

# Progress Status of New T0 Chopper System at J-PARC MLF

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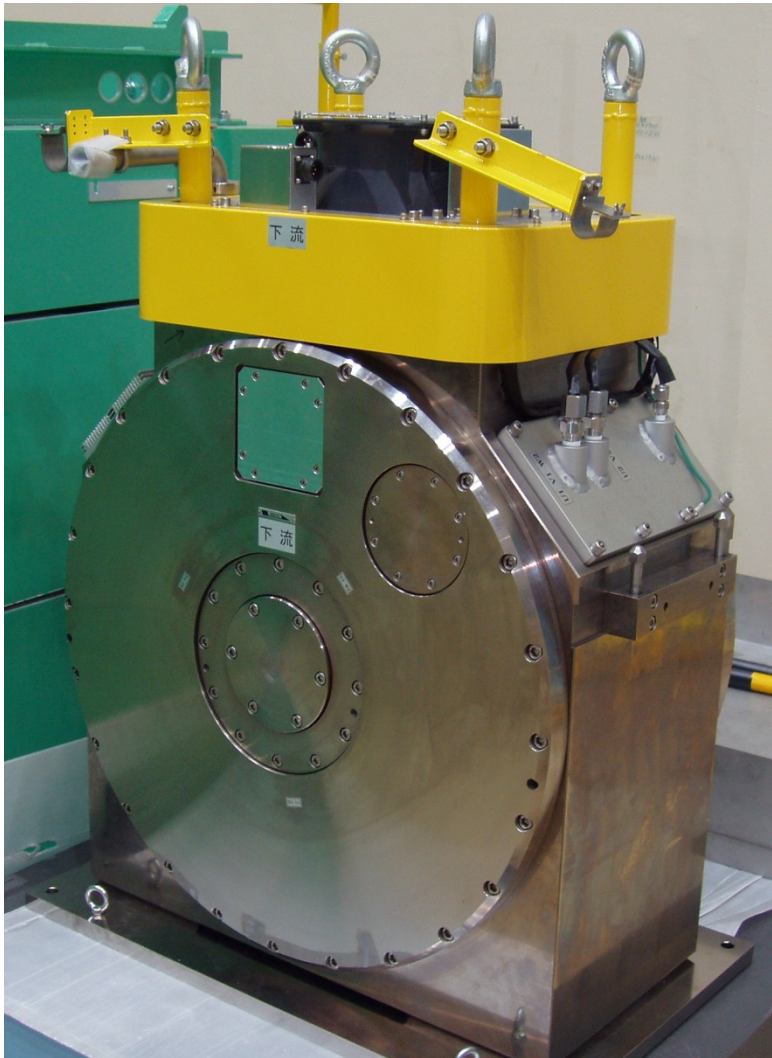


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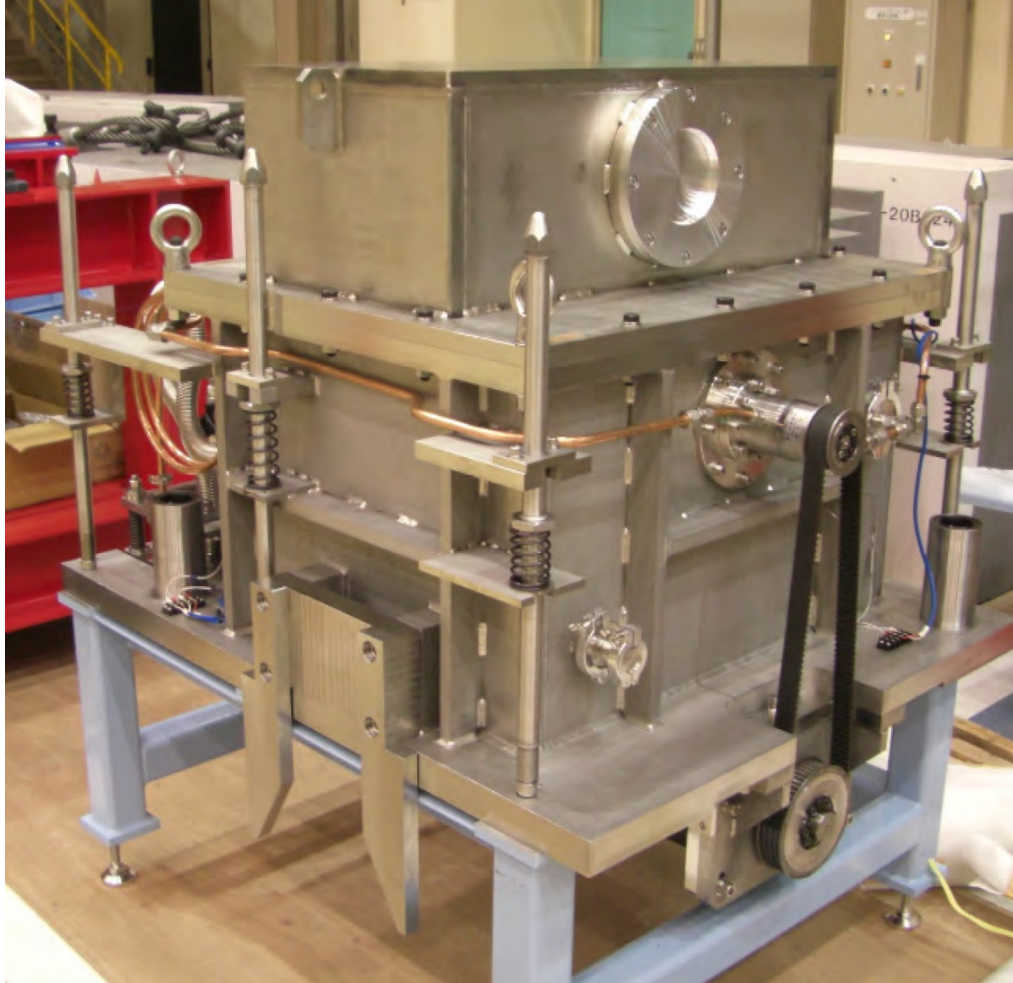
1. Existing T0 chopper condition
2. New T0 chopper concept
3. Brazing structure between rotor and hammer
4. Dynamic balancing of rotor
5. Rotation test, Explosion protect
6. Vibration, Field balance adjustment
7. Cooling
8. Future Work

# Existing T0 Chopper 1



Manufacture:	JAEA, KOBELCO (KSL)
Type:	Horizontal axis
Rotation Speed:	25, (50Hz)
Hammer:	70-84 300, Single
Hammer Material:	Nickel alloy
Diameter:	600 at center of hammer
Bearings:	Ball bearing
Motor:	Outer-rotor three phase Induction
Cooling:	None

