13th International Conference on Fracture
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Development and Several Additional Performances of Dual-Spindle Rotating Bending Fatigue Testing Machine *GIGA QUAD*

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1) Background
2) Development of New Testing Machine
3) GIGA QUAD　Outline
4) Main environmental options
5) Concluding Remarks

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Background

Background 1

Recently, particular attention has been paying to the fatigue property of metallic materials in the very high cycle regime to realize the low-carbon sustainable society.

But, one of difficulties in fatigue tests in the very high cycle regime is to take a long time to perform the fatigue test. If the fatigue test is performed at the loading frequency of 50Hz, it takes 200 days to 10^9 cycles.

Background 2

The fatigue property data in various environments still remain unsolved.

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Development of New Testing Machine

★ In order to overcome this difficulty, we have developed special type of fatigue testing machines in rotating bending, in which four specimens can be tested simultaneously. Thus a series of fatigue tests even in gigacycle regime can be carried out within a reasonable period.

★ Based on this advantageous performance, the name of “GIGA QUAD” was accepted for this new machine. Accordingly, this machine is very useful to file up a number of fatigue test data.

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Dual-Spindle Rtating Bending Fatigue Testing Machine

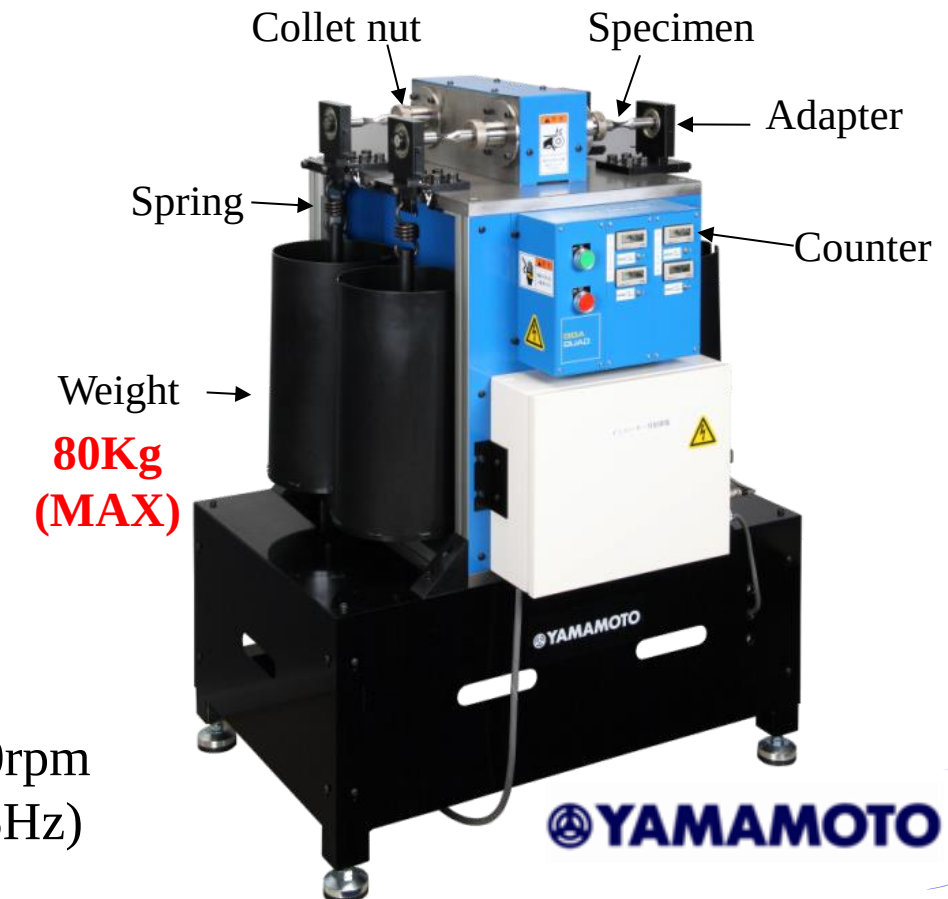
<GIGA QUAD Outline>

GIGA QUAD :YRB200

SIZE OF MACHINE(mm): 470X400X1050
WEIGHT(Kg): 140

GIGA QUAD : YRB200L

SIZE OF MACHINE (mm): 800X660X1100
WEIGHT(Kg): 170



3,150rpm
(52.5Hz)

