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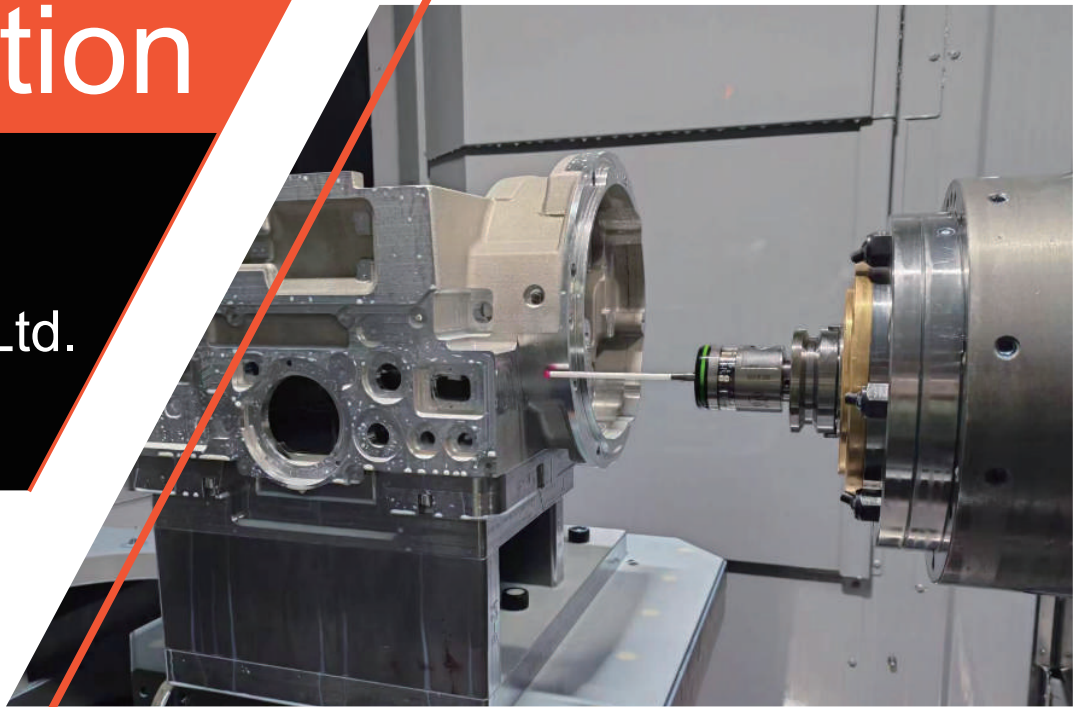
<https://www.casting-parts.net/>

Comapny address: Room 304, Building A3, Yijing
Industrial City, Guangming District, Shenzhen



Casting Case Introduction

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PRODUCT OVERVIEW

-
1. Casting requirements
 2. Processing difficulties
 3. Surface treatment
 4. Processing process

Risk and Difficulty Analysis

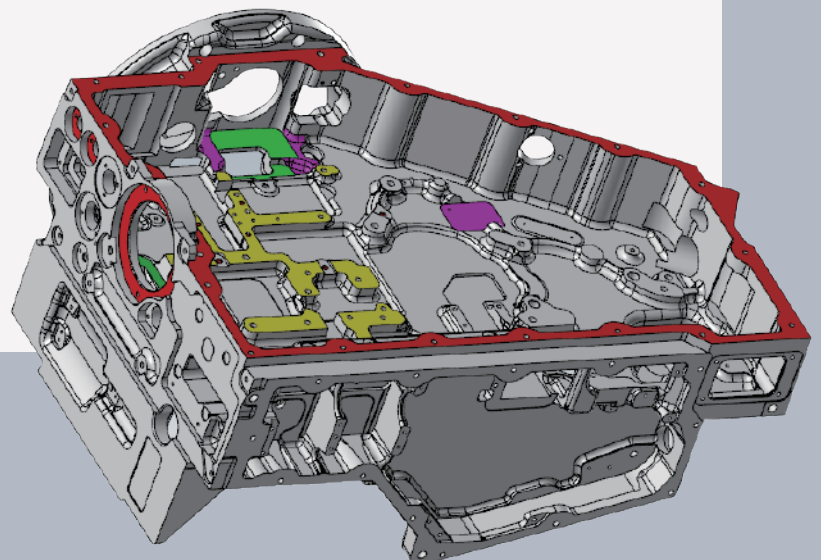
一. Casting requirements:

1. High and low temperature cycle standards.
2. Casting accuracy level 10-0-10-10 ГOCT 26645-85.
3. Heat treatment according to OCT3-5231-82 T1.
4. Raised areas or gouges of no more than 0.2 mm are allowed in the gate smooth area and surface matching/mold area.
5. According to ГOCT 26645-85.20 Scrape off the irregularities on the casting surface. The casting surface needs to be kept flat. If there are sand particles, they need to be smoothed.
6. The interface between the sand mold and the steel mold is allowed to be no more than 0.2 mm.
7. When designing the mold, analyze the subsequent process processing evaluation, increase the process step position, and ensure the reliability and stability of the product machining.