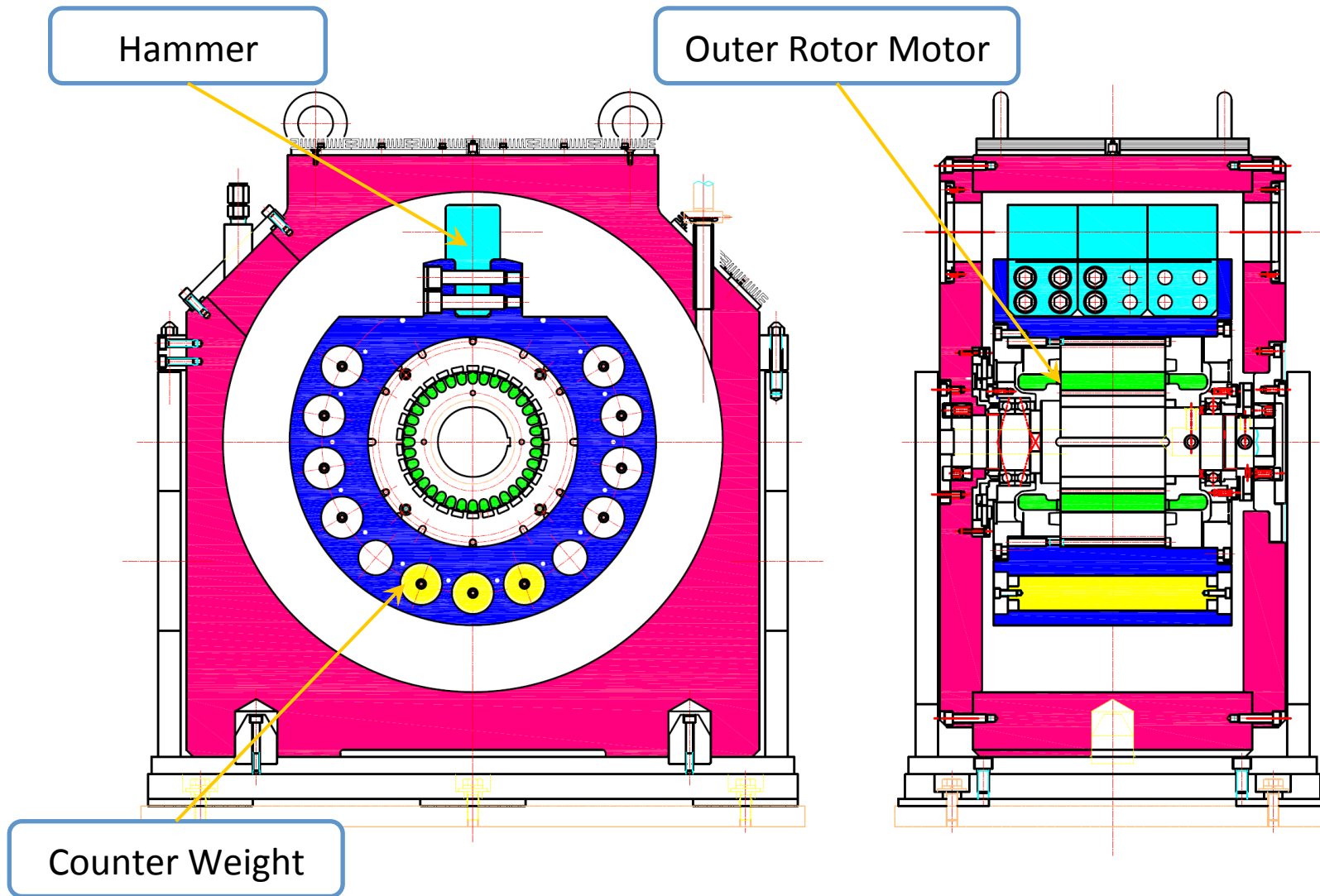
# Existing T0 Chopper 2



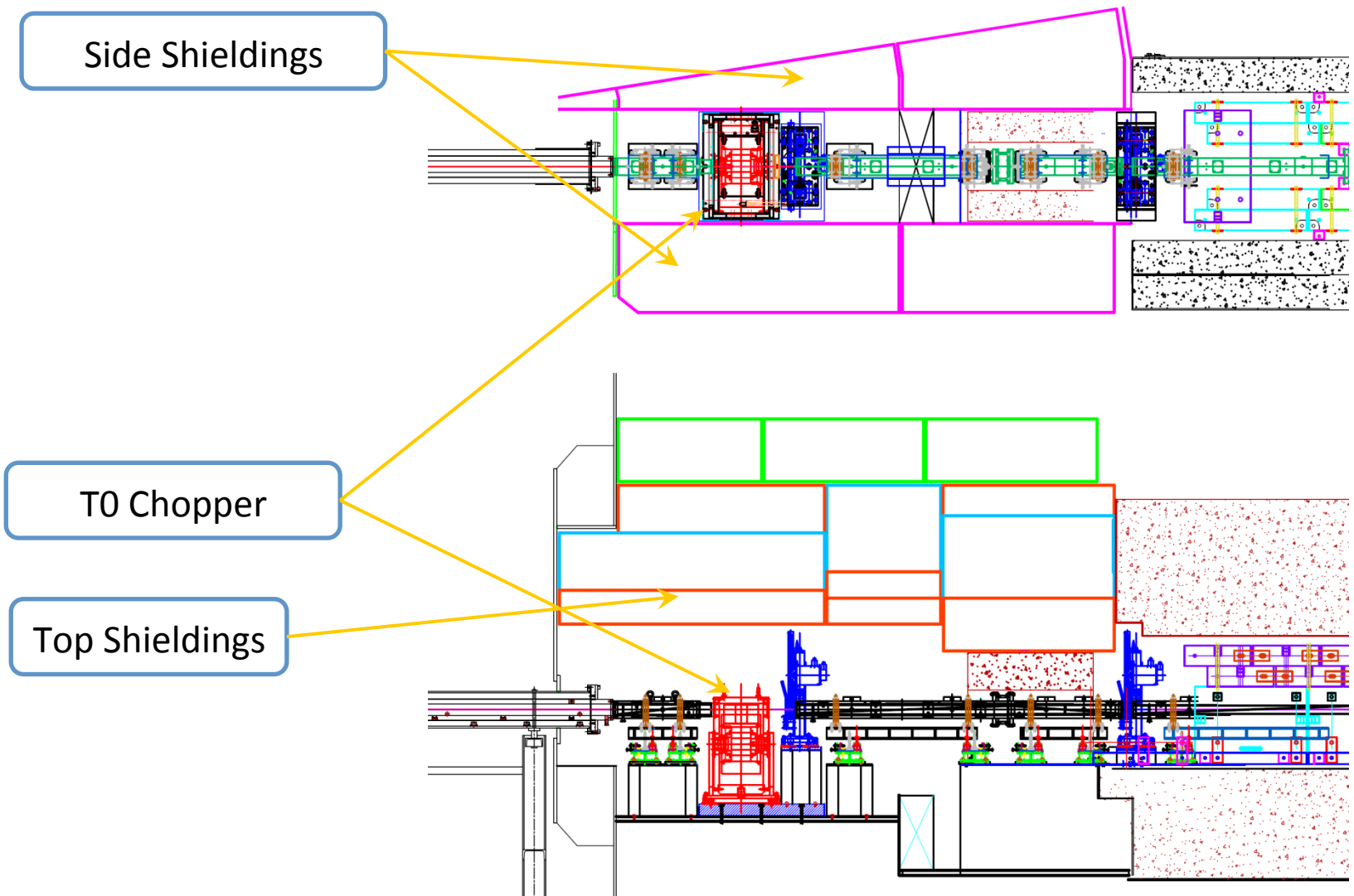
Manufacture:	KEK,MTC
Type:	Horizontal axis
Rotation Speed:	25,50,100Hz
Hammer:	300, Single or Double
Hammer Material:	Nickel alloy
Diameter:	600
Bearings:	Ball bearing
Motor:	AC Servo
Cooling:	Water
	Rotary Feedthrough seals with magnetic fluid



# JAEA, KOBELCO T0 Chopper Structure



# T0 Chopper Layout



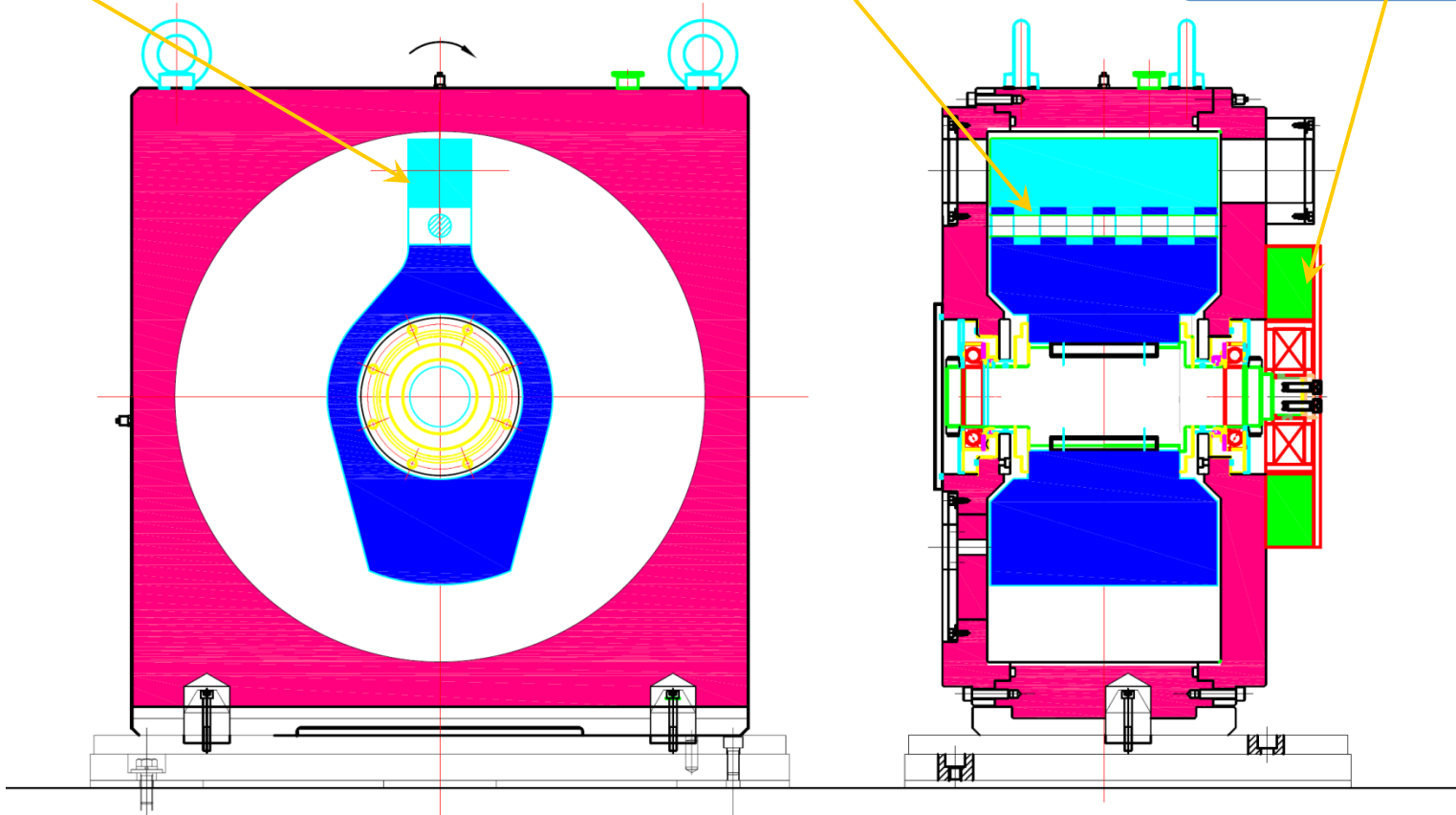
1. Thin Type PM Motor Placed Outside
2. High Speed Rotation : 100Hz
3. Single Hammer
4. Long Maintenance Interval
5. Same mount fixing method as Current T0 Chopper

# Next T0 Chopper Structure

Single Hammer

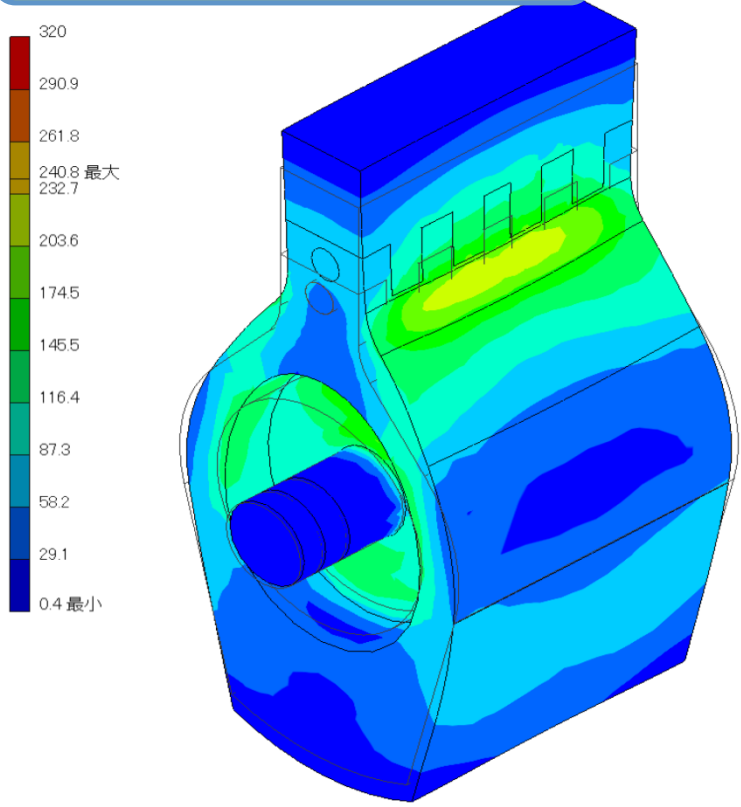
Brazing Structure for High Speed

Thin Type Motor



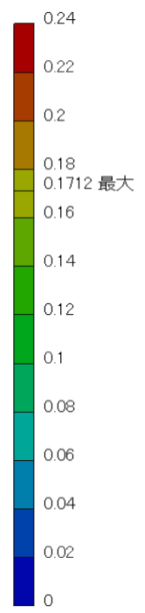
Same fixing method as Current T0 Chopper