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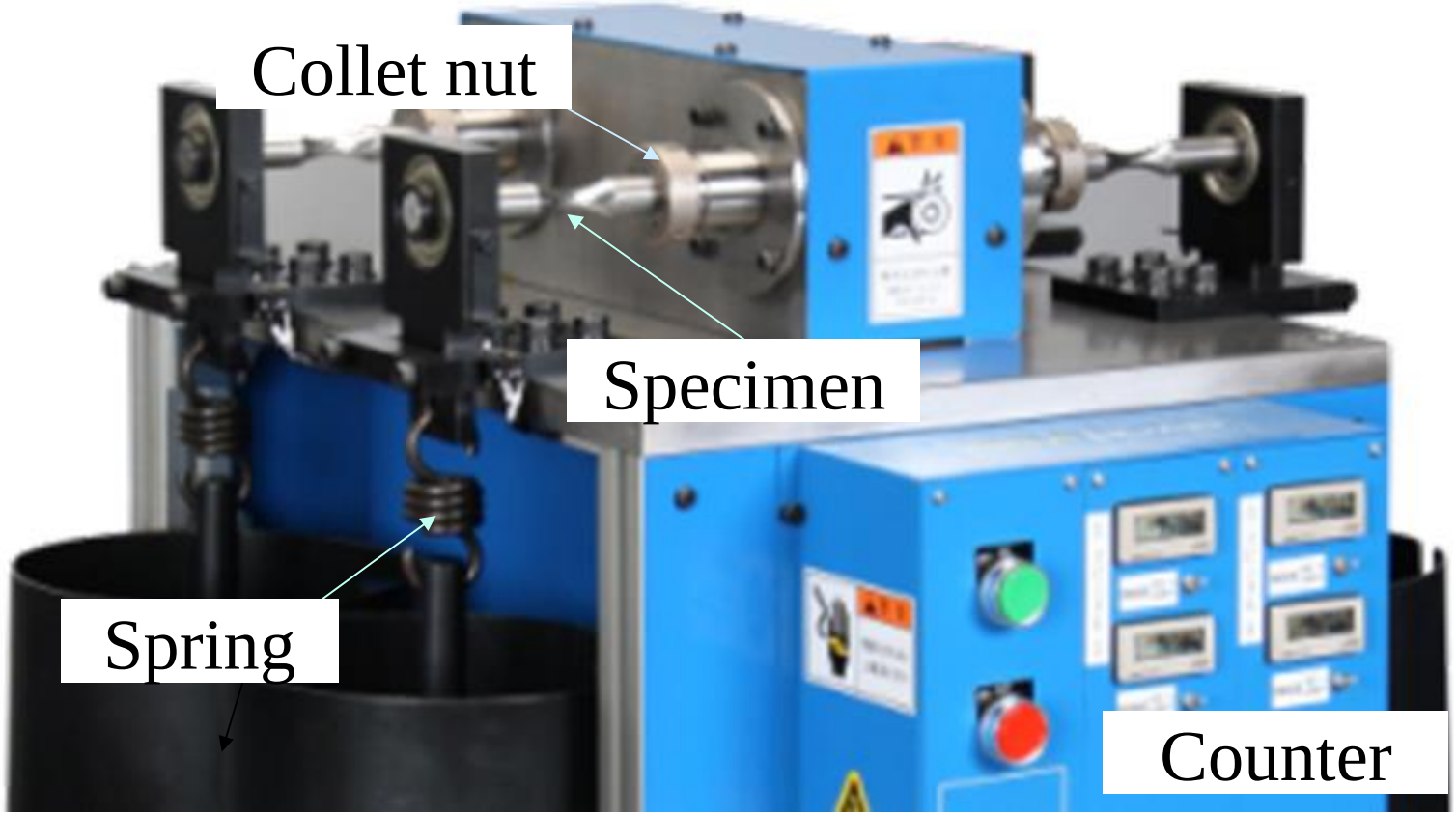
Dual-Spindle Rtating Bending Fatigue Testing Machine