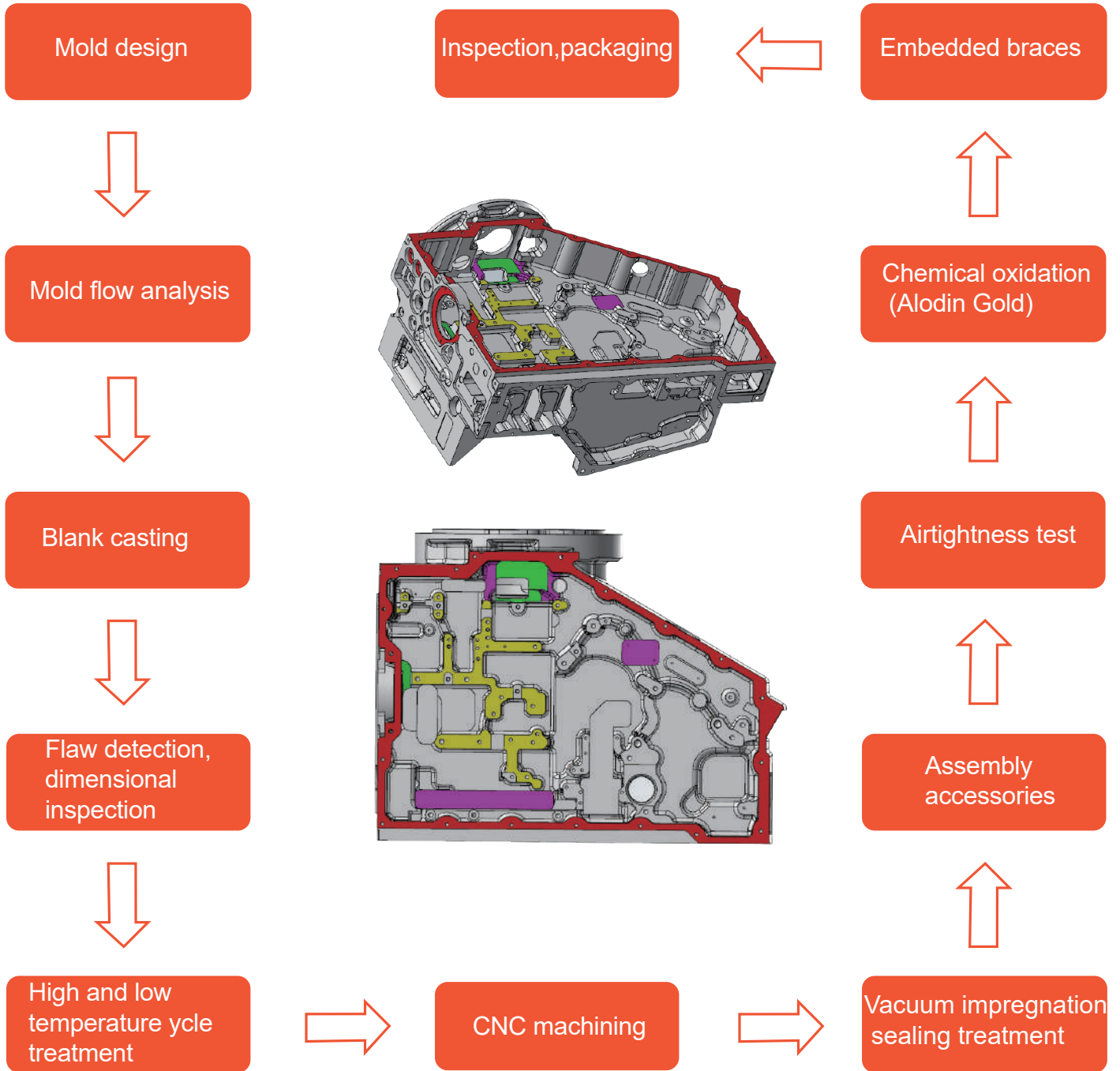
二. CNC processing: product complexity, multiple sizes and high precision requirements, high shape and position tolerance requirements, high requirements for processing equipment horizontal milling machine processing, high precision requirements for testing equipment and fixtures, and high quality requirements for operators.

三. Surface treatment: The product needs to be surface treated, which increases the difficulty of special process control.

四. Assembly and transportation: The process is long and the probability of damage during transportation operation increases.



