

Surface magnetic 3D vector detection equipment Product Brochure

1.Introduction

Product name

Surface Magnetic 3D Vector Detection Equipment

Product introduction

In the field of magnetic performance testing, traditional one-dimensional probe technology is limited in that it can only detect the strength of the magnetic field in a single direction. When the magnetic field is parallel to the Hall effect chip, the one-dimensional probe cannot accurately capture the magnetic field information. This is a significant shortcoming when testing products with extremely high magnetic performance requirements.

To address this challenge, we have introduced the surface magnetic three-dimensional vector magnetic detection device. By integrating magnetic field probes in the X, Y, and Z directions, it can fully capture and synthesize three-dimensional vector information of the magnetic field. This innovative detection method not only provides a more detailed and comprehensive magnetic field analysis, but also intuitively displays the direction and intensity of the magnetic field, giving the detection process a stronger sense of three-dimensionality and intuitiveness.



2. Advantages of 3D detection technology

2D vs. 3D

Comparison Item	Two-dimensional surface magnetic detection platform (X direction)	Three-dimensional surface magnetic detection platform (X/Y/Z direction)
Collection direction	Only the X-direction magnetic field component can be measured	Can simultaneously measure the magnetic field components <u>in the X/Y/Z directions</u>
Magnetic field information acquisition	Incomplete, ignoring normal or tangential components	<u>Three-dimensional and complete</u> magnetic field information
Defect Identification	Defects that are confined to a specific direction or have significant variations in intensity	Easier to identify <u>complex, subtle, and angled</u> defects
Application	Suitable for simple magnetic rings and sheet workpieces	<u>magnets, permanent magnets, special-shaped parts</u> , etc. with complex changes in three-dimensional magnetic fields

2. Advantages of 3D detection technology

1. More comprehensive magnetic field imaging

X, Y, Z) of each detection point can be constructed ;
The magnetic field distribution is closer to the actual working magnetic circuit, making it easier to judge whether the product quality meets the usage scenario.

2. Stronger defect detection capabilities

It can identify problems such as tilted magnetic circuit, demagnetization, eccentricity, magnetic short circuit, etc. that are difficult to detect with two-dimensional detection; Improve early warning capabilities to avoid problems in later assembly or shipment.

3. Higher product sorting accuracy

Three-dimensional characteristic parameters can be used for more detailed grading and sorting;
When customers have refined requirements for magnetic fields (such as drive motors, servo magnets, etc.), it can provide higher consistency and performance controllability.

4. Support more detection strategies and algorithms

Advanced algorithms such as magnetic field direction angle analysis, vector deviation analysis, and spatial symmetry analysis can be developed;
Supports linkage with simulation models to improve R&D verification efficiency.

5. Enhance the added value of customer products

Customers can demonstrate higher-standard testing capabilities to end customers and enhance their brand image.

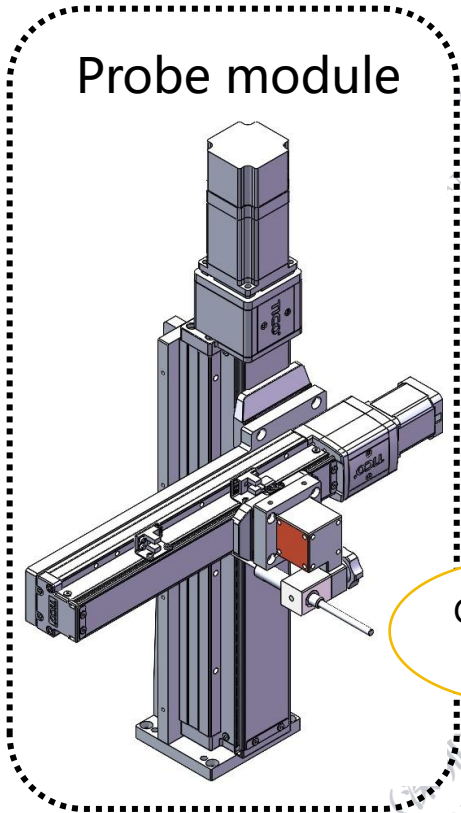
For example:



[Surface magnetic two-dimensional detection] The magnetic field of a certain magnet is normal when measured in the X direction, but there is actually a significant abnormality in the Y direction due to angle deviation , **which is completely missed by the two-dimensional detection.**