< GIGA QUAD　Outline>



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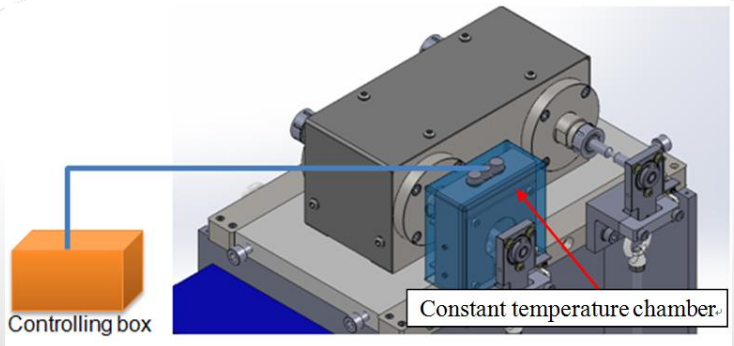
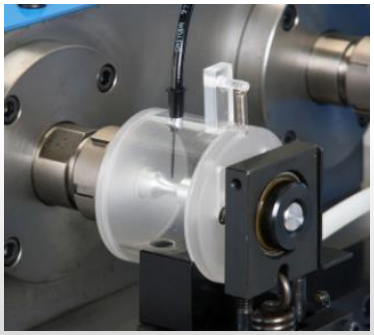
GIGA QUAD
<Main environmental options>



① High temperature environmental testing unit
② Low temperature environmental testing unit



③ Corrosive environmental unit

④ 2-step variable loading unit

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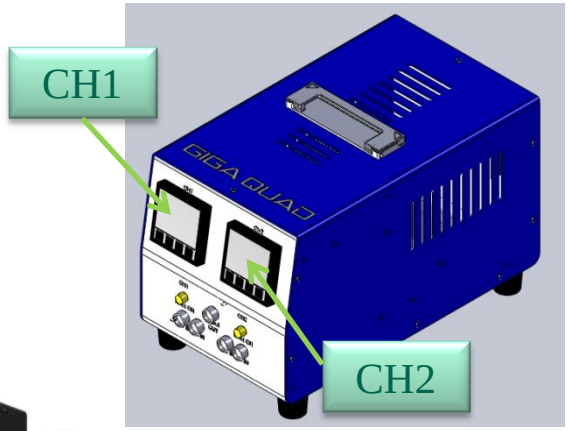
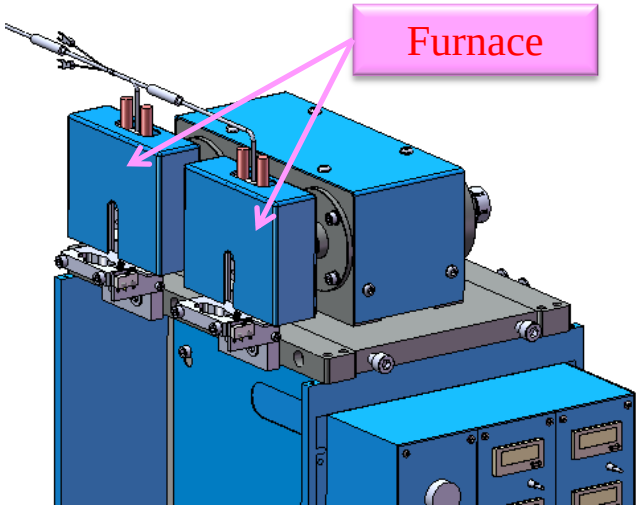
GIGA QUAD
<Main environmental options>

High temperature environmental testing unit





【Temperature controlling range】
room temperature to 600deg.C
【Size of control panel box】
170mm x 220mm x 280mm

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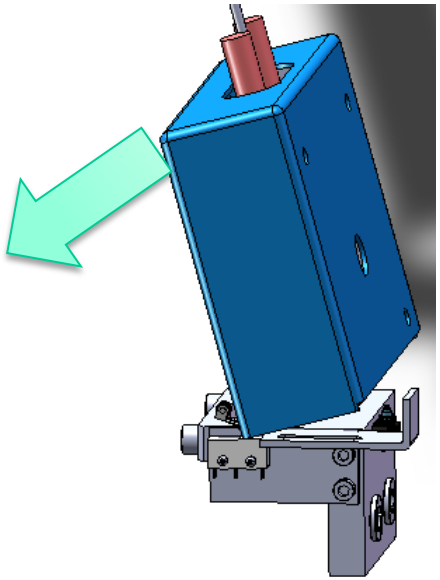
GIGA QUAD
<Main environmental options>

High temperature environmental testing unit



Safety mechanism

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Low temperature environmental testing unit

Compressed
liquid nitrogen cylinder

Insulation manifold

Exhaust

Temperature indicating controller

Proportional valve

No.1 No.2 No.3 No.4

Insulation chamber
with specimen

Protection Cover

Control box

O_2 densitometer

PL
TIC
ON SW
OFF SW

【Temperature controlling range】
－100deg.C. to room temperature
【Size of control panel box】
170mm x 220mm x 280mm