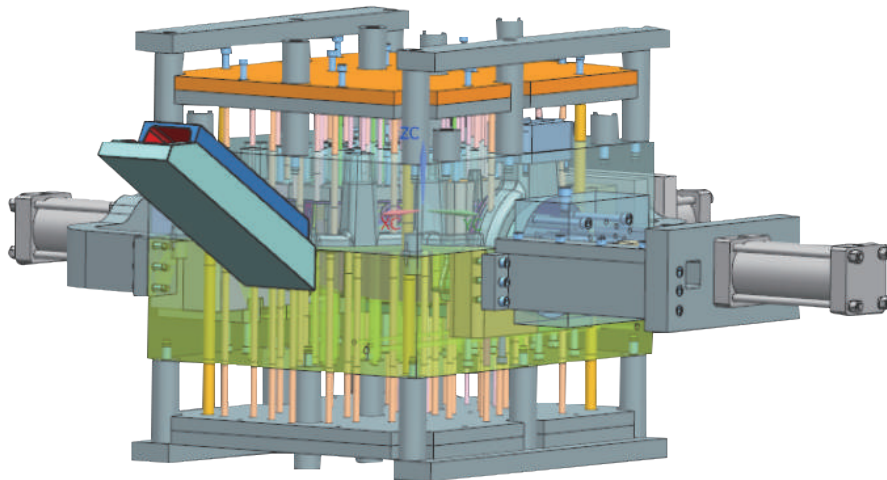
Processing process flow chart



Process flow

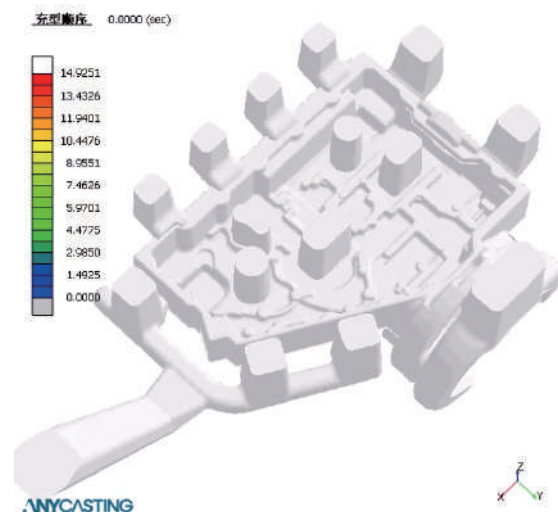
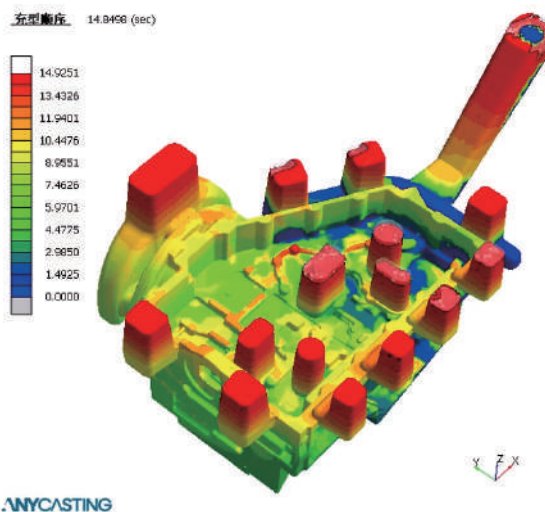
Mold design

According to the characteristics of this product, the problems that are likely to occur in product casting are fully considered in the mold design, such as pores, sand holes, sand loss, slag holes, shrinkage, cracks, deformation, bruises, cold shut, poor sand core, poor exhaust, crooked mold, and bulging mold.



Mold flow analysis

To reduce the risk of poor mold design, the software simulates the flow of the melt filling process, determines the reasonable gate and finds the best feed port position, optimizes the pouring system design, makes the molten material achieve the best flow balance, understands the mold temperature and cooling conditions, analyzes whether defects such as warping, shrinkage, and dents will occur in the product, analyzes the location of trapped air in the melt during the filling process, optimizes the exhaust system, analyzes and changes the product thickness, etc.

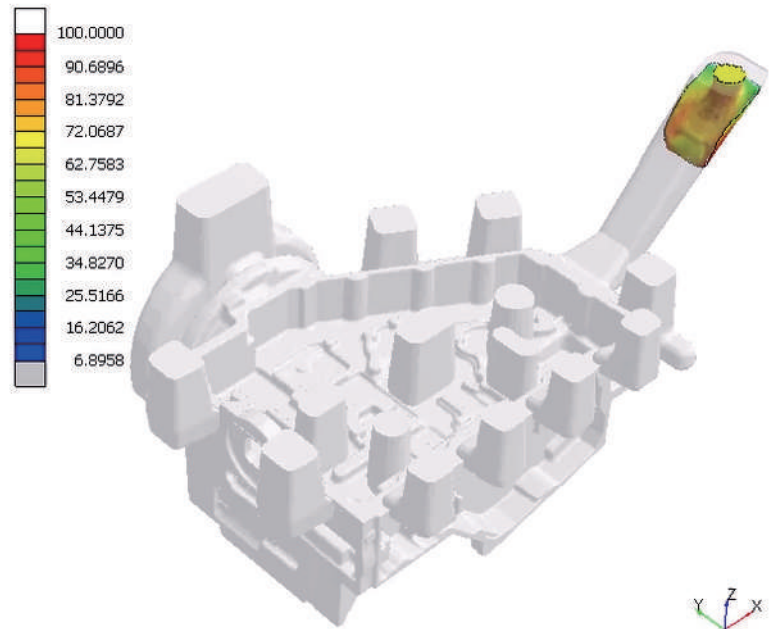


FILLING ANALYSIS

Filling analysis-filling speed

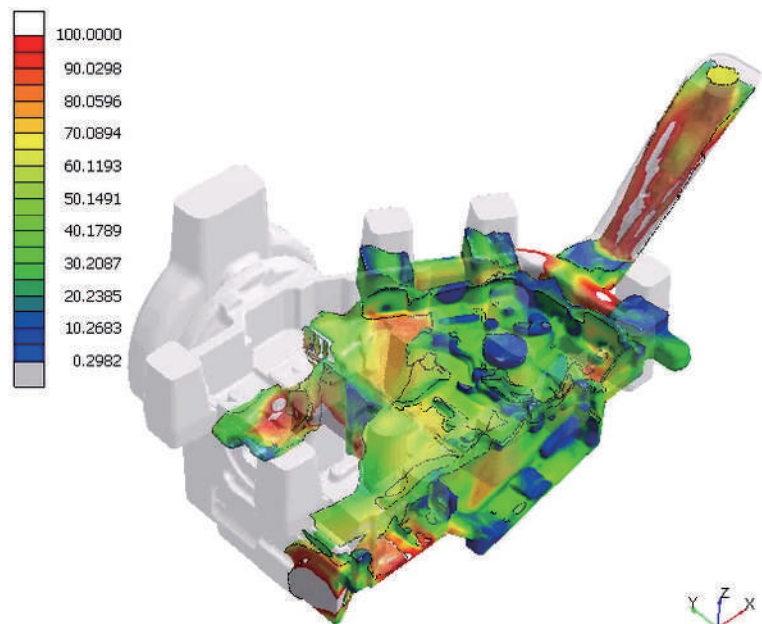
The filling speed of aluminum liquid in the casting is less than 1m/s, and turbulence is not easy to occur when the cavity is filled.