## Stress Analysis



Stress @ 100Hz

タイプ: Z 変位  
単位: mm



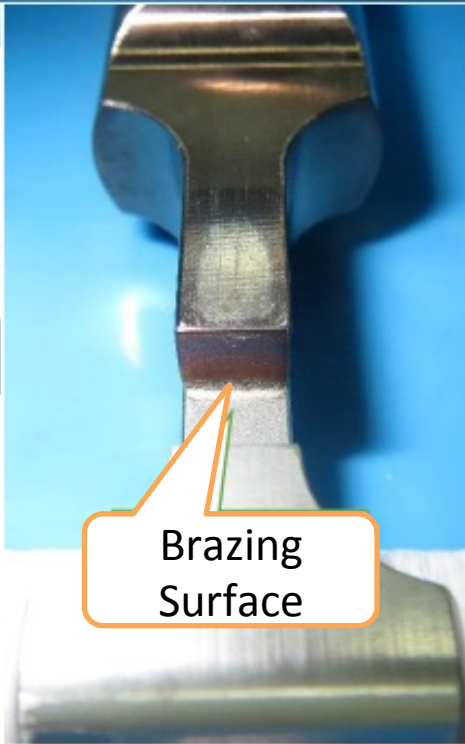
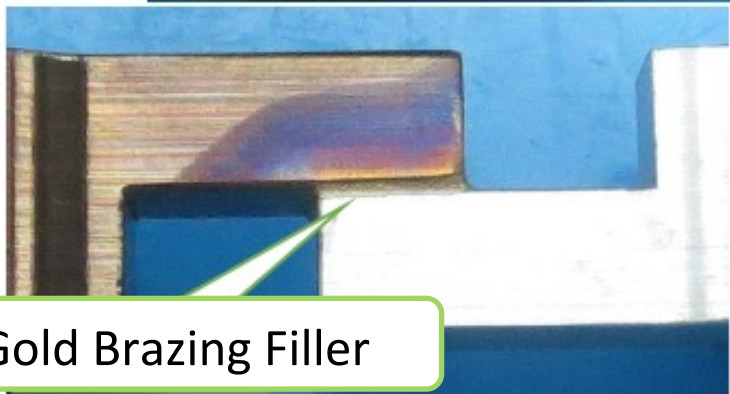
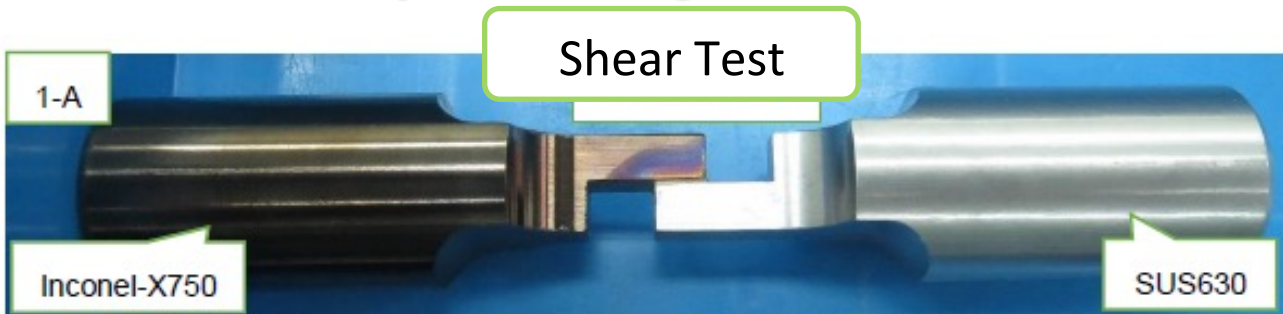
Displacement @ 100Hz





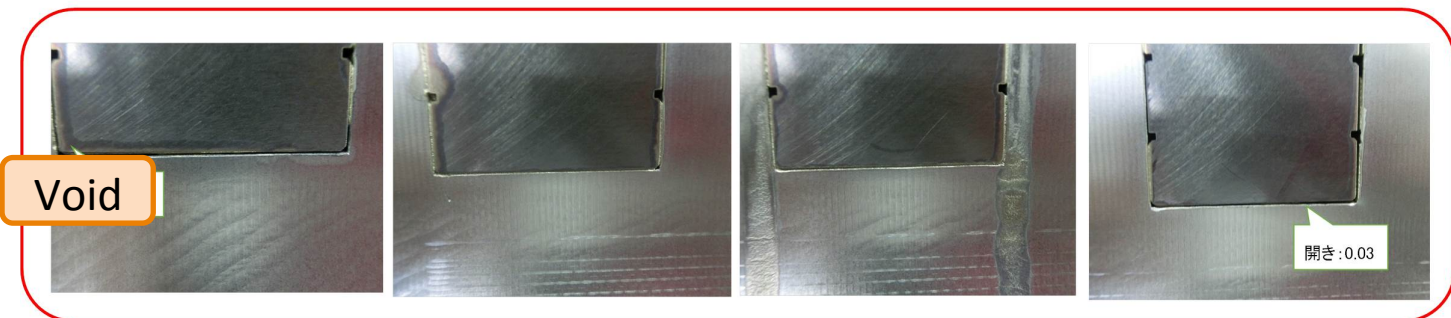
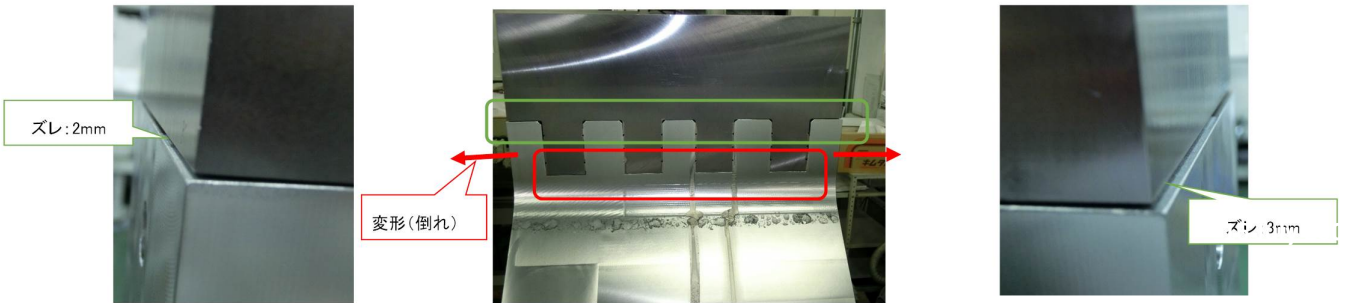
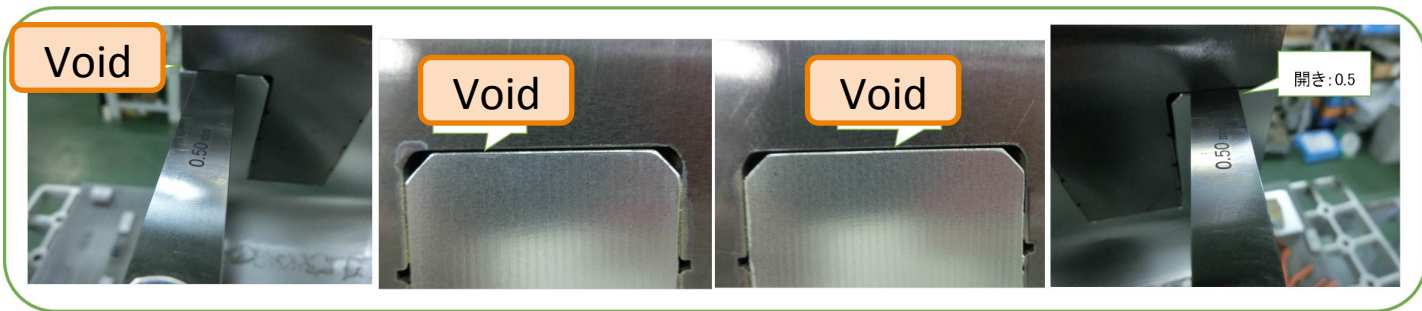
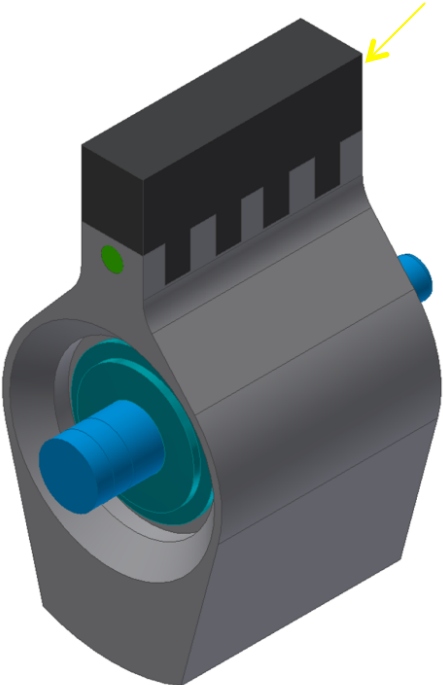
# Brazing Structure between Rotor and Hammer