【Surface Magnetism Three-Dimensional Detection】 Simultaneous detection of XYZ axes can not only see the X -direction value, but also find abnormal signals in the Y and Z directions, **and judge problems such as magnetic steel tilt or tooling offset.**

3. Dimensions



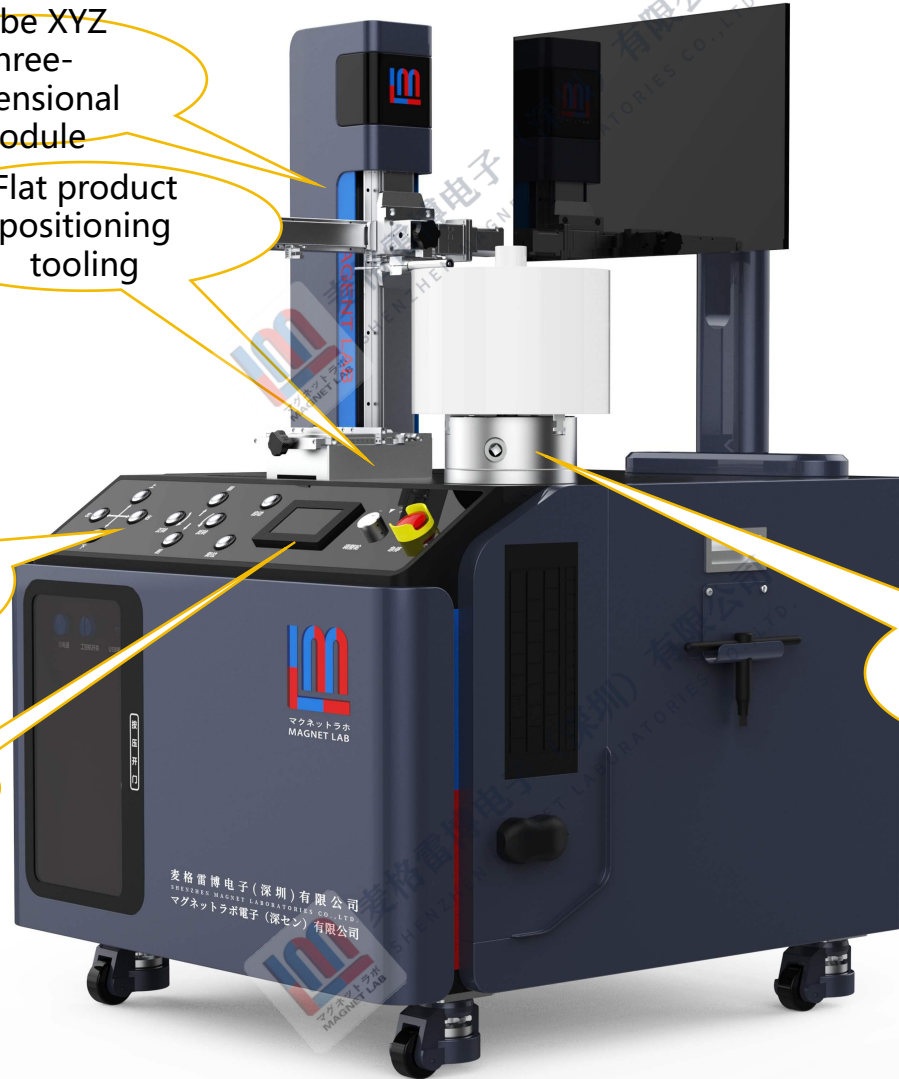
Probe module

Probe XYZ three-dimensional module

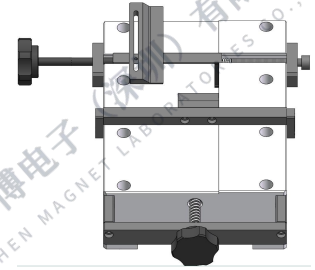
Flat product positioning tooling

Operation panel

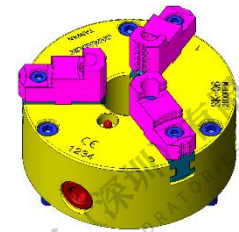
HMI



Plane fixture

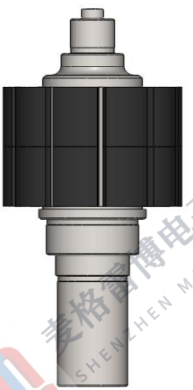


Three-jaw chuck

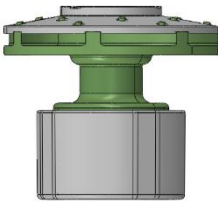


Product fixing chuck + rotating mechanism

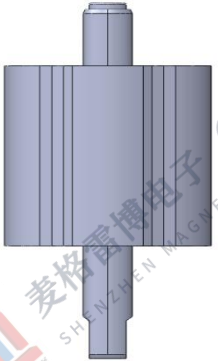
4.Application Scenario



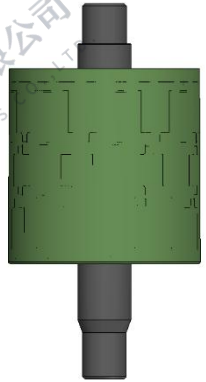
Servo/stepper motor rotor surface magnetism



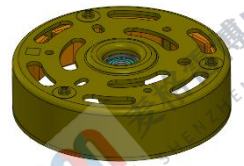
Water pump motor Rotor surface magnetism



Oil pump motor Rotor surface magnetism



EPS motor Rotor surface magnetism



Fan motor Stator surface magnetic



BLDC Motor stator surface magnetic



Planar multi-pole magnet surface magnetism



Multi-pole encoder magnetic ring surface magnetic

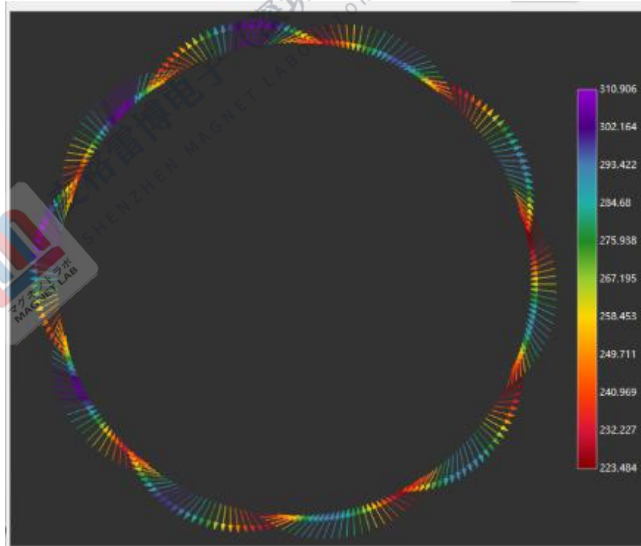