速度 时间: 0.150329(sec) 充型: 1.00(%) 凝固: 0.00(%) (cm/sec)



ANYSYSTEM

速度 时间: 4.20041(sec) 充型: 28.00(%) 凝固: 0.00(%) (cm/sec)



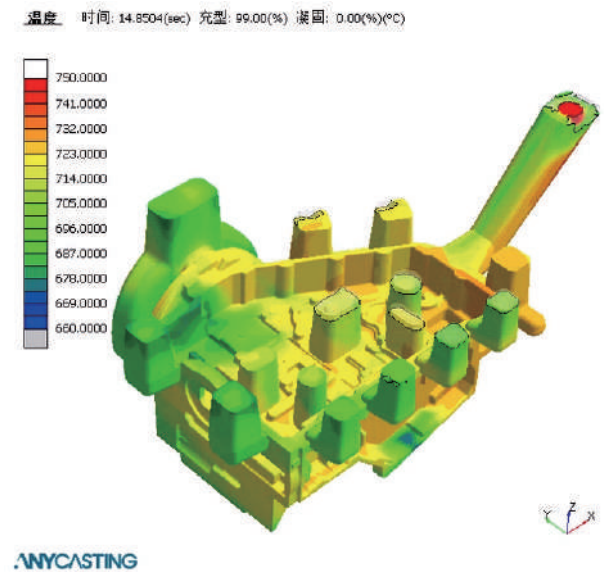
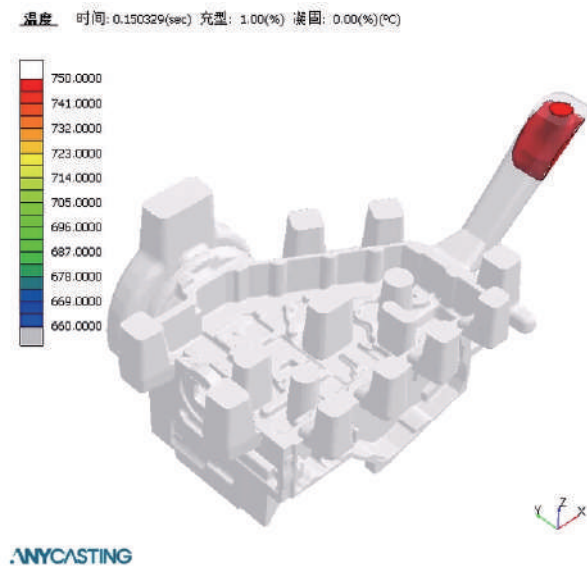
ANYSYSTEM

PROCESS
FLOW

FILLING ANALYSIS

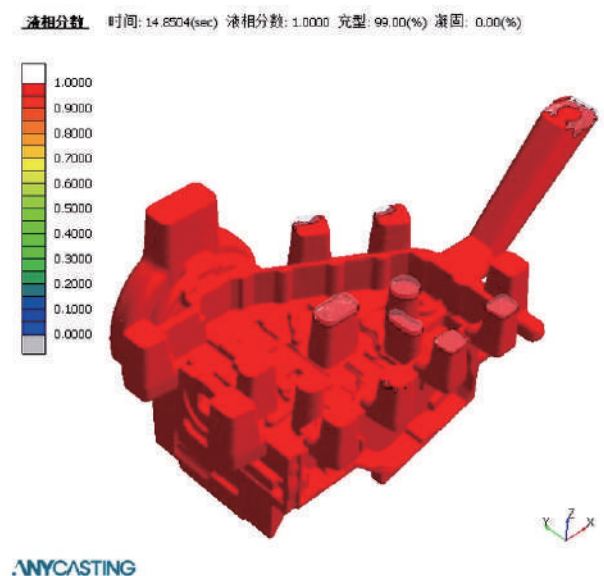
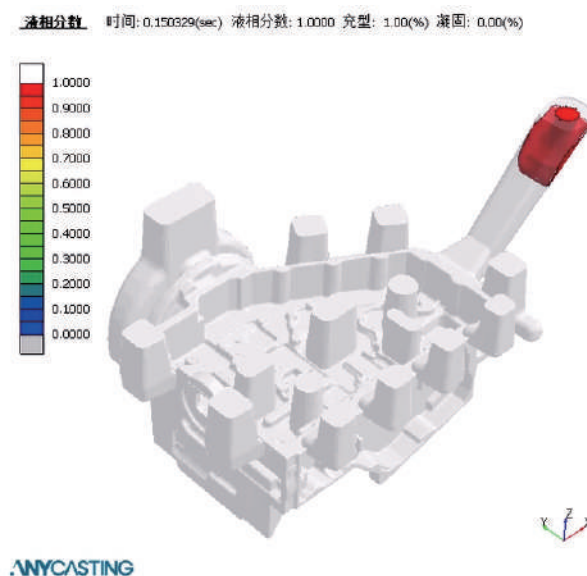
Filling analysis-filling temperature

During the filling process, the casting temperature drops by about 90°C , which is above the liquidus temperature. There is no problem of cold shut and insufficient pouring. It is recommended that the pouring temperature (750°C) can be adjusted to about 710°C - 720°C .



Filling analysis-liquid fraction

The liquid fraction is 1 during the filling process, indicating that there is no problem of cold shut and insufficient pouring during filling.



PROCESS FLOW

Liquid aluminum

During the smelting process of aluminum liquid, various reasons may cause the alloy composition to change, such as melting speed, metal inclusions, charging sequence, purity of the furnace body, etc.