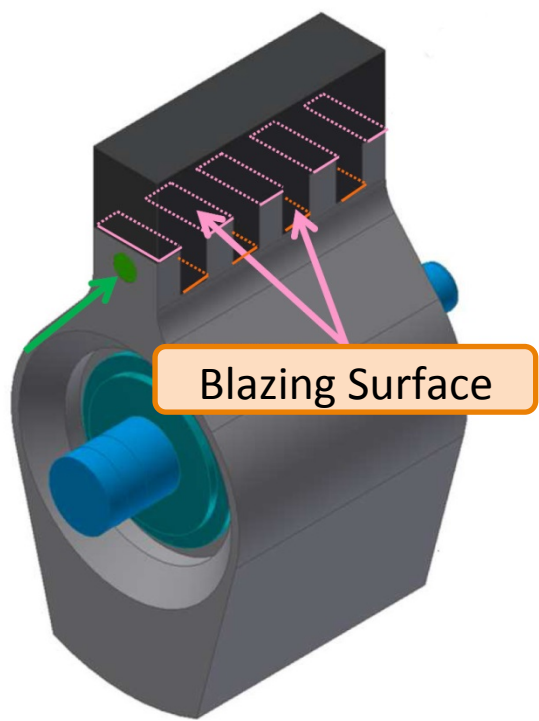
## Primary Brazing Test



# Blazing Structure between Rotor and Hammer

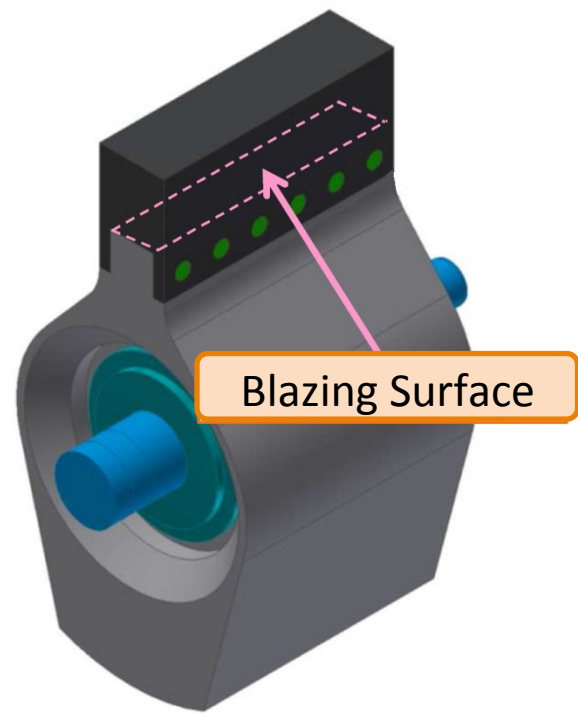
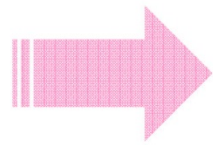
## Prototype ( 1st Design )





Blazing Surface

Prototype



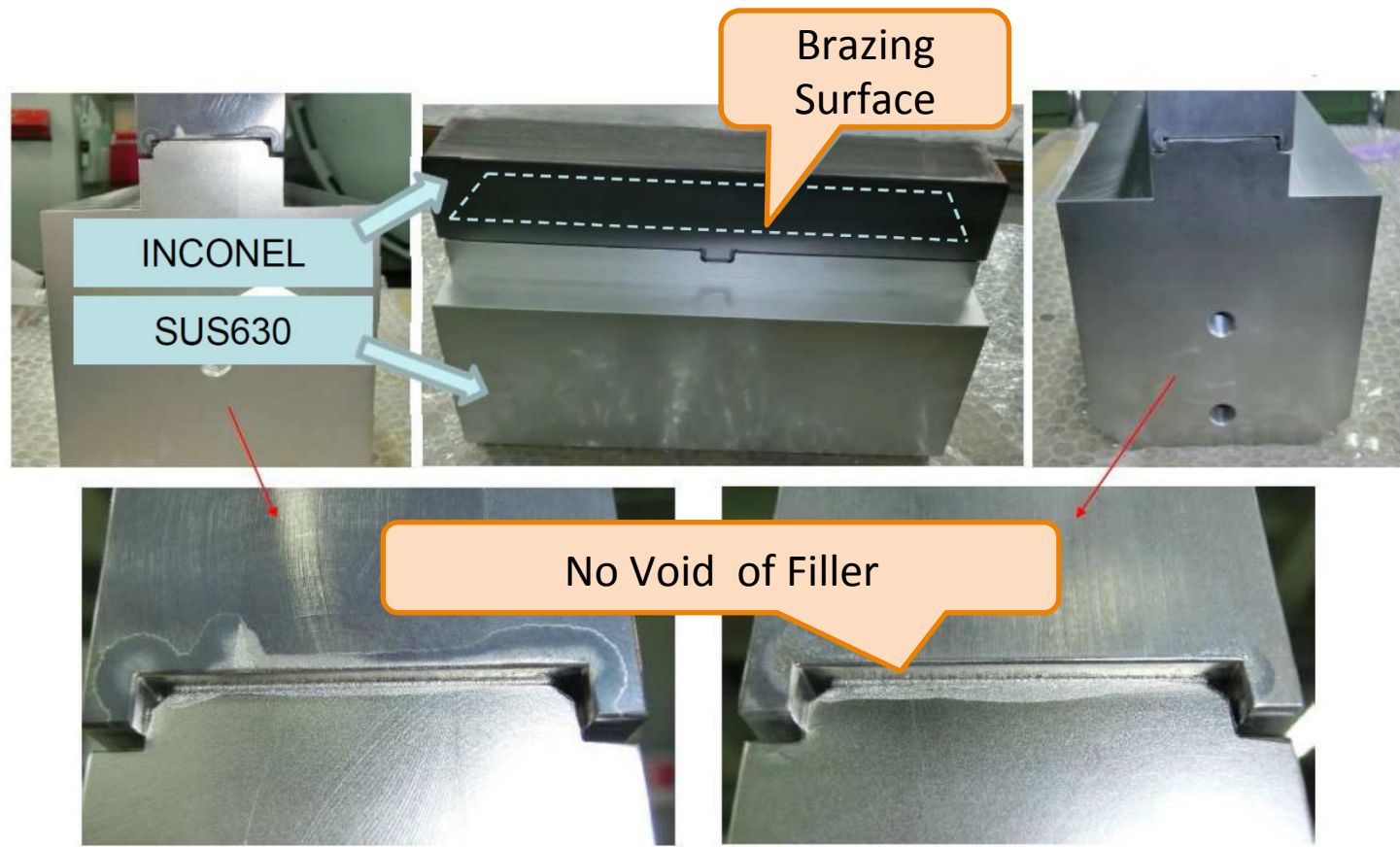
Blazing Surface

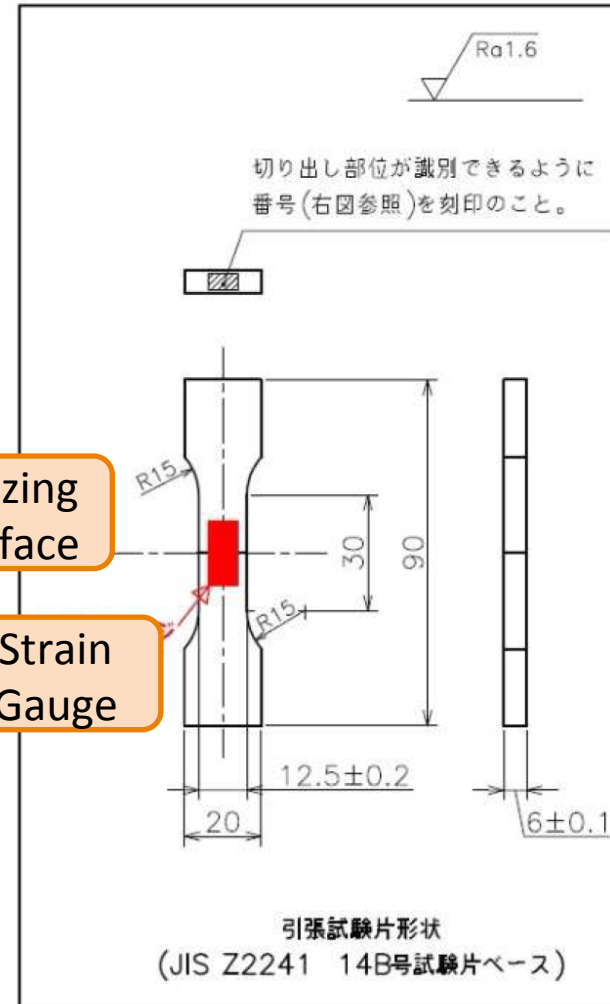
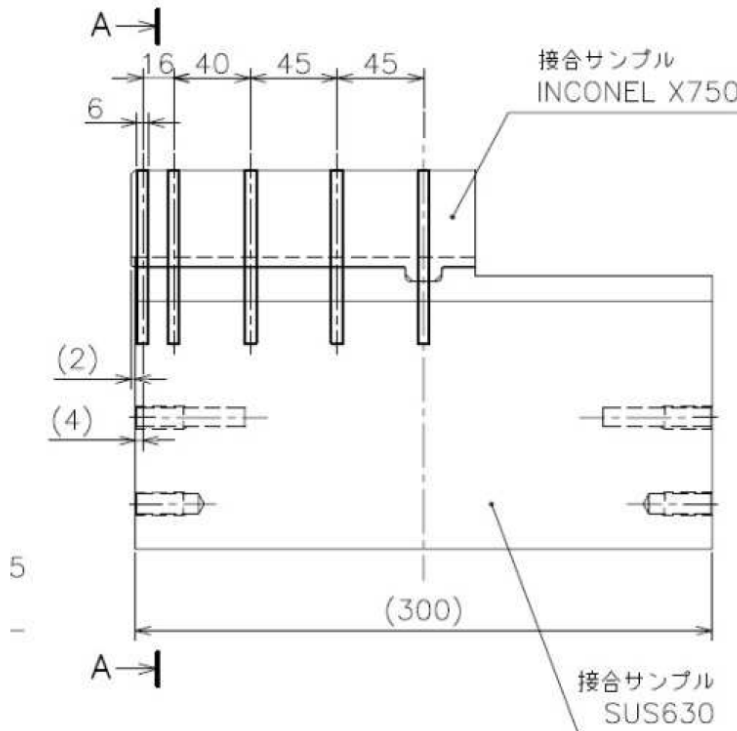
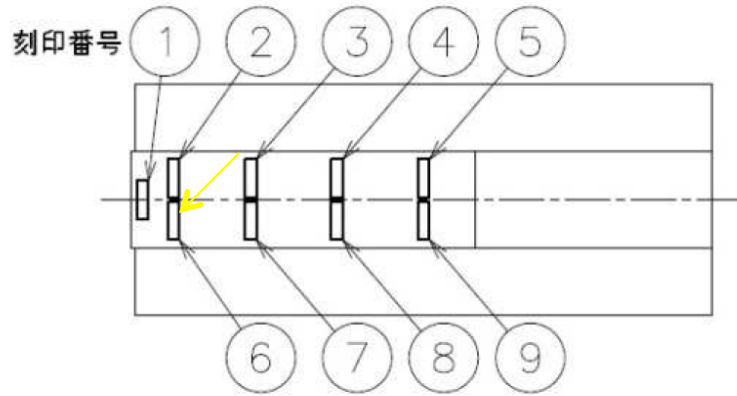
New Design



