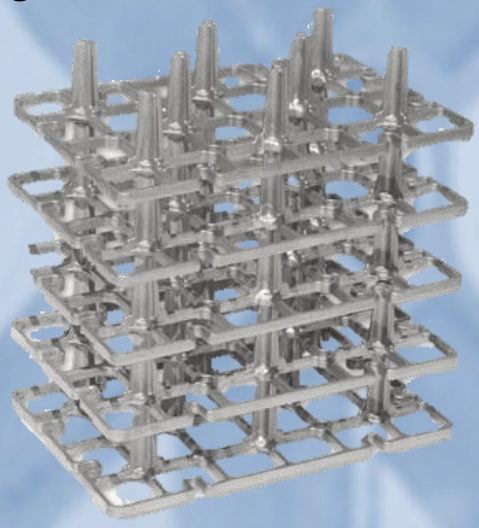
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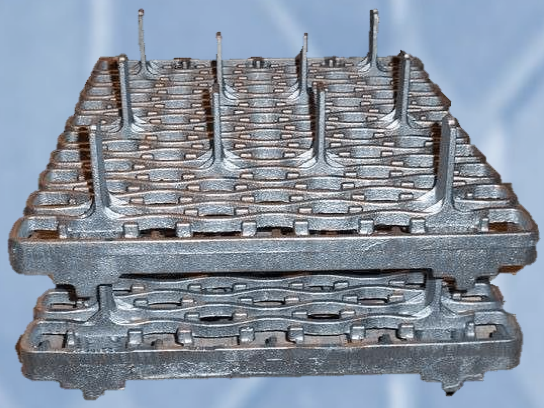


Lightweight Fixtures

- Inherent strength of cast structure
- Choice of alloys
- Increased load capacity and throughput
- Reduced energy consumption
- Increased fixture life
- Improved efficiency with stackable designs







Pit Furnace Applications

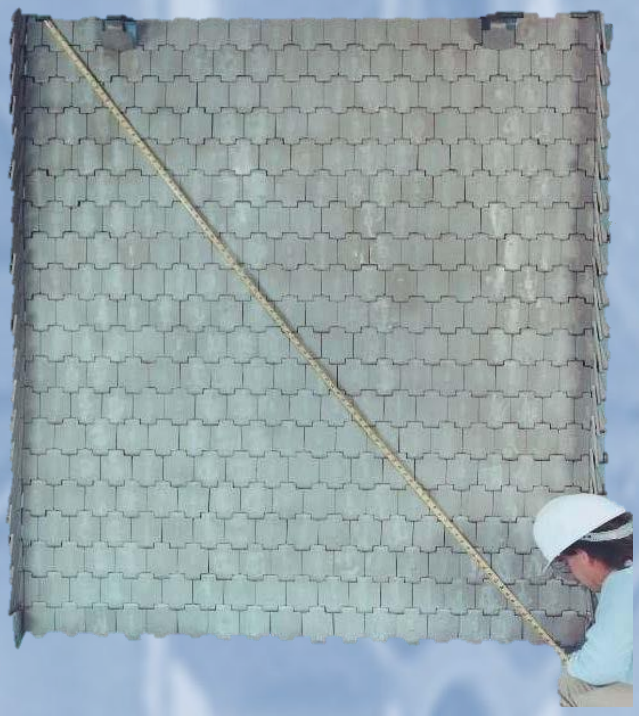
- Inherent strength of cast structure
- Choice of alloys
- Perfect for severe applications such as Water Quenching
- Improved efficiency with stackable designs





Cast Belt Links

- Multiple pitch sizes
- Choice of alloys
- Variety of pin diameters
- Standard and trunnion assemblies



Roller, Rails & Piers

- We can manufacture replacement parts such as roller rails, roller, chain guides, brackets, bends, extrusion dies etc.
- Choice of alloys
- Reverse engineering and design service offered







www.castalloygroup.com

Life Cycle & Recycling



- We support the sustainable use of metals
- Help minimize the negative impact on the environment and reduce carbon footprint
- Qualified metal waste can often be reused
- Help to recover and control your costs

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