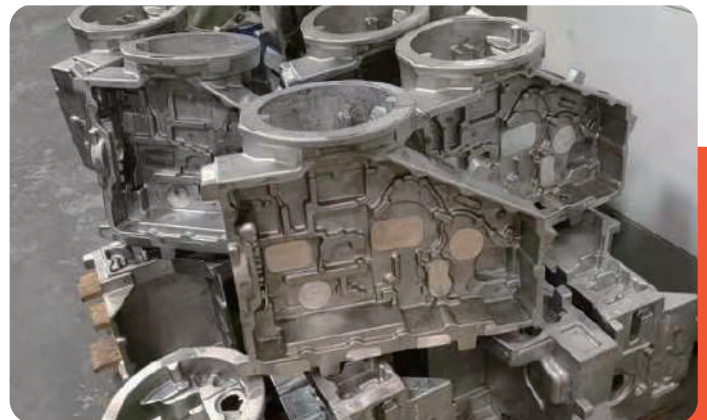
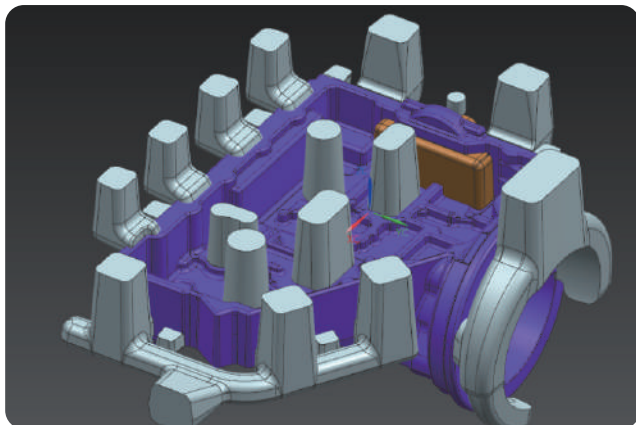
During the manufacturing process, the element composition and gas content will be checked.



Blank casting

After the casting blank comes out, the sprue is sawn and shot peened. Shot peening can clean the surface sand and oxide layer,

remove tiny burrs and oil stains on the surface increase surface adhesion, and make the surface beautiful and uniform.

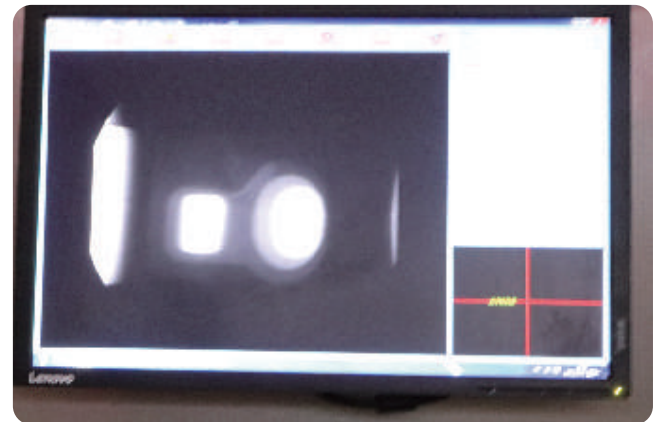
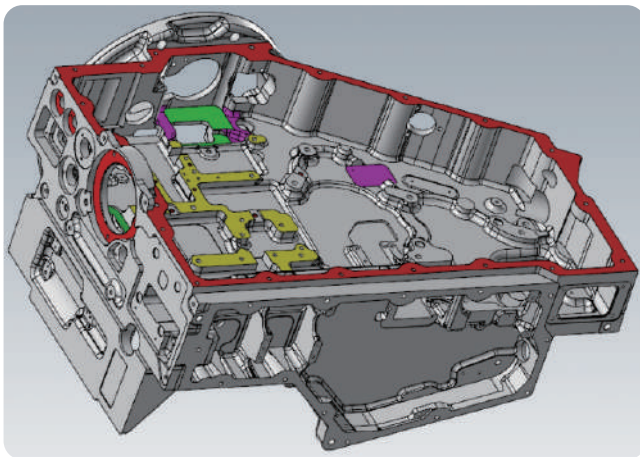




X-ray flaw detection

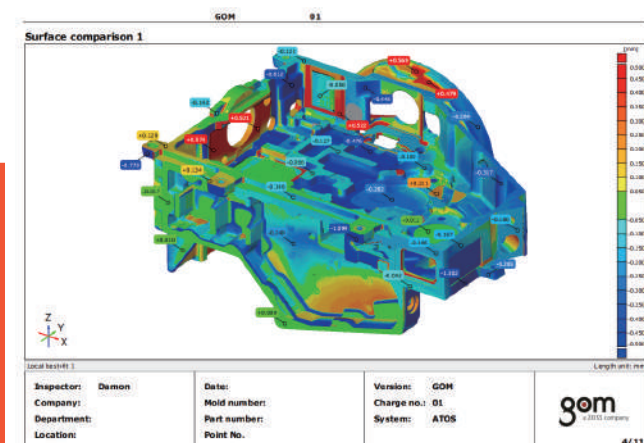
X-ray routine internal inspection

- Check for internal cracks, if there are any, they will appear as light lines.
- Check for large internal bubbles, if there are any, they will appear as white dots.
- Check if the density is loose, if there are any, they will appear as light clouds or filaments.
- Check if the material has slag inclusions, if there are any, they will appear as dark blocks.



Sample structural feature inspection

GOM3D blue light scanning comparison inspection

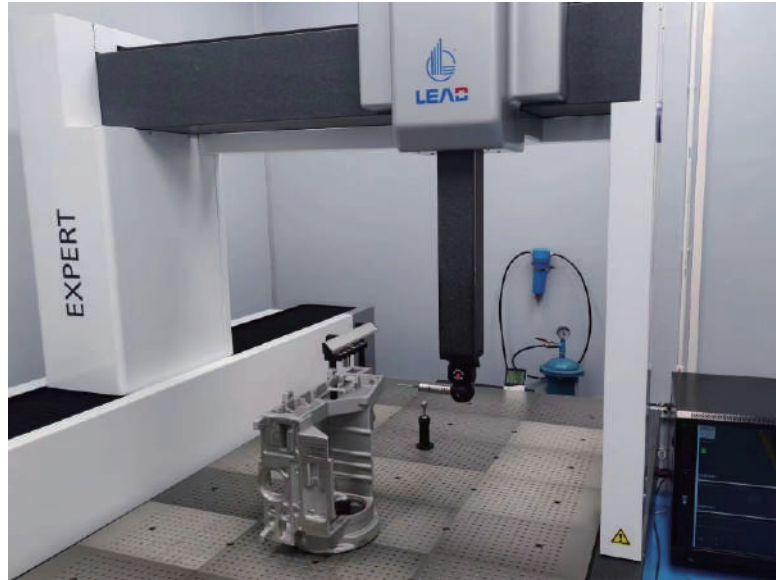


GOM3D blue light scanning inspection:

- Sample structural feature inspection and comparison.
- Full-size inspection, quality inspection and efficiency improvement.
- Dimension data can be traced and queried, greatly improving the convenience and efficiency of inspection.