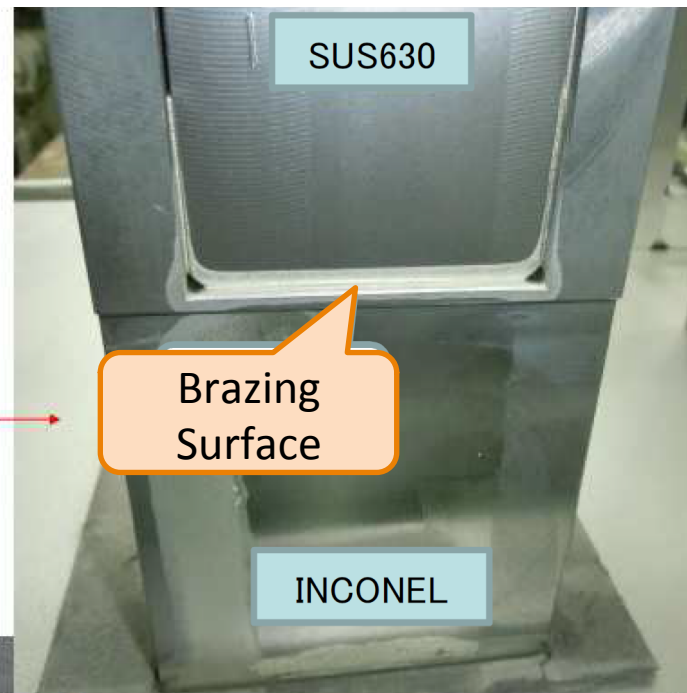
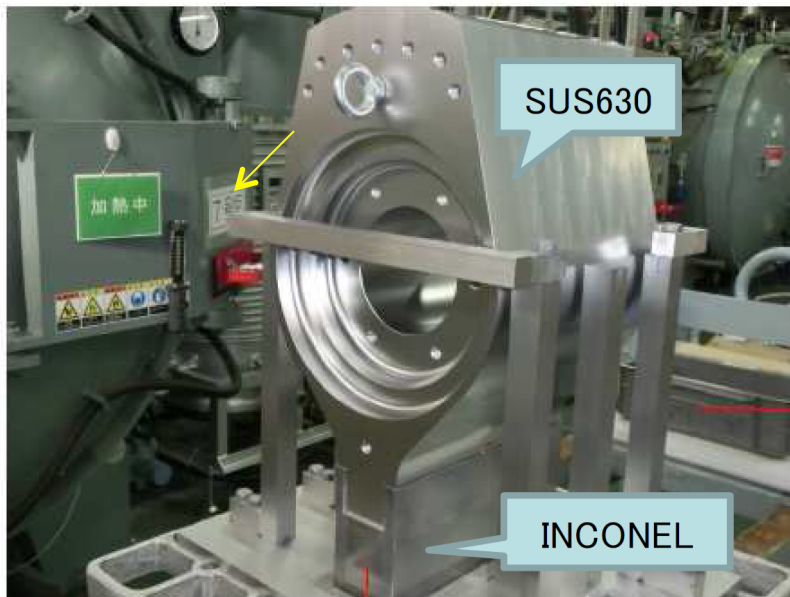
# Brazing Structure between Rotor and Hammer

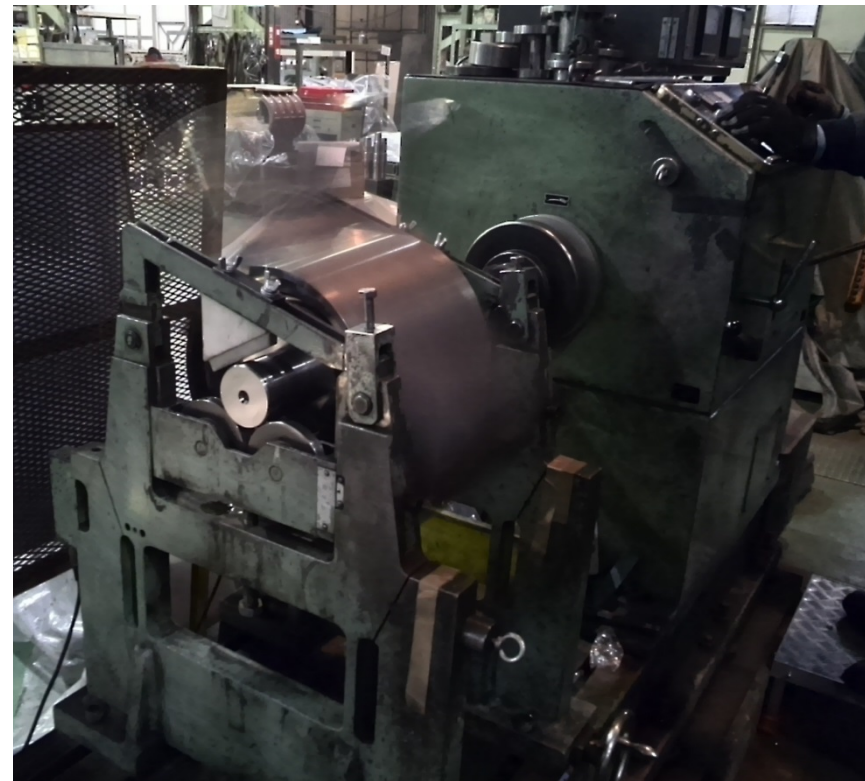
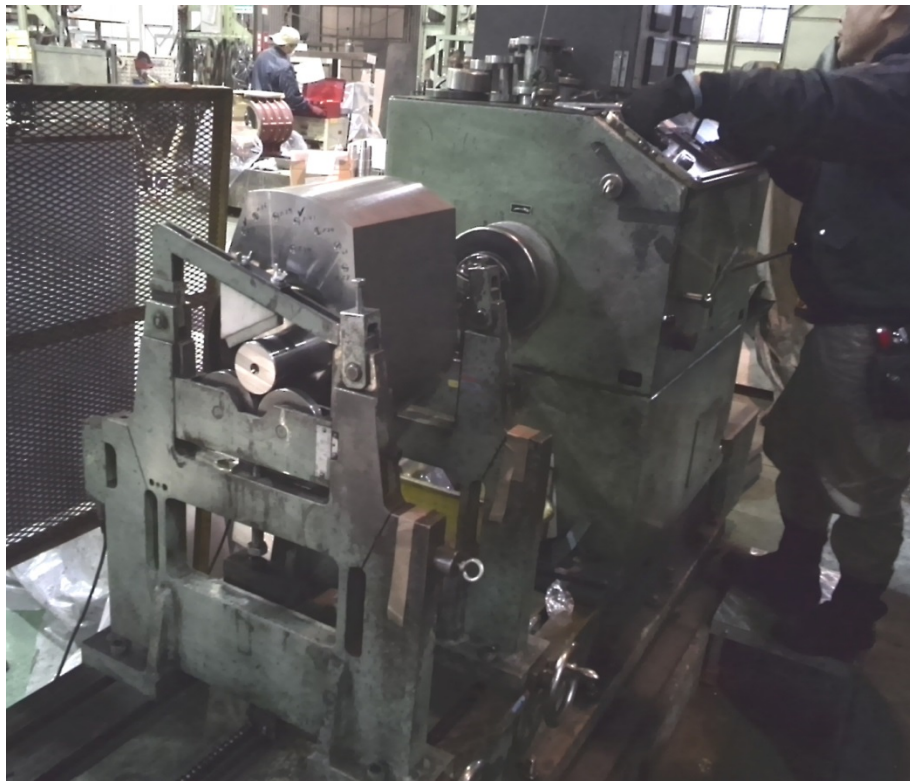
## Brazing Test ( New Design )







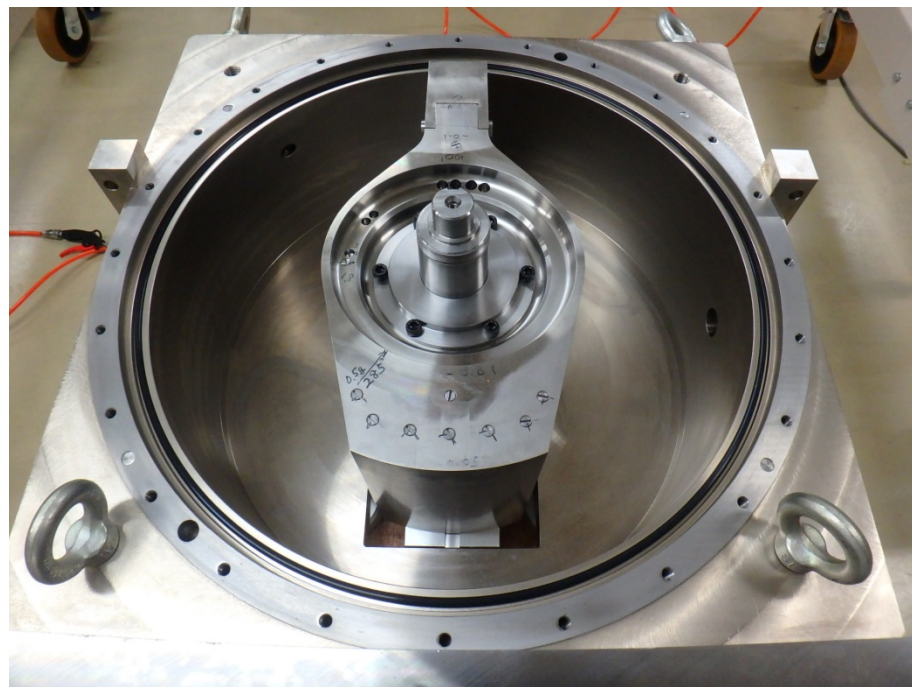
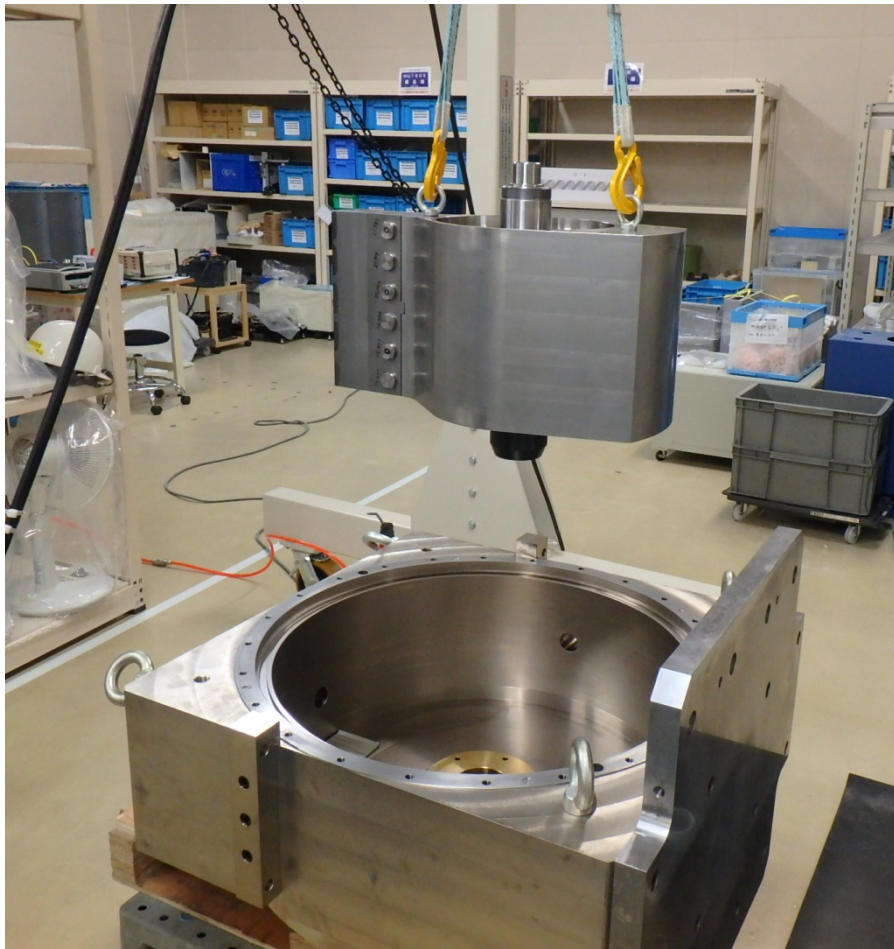