Linear magnetic grating surface magnetic

5. Features

1. More intuitive display

3D vector diagram, intuitively showing the distribution of magnetic field strength and direction



2. Rich software interface graphics

Can provide waveform diagram, 2D diagram, 3D diagram, 3D vector diagram, polar coordinate diagram, FFT (spectrum diagram)

3. Real-time display of detection data

MAGNET DETECTING

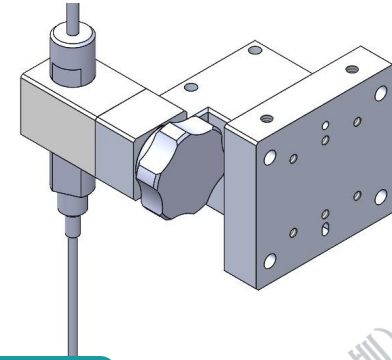
magnet	Bx(mT)	By(mT)	Bz(mT)	current Position	X(mm)	Y(mm)	Z(mm)	U(°)
	0	0	0		0	0	0	0
probe	Distance	Temp(°C)		target Position	X(mm)	Y(mm)	Z(mm)	U(°)
	1.0	22.5			1.1	1.2	1.3	360

4. High detection accuracy

Adopt DMT 3D Gaussmeter + 3D probe, accuracy $\pm 0.5\%$ FS



5. The probe can realize axial/radial switching



6. Probe anti-collision protection

The probe has automatic deceleration function for approaching products (anti-collision protection) and stroke protection function



5. Product Features

7. Simple motion programming

You can easily obtain the product detection



8. You can choose the judgment conditions



9. Wide compatibility

Can detect both round products and straight products (waveform, extreme width, peak)

Round products - chuck positioning:

Outer diameter $\varphi \leq 260\text{mm}$

Height $\leq 180\text{mm}$

Weight $\leq 14\text{KG}$

Shaft diameter $\varphi 2-90\text{mm}$, shaft length $10-65\text{mm}$

Plane / Linear Products——Jig Positioning:

100mm long

Width 40mm

Height 1.5-30mm

Weight $\leq 20\text{KG}$

6. System Configuration List

project	model	quantity	unit	brand
Three-dimensional surface magnetic detection platform	MAS-3DV-CB-LAB-01A	1	tower	Maglab
3D magnetic surface software	3DMS-1.0	1	set	Maglab
Three-dimensional Gaussmeter	TM-4300	1	tower	DMT
3D probe	3DP-1315	1	individual	DMT

7. Parameters of 3D surface magnetic detection platform

project	Technical Parameters
Input power	AC220V±5% 50/60Hz
Input current	< 20A
Rated power	< 2KW
Detection beat	Round products ≤ 8s/ layer, flat / straight products ≤ 10mm/s (speed adjustable)
Positioning accuracy	XYZ axis repeat positioning accuracy ≤ ±0.02mm ; rotation axis positioning accuracy ≤ ±0.05mm
Detecting repeatability errors	± 1% ± 0.5mT
Compatibility	Round product outer diameter φ ≤ 260 mm , height ≤ 180 mm , weight ≤ 14 kg Flat / linear products: 100mm long , 40mm wide , 1.5-30mm high , weight ≤ 20KG
Chuck clamping range	Clamping side shaft diameter φ 2-90mm , shaft length 10-65mm
Amount of collected data	≥ 36,000 points
Equipment noise	≤ 75dB
Device body color	Dark gray RAL7015
size	Width, depth and height (mm): 860*930*1246
weight	About 100Kg
Main functions	<ol style="list-style-type: none">1) Can display FFT , two-dimensional data graph, parameter data analysis chart2) Calculate its zero crossing point, peak value, area, angle, slant polarity angle, torsion angle, and plane angle data, and perform FFT/THD analysis on the data to obtain the spectrum data graph3) The vectors of each point are calculated based on the data and saved in correspondence with the mechanical coordinate system4) The motion control card controls the XYZU four-axis motion and obtains its position feedback5) Motion control module provides manual control function6) Provides functions such as software language pack, version management, log printing, and operating condition detection

8. 3D Gaussmeter Parameters

project	Technical Parameters
Input power	AC100V -220V $\pm 10\%$ 50/60Hz approximately 15VA
Measuring channel (axis)	3 channels (X- axis, Y- axis, Z- axis)
Range gear	40mT/400mT/4T
show	4 digits
Frequency characteristics	DC~500Hz/-3dB
Accuracy	$\pm 0.5\%/FS$ or less than 0.5% of the reading value
Operating temperature range	0~40 °C
Temperature coefficient	0.06%/ °C (TYP)
Communication interface	RS-232C (9600bps fixed)
Dimensions	260W*162H*350D (mm)
weight	About 3Kg