Blank size inspection

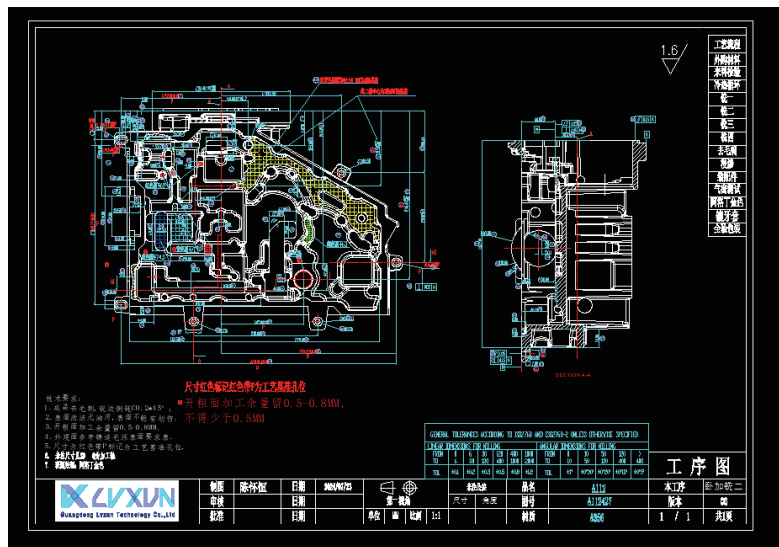
The three-dimensional 3D inspection of the casting blank surplus can prevent the blank surplus from being insufficient after processing, reduce working hours and improve product yield.



CNC machining process splitting, process flow production

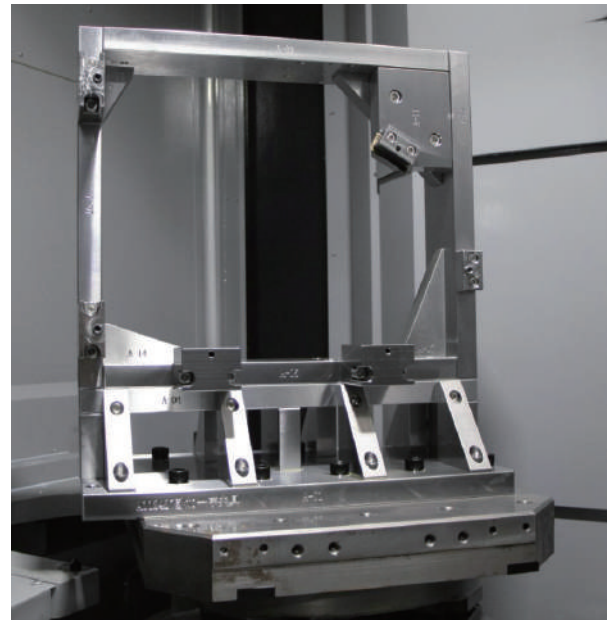
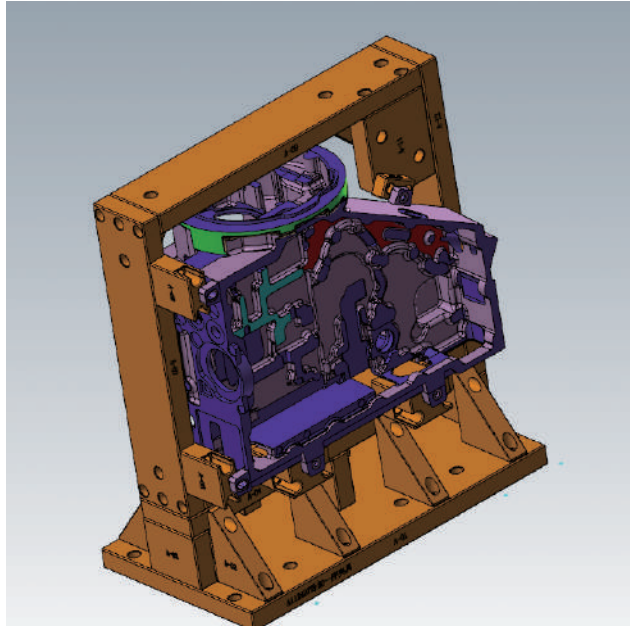
The splitting of processing procedures follows the principle of process concentration, reduces the number of procedures, shortens the process route, simplifies production planning and production organization; reduces the number of workpiece clamping times, ensures the relative position accuracy between the processing surfaces, reduces the number of fixtures and the number of clamping times, and reduces the risks brought by processing sequence transfer.