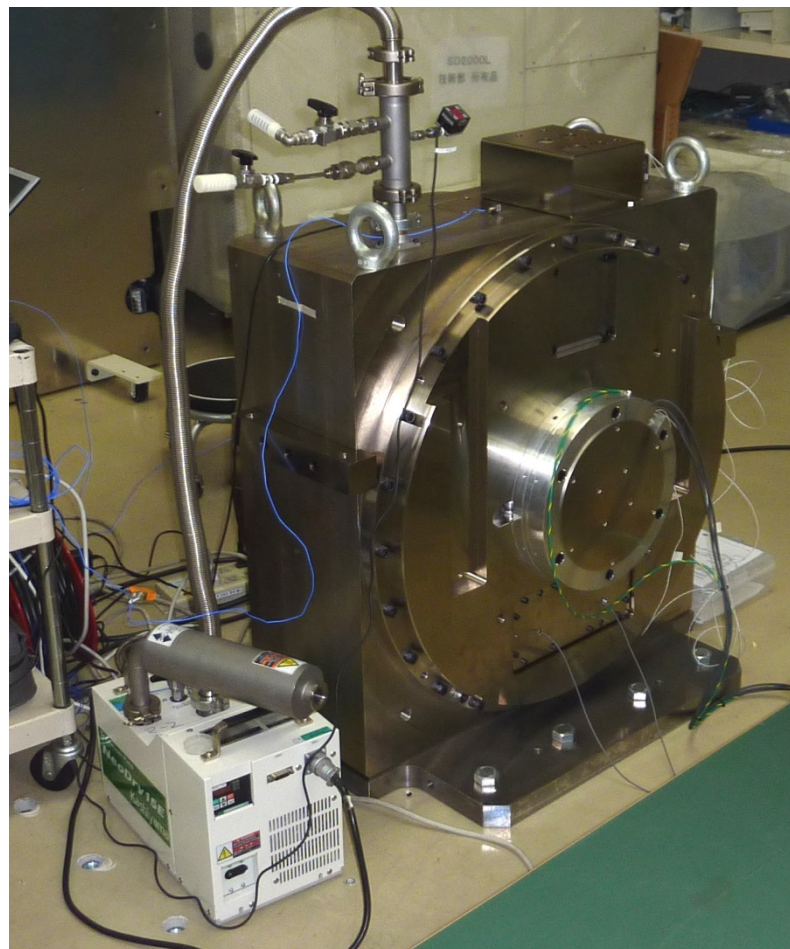
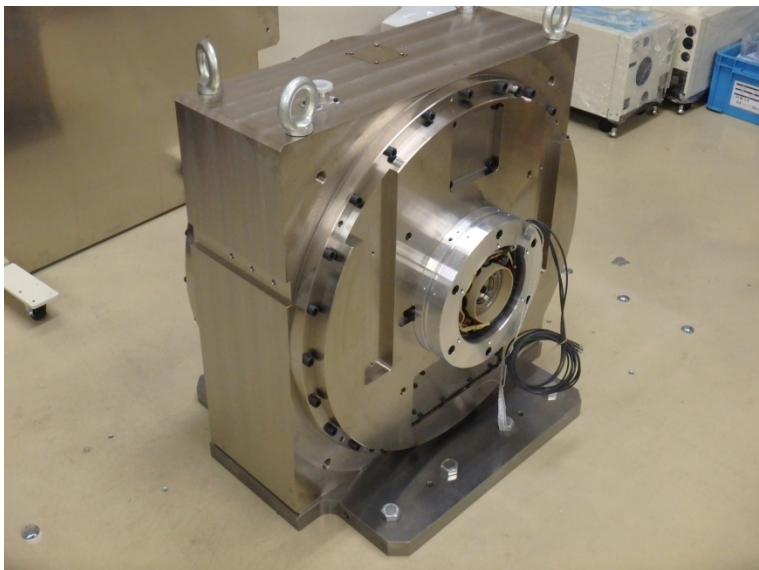
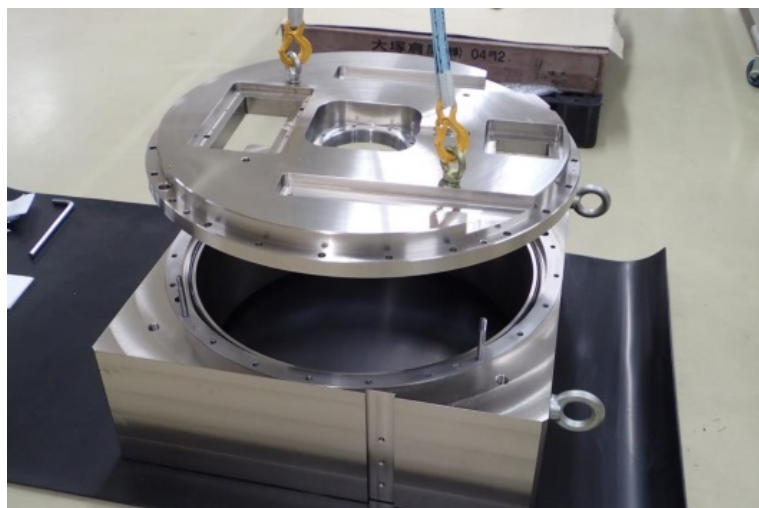
Dynamic Balancing Machine



# Dynamic Balancing and Assembling

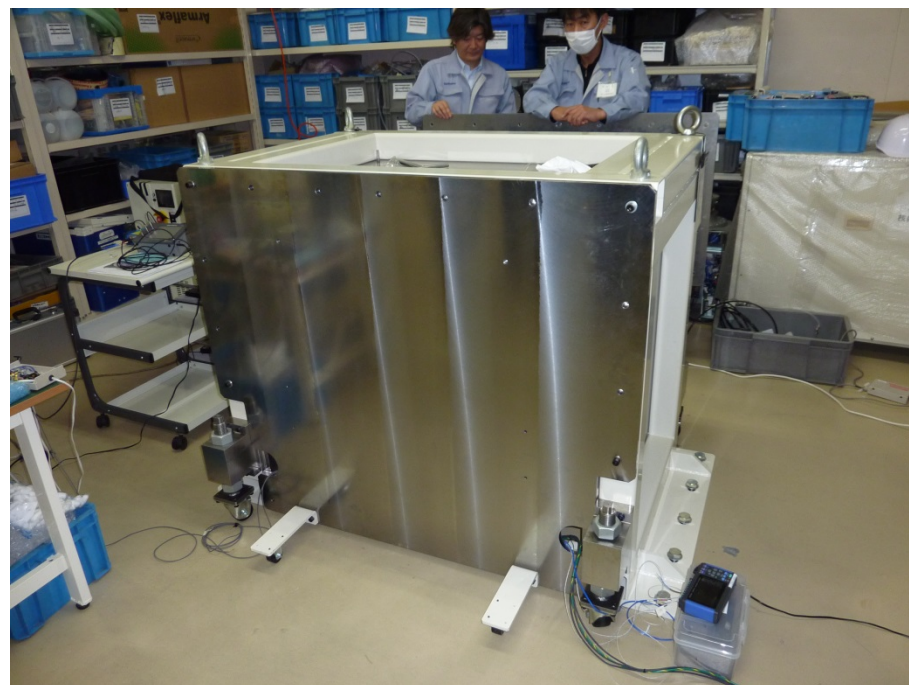
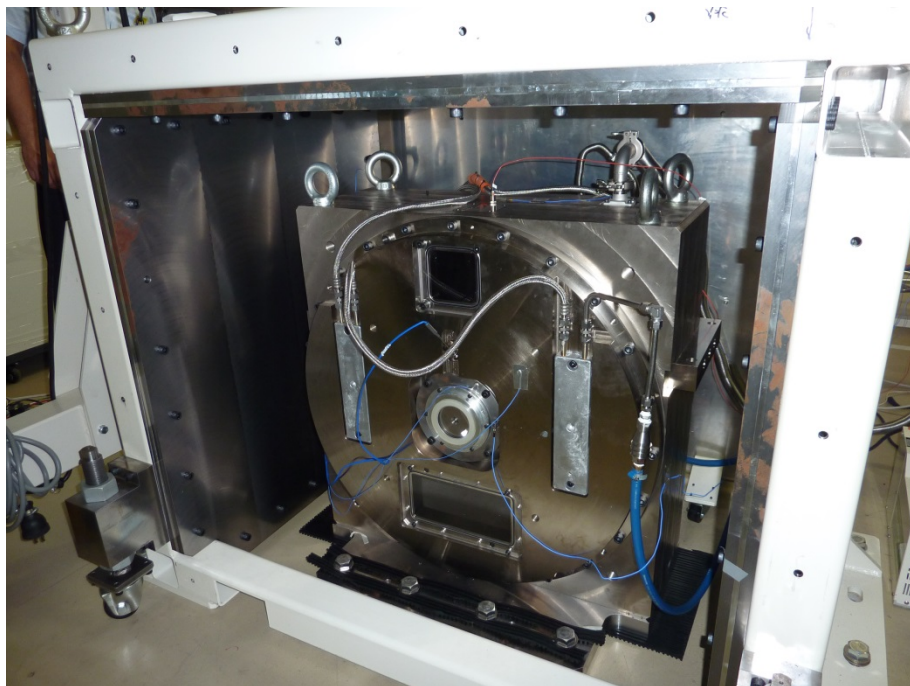