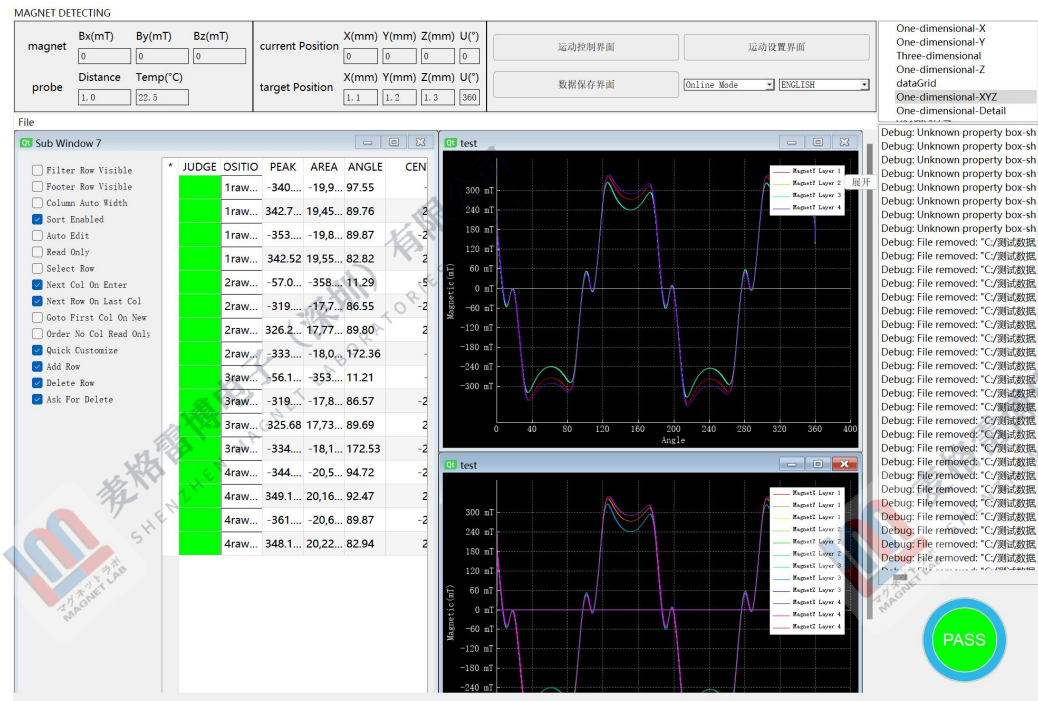


Gaussmeter appearance

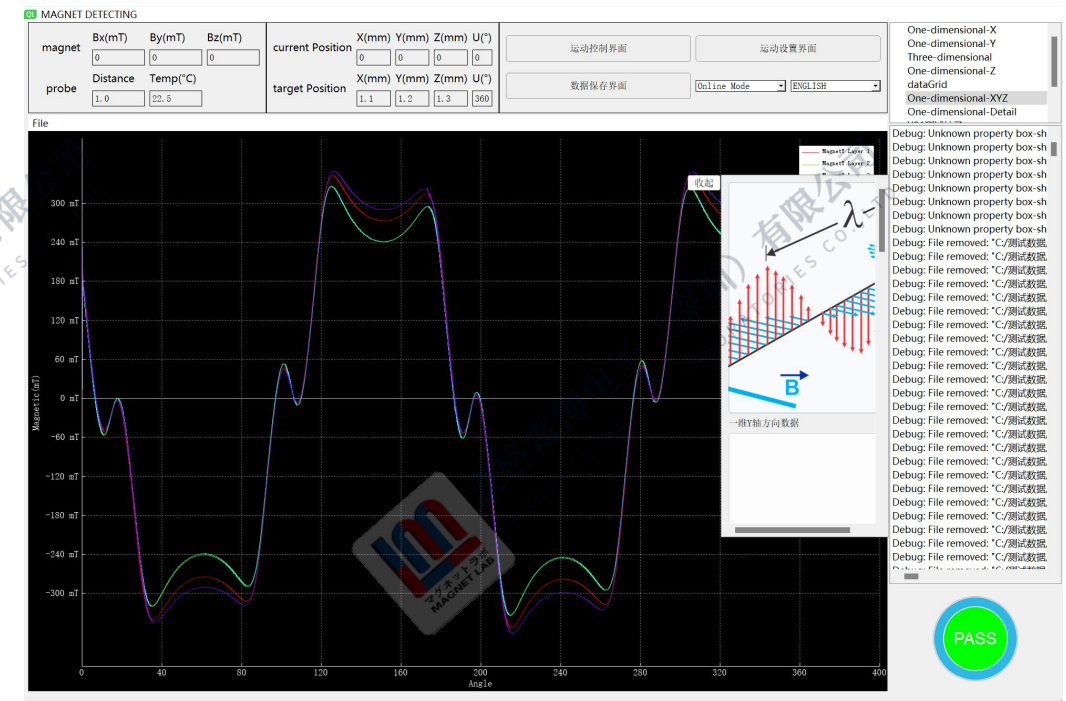


Probe dimensions

9. Table magnetic software interface

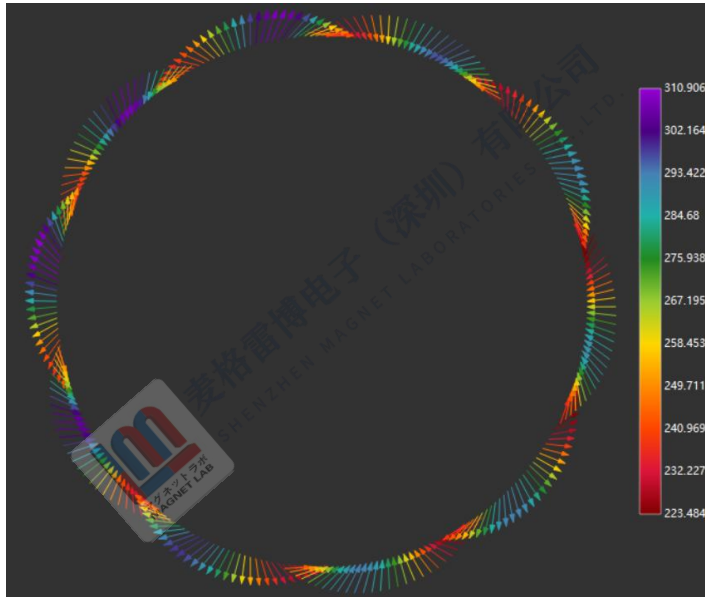


Main interface

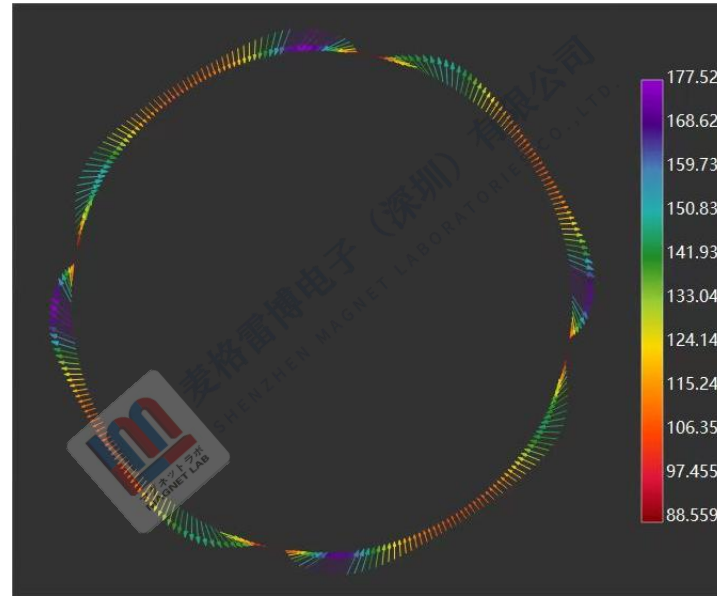


Main interface with sidebar

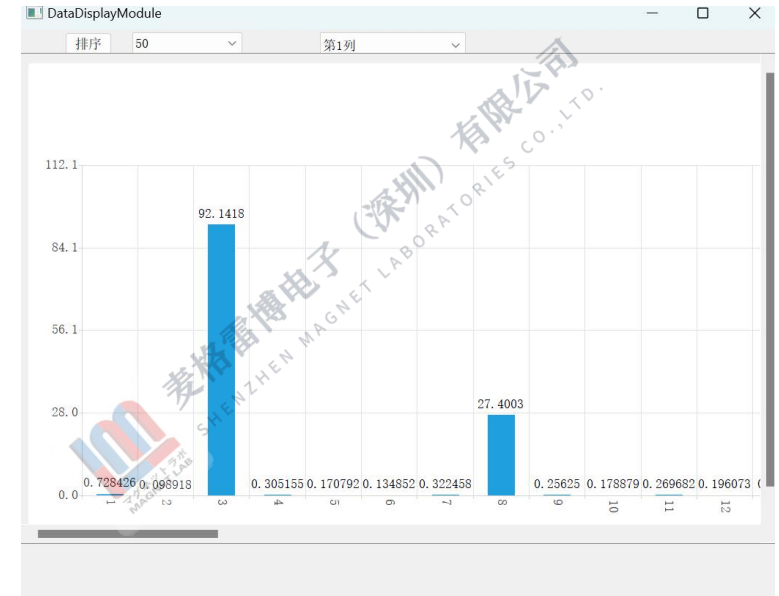
9. Table magnetic software interface



10-pole magnetic ring
2D magnetic vector
diagram

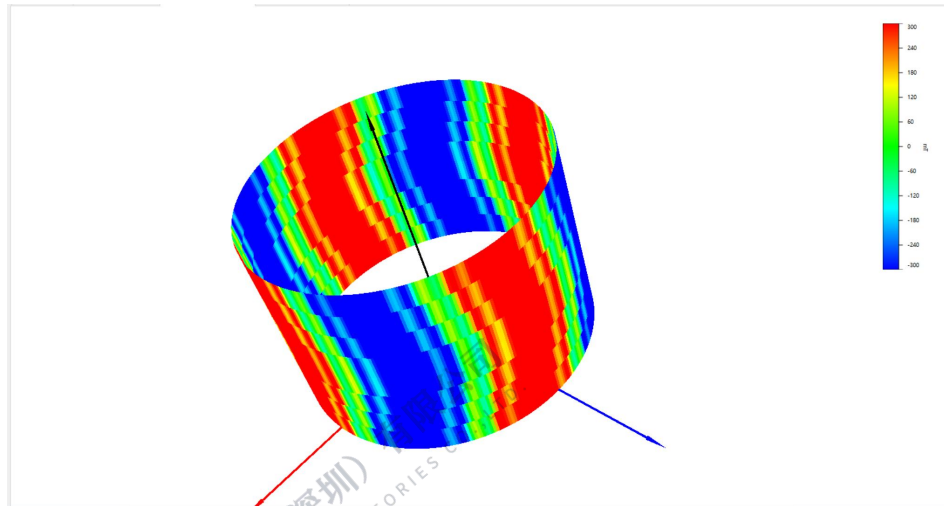


4-pole magnetic ring
2D magnetic vector
diagram

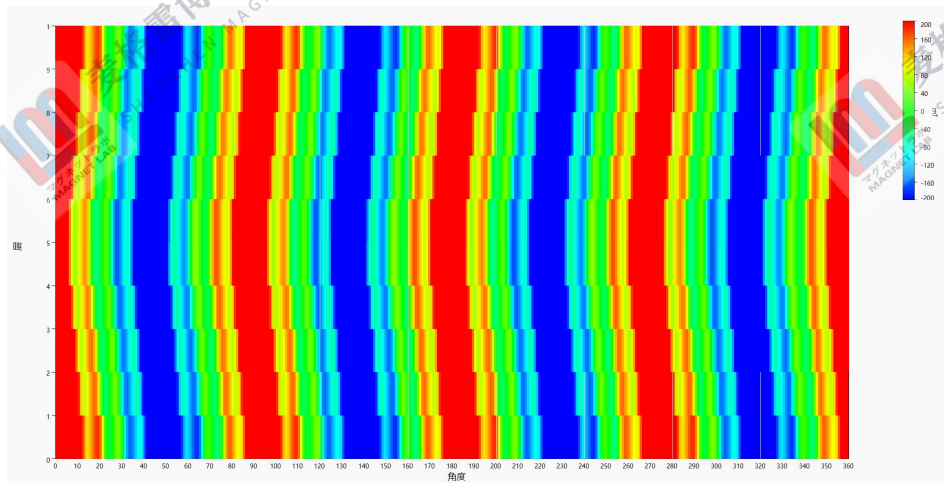


FFT spectrum

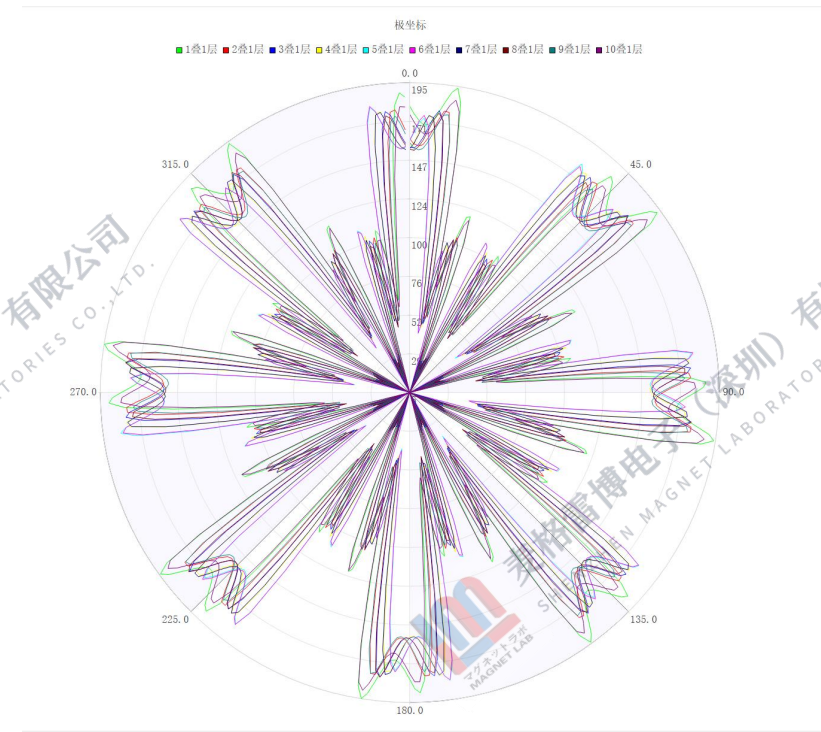
9. Table magnetic software interface



3D waveform graph