PROCESS
FLOW



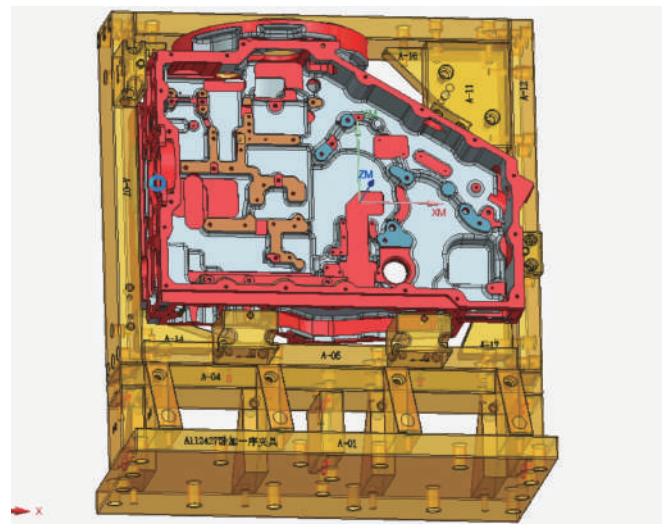
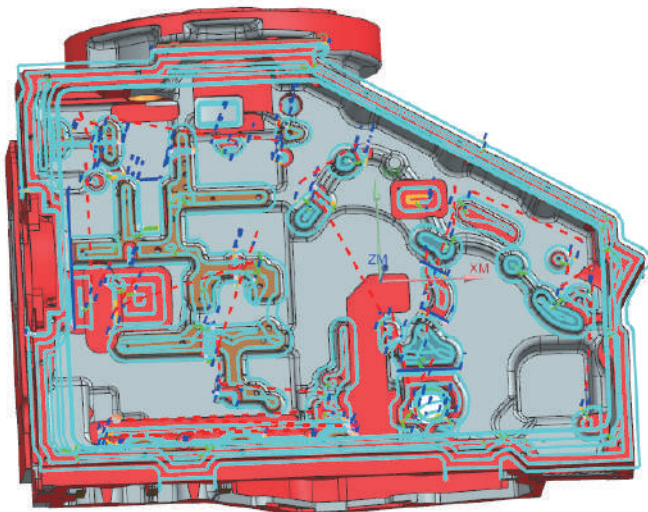
CNC machining fixture design

Design screw locking fixtures, design process steps based on the complex structural characteristics of the product, and use horizontal machining to process multiple surfaces at one time to ensure geometric tolerances and dimensional stability. It is easy to operate and ensures the stability of repeated clamping in mass production.



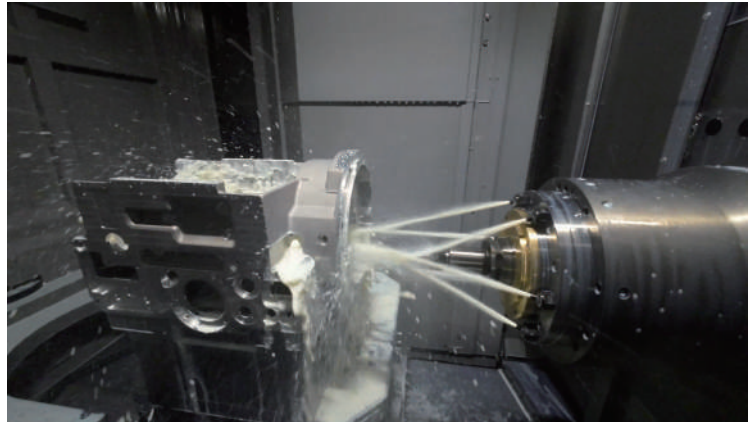
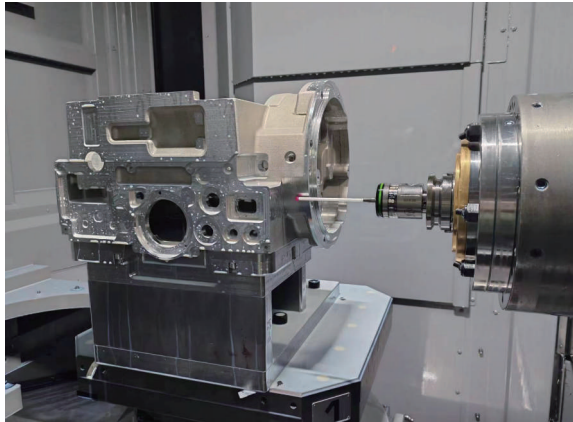
CNC machining program tool simulation verification

Rapid simulation verifies tool path safety, checks overcutting and empty cutting. Optimize tool path sequencing and tool path mode, optimize tool feed, tool speed, and cutting allowance according to product tolerance, avoid chatter marks and burrs during processing, and ensure product dimensional stability.



CNC fixture online measurement and processing

Use probes to quickly measure size and position, avoiding disassembly of products for testing during processing, and errors caused by repeated clamping and repeated positioning. Use high-precision zero-point fixtures to reduce clamping risks caused by process conversion.



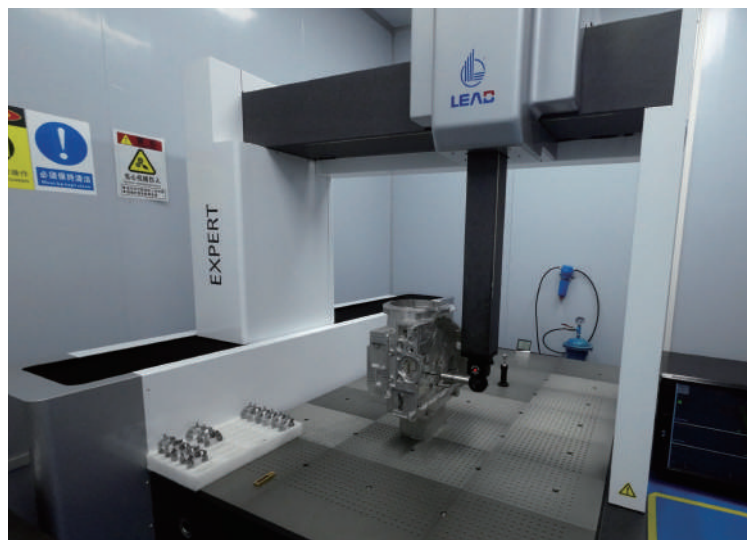
Air tightness test, leakage

The pressure range for air tightness testing is usually determined by the type and design of the product. The pressure range should be within the product's tolerance range and should not exceed the standard value. It is necessary to select the appropriate pressure range according to the actual situation and conduct rapid testing to ensure the accuracy and reliability of air tightness testing.