# Dynamic Balancing and Assembling



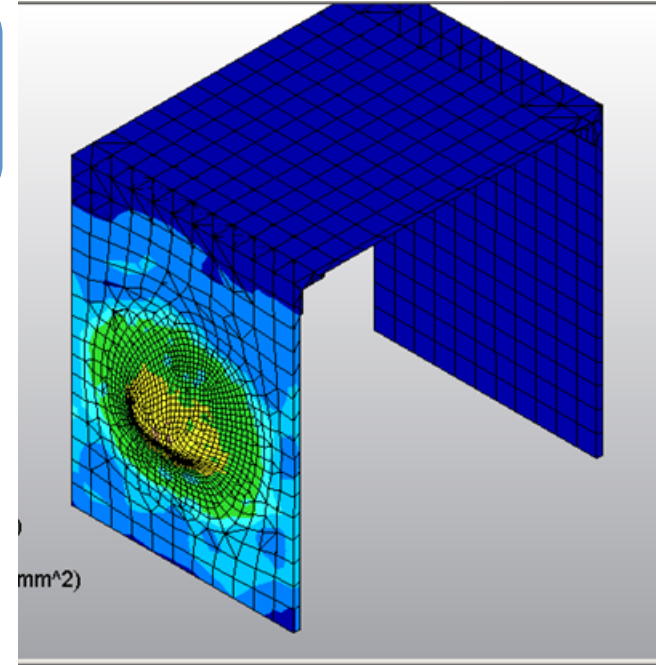
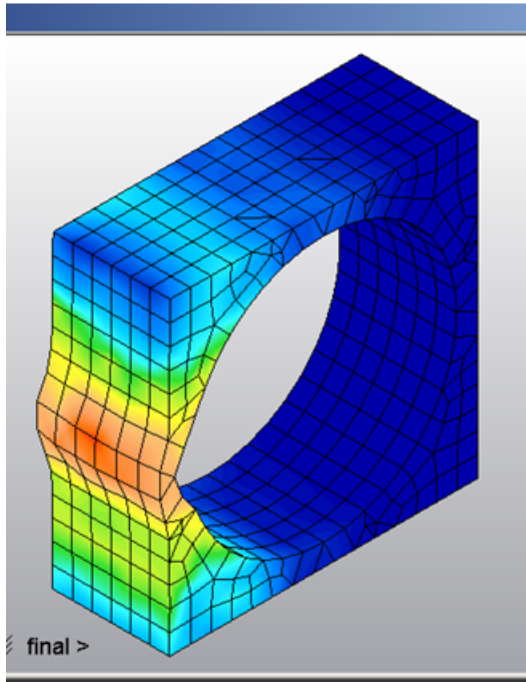
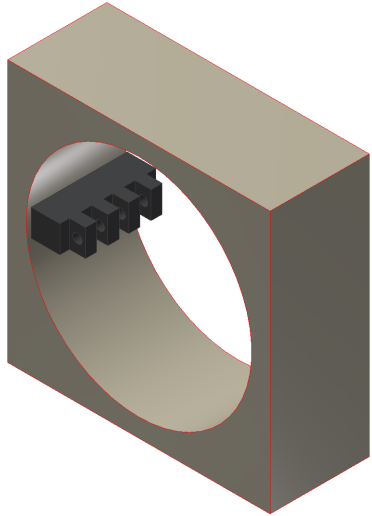