2D waveform graph



Polar Plot

9. Surface magnetic

手动操作

卡盘旋转

旋转角度 0.00 ° 清零 正向旋转

旋转速度 0 rpm 旋转停止

当前位置 0.00 ° 反向旋转

装置移动

坐标

绝对位置 相对位置 测量开始位置 测量开始位置

X轴(左右) 0.000 0.000 清零 0.000 X轴原点 全轴移动顺序:

Y轴(前后) 0.000 0.000 清零 0.000 Y轴原点 同时

Z轴(上下) 0.000 0.000 清零 0.000 Z轴原点 全轴回原点

工作限制

启用 X轴 20.000 mm (0-250) Y轴 50.000 mm (0-150) Z轴 65.000 mm (0-200)

绝对位置移动

X轴绝对位置移动 0.000 移动开始 装置速度 0.00 mm/s

Y轴绝对位置移动 0.000 现在位置取得 减速位置 mm

Z轴绝对位置移动 0.000 减速后速度 0.00 mm/s

相对位置移动

相对移动距离 (mm)

移动方向

Z轴(上) Y轴(后)

X轴(左) X轴(右)

Z轴(下) Y轴(前)

相对移动开始

查看告警信息 保存配置 手动操作结束

Manual operation interface

JUDGE	POSITION	PEAK	AREA	ANGLE	CENTER
	1raw1pole	-343.094	-20,073.10	97.50	-278.716