Special zero-point fixture 3D CMM auxiliary detection

Zero-point fixture three-dimensional auxiliary measurement reduces data errors caused by different measurement positions, methods, and measurement personnel.



Vacuum immersion sealing treatment

Vacuum impregnation sealing


During the manufacturing process of die-casting parts, a large number of micropores, sand holes, cracks, etc. are inevitably formed due to residual pores, crystal shrinkage and other reasons. The scrap rate of products through impregnation is almost zero, greatly saving costs reducing resource waste, and improving yield.





Nest shape

If the nest holes in die-cast products are classified, they can be divided into three different types.

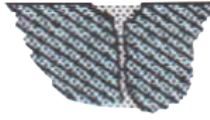
- ① The nest holes that are closed inside are processed by cutting. If these nest holes appear on the surface, it will cause problems.


- ② These nested holes with blind holes on one side will cause bubbles to form during electroplating and coating.



- ③ A nest of holes connected on both sides of a workpiece. In this case, when internal pressure is applied, the wall will be penetrated, resulting in pressure leakage.



The most serious problem is the last nest hole connected on both sides. In addition, the size of the nest hole shown in the picture may not match the actual size on the surface.

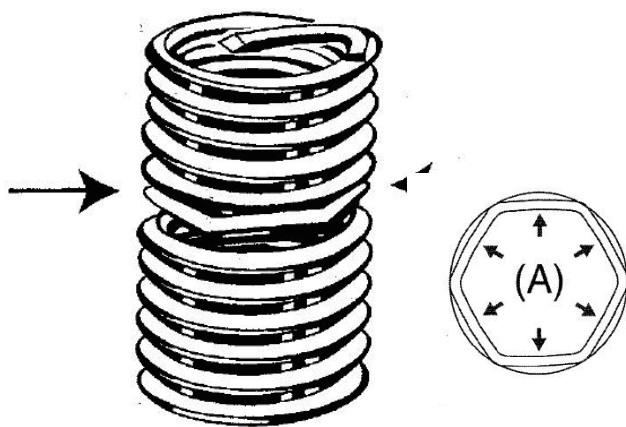


A nest hole with a large surface size will also become smaller inside, and the opposite is also true. Of course, either way will cause pressure leakage.



Chemical oxidation (Alodin gold)

Alodine Gold Treatment is a surface treatment technology mainly used on the surface of aluminum alloys and their alloys, which forms a protective film by immersing the aluminum surface in a chromate solution to produce a chemical reaction. This treatment can provide a variety of advantages, including improved corrosion resistance, enhanced paint adhesion, environmental protection, wear resistance, and maintaining the thermal and electrical conductivity of the metal.



Inspection


Locking Helicoil Inserts Features

Interlocking helicoil inserts consist of a series of interlocking chords of uneven design. As the screw moves through the insert's interlocking chords, it causes the wires to bend, as indicated by the inner arrows (A). This bending causes the insert to press against the bolt, resulting in repeated locking. This pressure is concentrated against the wall of the threaded portion of the screw, maximizing the contact area. Locking inserts maintain torque over multiple screw installation cycles.



Inspection

Quality inspection is divided into structural dimension report and appearance report. We have established a traceability system and ERP system to ensure customer traceability requirements.

Product Structure Report 产品结构报告						
	Part ID	A112428		Operator	Admins	
	Part SN			Phone		
	Time	2024/8/30 13:15		Remark		
271 MM/ASME Y14.5M						
	NOM	ACT	DEV	-TOL	+TOL	OUTTOL
DistB	95.0000	94.9509	-0.0491	-0.3000	0.3000	OK
272 MM/ASME Y14.5M						
	NOM	ACT	DEV	-TOL	+TOL	OUTTOL
DistB	47.0000	47.1810	0.1810	-0.3000	0.3000	OK
273 MM/ASME Y14.5M						
	NOM	ACT	DEV	-TOL	+TOL	OUTTOL
DistB	27.0000	26.9994	-0.0006	-0.2000	0.2000	OK
274 MM/ASME Y14.5M						
	NOM	ACT	DEV	-TOL	+TOL	OUTTOL
DistB	32.5000	32.4795	-0.0205	-0.3000	0.3000	OK
275 MM/ASME Y14.5M						
	NOM	ACT	DEV	-TOL	+TOL	OUTTOL
DistB	17.0000	17.0075	0.0075	-0.2000	0.2000	OK
276 MM/ASME Y14.5M						
	NOM	ACT	DEV	-TOL	+TOL	OUTTOL
DistB	54.0000	53.8733	-0.1267	-0.3000	0.3000	OK
277 MM/ASME Y14.5M						
	NOM	ACT	DEV	-TOL	+TOL	OUTTOL
DistB	1.0000	1.0264	0.0264	-0.1000	0.1000	OK
278 MM/ASME Y14.5M						
	NOM	ACT	DEV	-TOL	+TOL	OUTTOL
DistB	11.0000	10.9337	-0.0663	-0.2000	0.2000	OK
279 MM/ASME Y14.5M						
	NOM	ACT	DEV	-TOL	+TOL	OUTTOL
DistB	220.0000	219.8568	-0.1432	-0.3000	0.3000	OK
280 MM/ASME Y14.5M						
	NOM	ACT	DEV	-TOL	+TOL	OUTTOL
DistB	151.0000	151.0345	0.0345	-0.3000	0.3000	OK