# Rotation Test and Explosion Protection



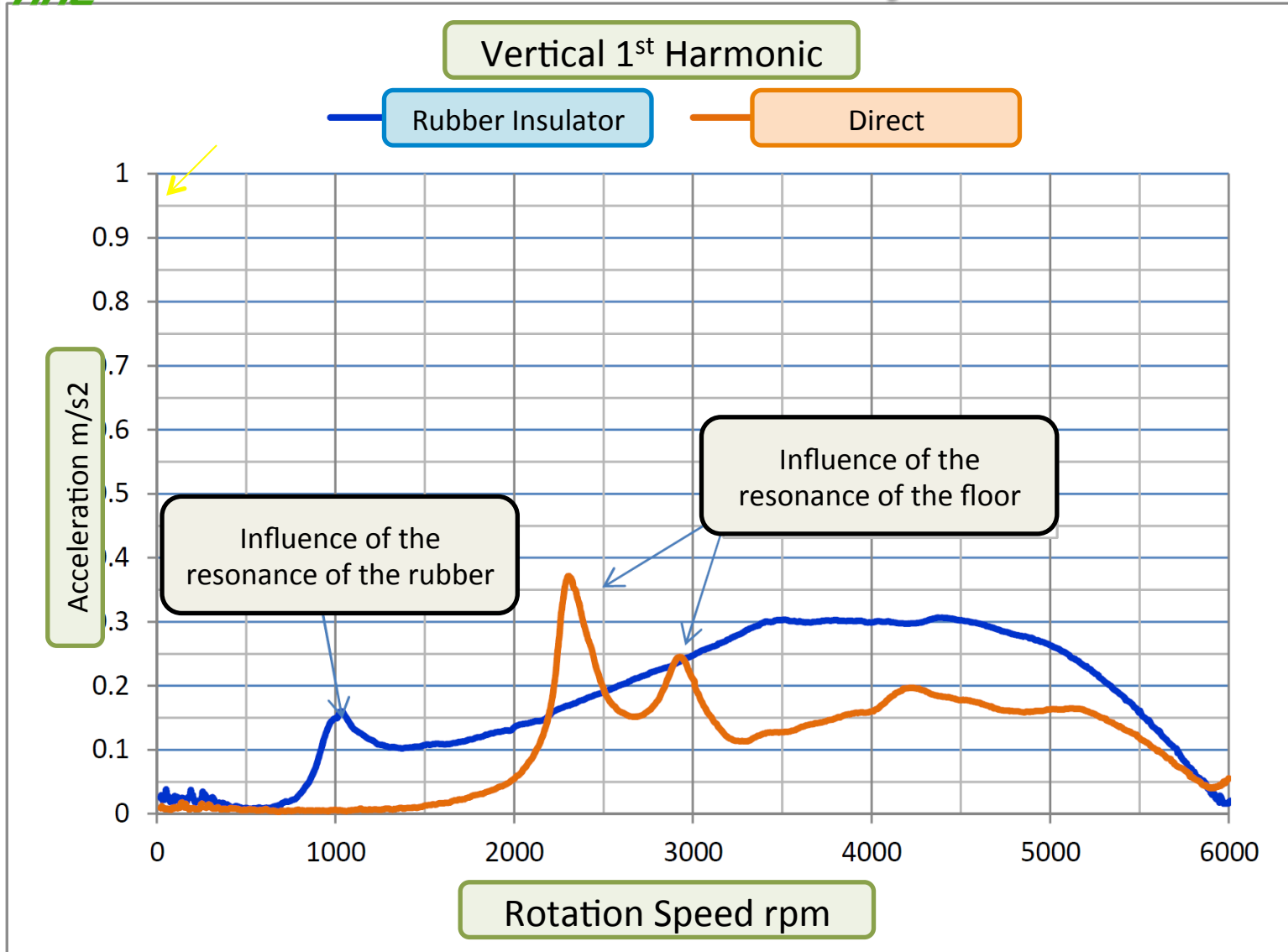


Wall Structure  
Impact Resistant Sandwich Structure

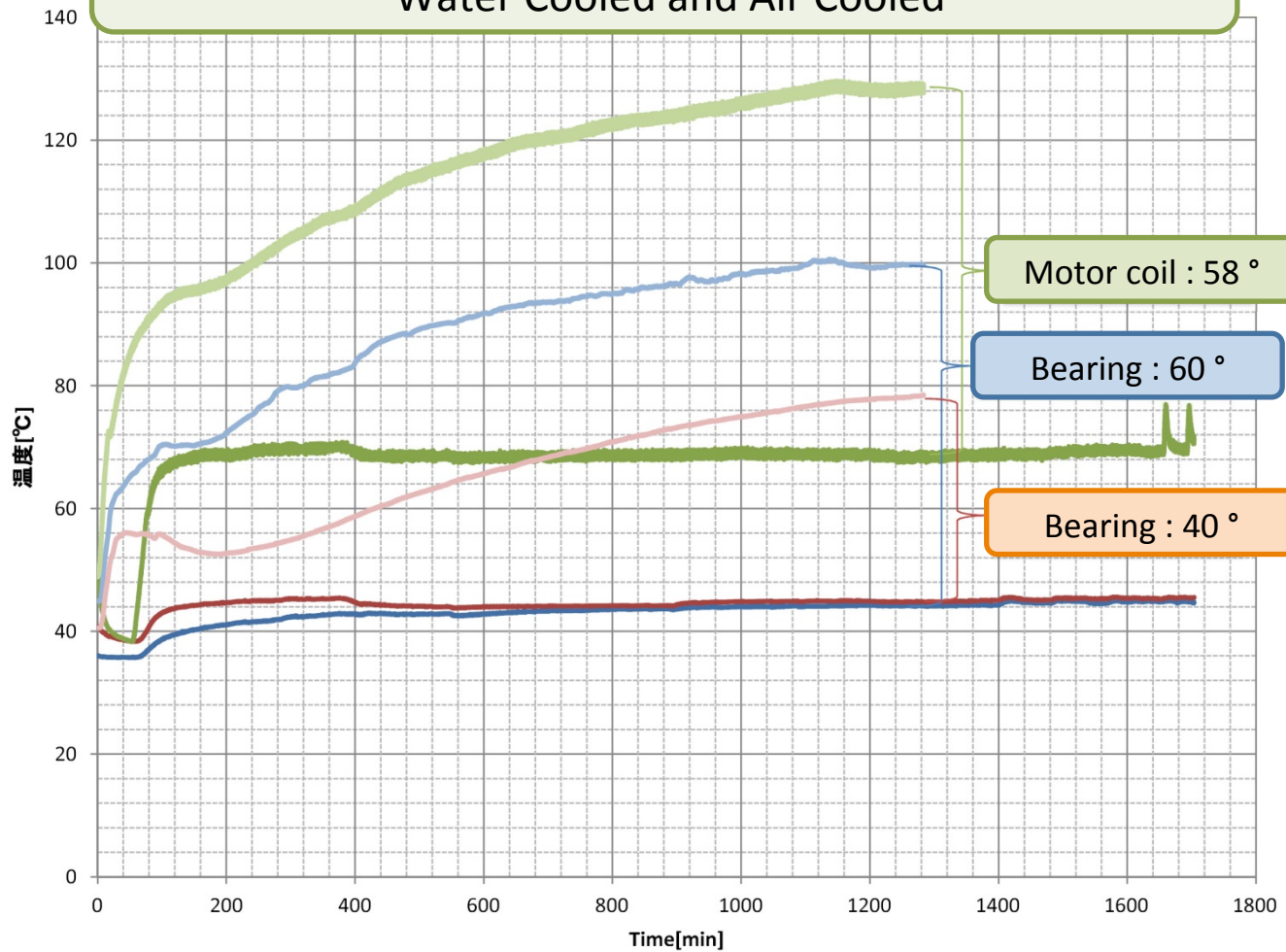


16mm Steel Plate  
8mm Aluminum Plate  
16mm Steel Plate

# Vibration, Field balance adjustment



## Temperature Differences between Water Cooled and Air Cooled

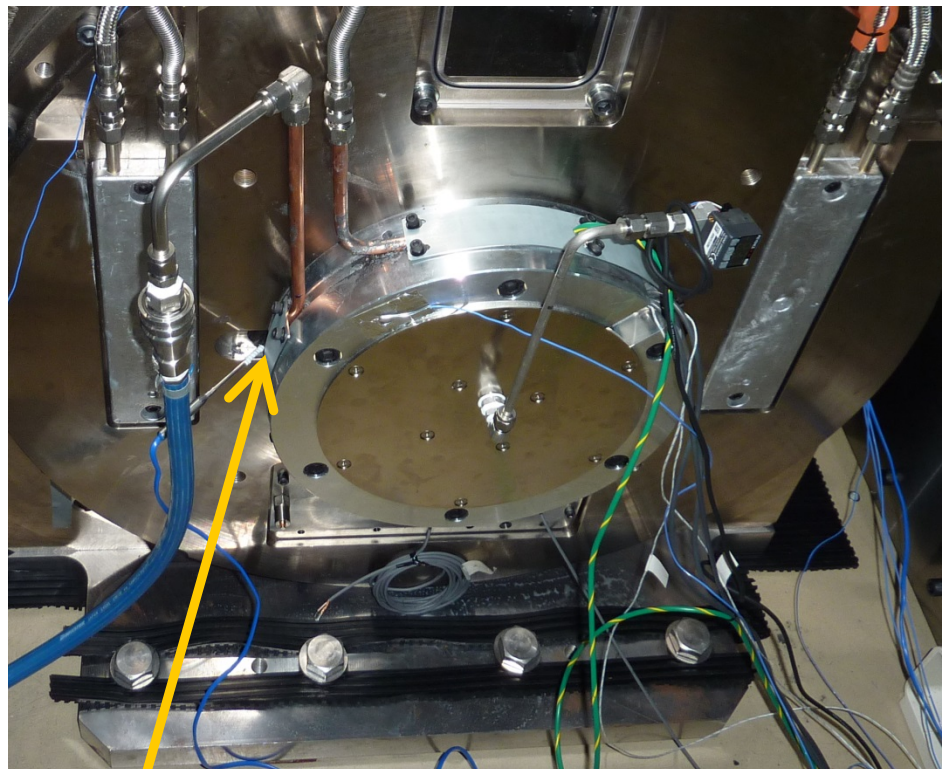
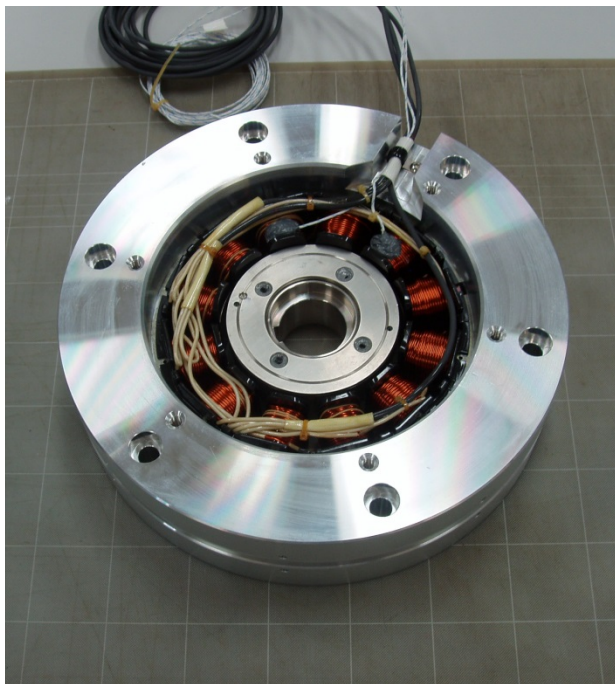


Motor coil : 58 °

Bearing : 60 °

Bearing : 40 °

Testing Condition  
 Speed : 6000rpm  
 Room Temp. : 30°C  
 Water Temp. : 36°C  
 Water Flow : 4L/min

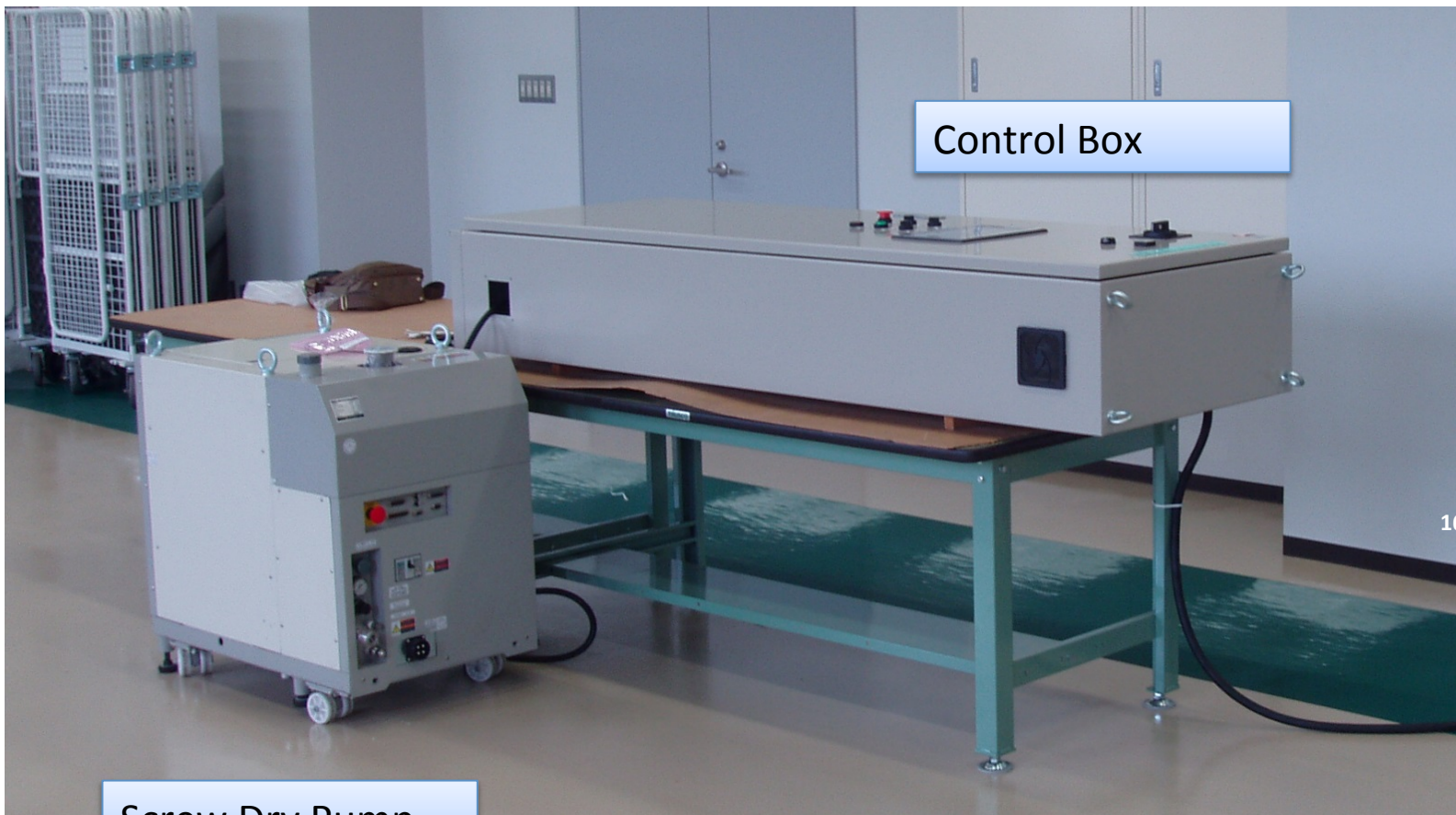


Cooling Water Line

PM Motor	
Output:	5.8kW
Speed:	6000rpm
Torque:	9.2Nm
Frequency:	400Hz
Number of Poles:	8



# Synchronizing Control Test



Control Box

Screw Dry Pump



1. Reduction of the vibration over whole range
2. Further Synchronizing control test
3. Get a budget for the chopper of final spec

To be continued