	1raw2pole	344.301	19,517.50	89.79	274.721
	1raw3pole	-355.035	-19,973.40	89.85	-280.278
	1raw4pole	344.91	19,636.00	82.86	274.094
	2raw1pole	-58.2429	-368.07	11.35	-53.8291
	2raw2pole	-321.15	-17,803.70	86.51	-239.393
	2raw3pole	328.43	17,817.80	89.79	241.656
	2raw4pole	-335.746	-18,101.00	172.35	-245.38
	3raw1pole	-57.4657	-361.69	11.24	-53.0956
	3raw2pole	-322.022	-17,888.40	86.60	-241.031
	3raw3pole	327.803	17,770.80	89.69	241.385
	3raw4pole	-336.377	-18,175.30	172.47	-246.407
	4raw1pole	-345.986	-20,547.80	97.60	-293.625
	4raw2pole	351.515	20,069.80	91.80	290.938
	4raw3pole	-364.369	-20,646.50	87.63	-298.734
	4raw4pole	350.002	20,273.90	82.97	291.885

Test data sheet

9. Surface magnetic software interface

Motion trajectory programming

运动控制界面

程序名: test

读取/模板

程序步骤	执行命令	移动模式	移动轴	X轴位置	Y轴位置	Z轴位置	现在位置取得	移动速度mm/	减速位置	加速速度mm/	次数	计时器	嵌入模式
1 Step1	测量开始	绝对位置	X轴				获取位置						无
2 Step2	原点位置移动	绝对位置	X轴				获取位置						无
3 Step3	指定位置移动	绝对位置	X轴				获取位置						无
4 Step4	测量结束	绝对位置	X轴				获取位置						无
5 Step5	回归原点	绝对位置	X轴				获取位置						无
6 Step6	保存数据	绝对位置	X轴				获取位置						无

添加行 删除行 上移 下移 删除所有步骤

保存 取消

判断设置界面

规则名: test

读取/模板

判断规则	判断条件	判断位置	上限	下限	上限范围	下限范围	当前数据计算	是否开启	是否打印
1 Rule1	峰值	全部层					获取位置	是	是
2 Rule2	面积	全部层					获取位置	是	是
3 Rule3	角度	全部层					获取位置	是	是
4 Rule4	最大谐波幅值	全部层					获取位置	是	是

添加规则 删除规则 上移 下移 删除所有规则

保存 取消

Judgment criteria setting