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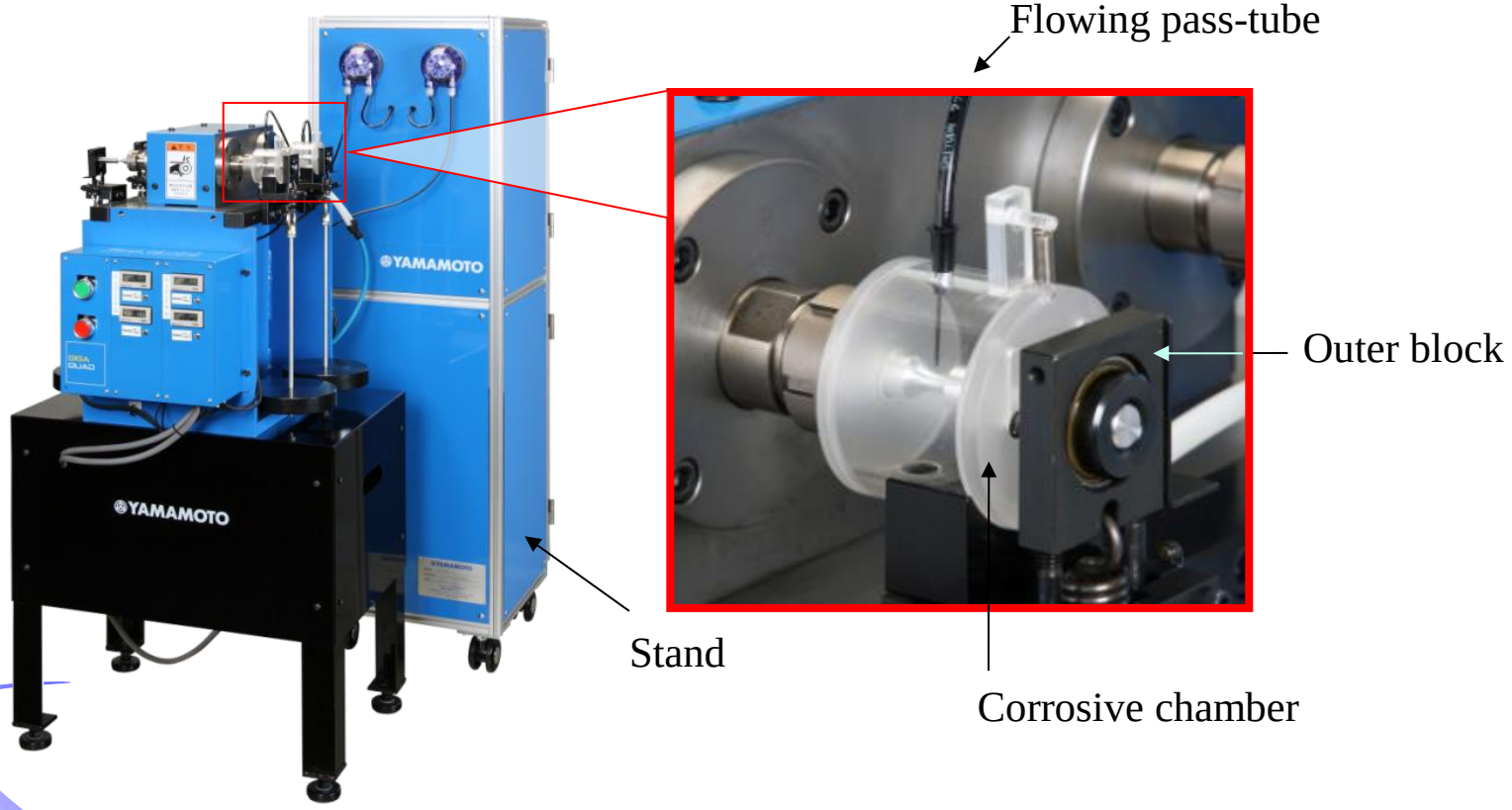
GIGA QUAD
<Main environmental options>

Corrosive environmental unit



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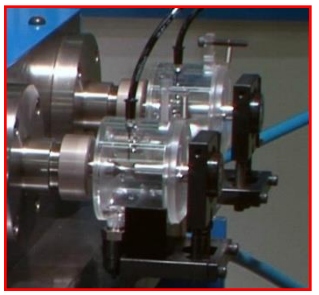
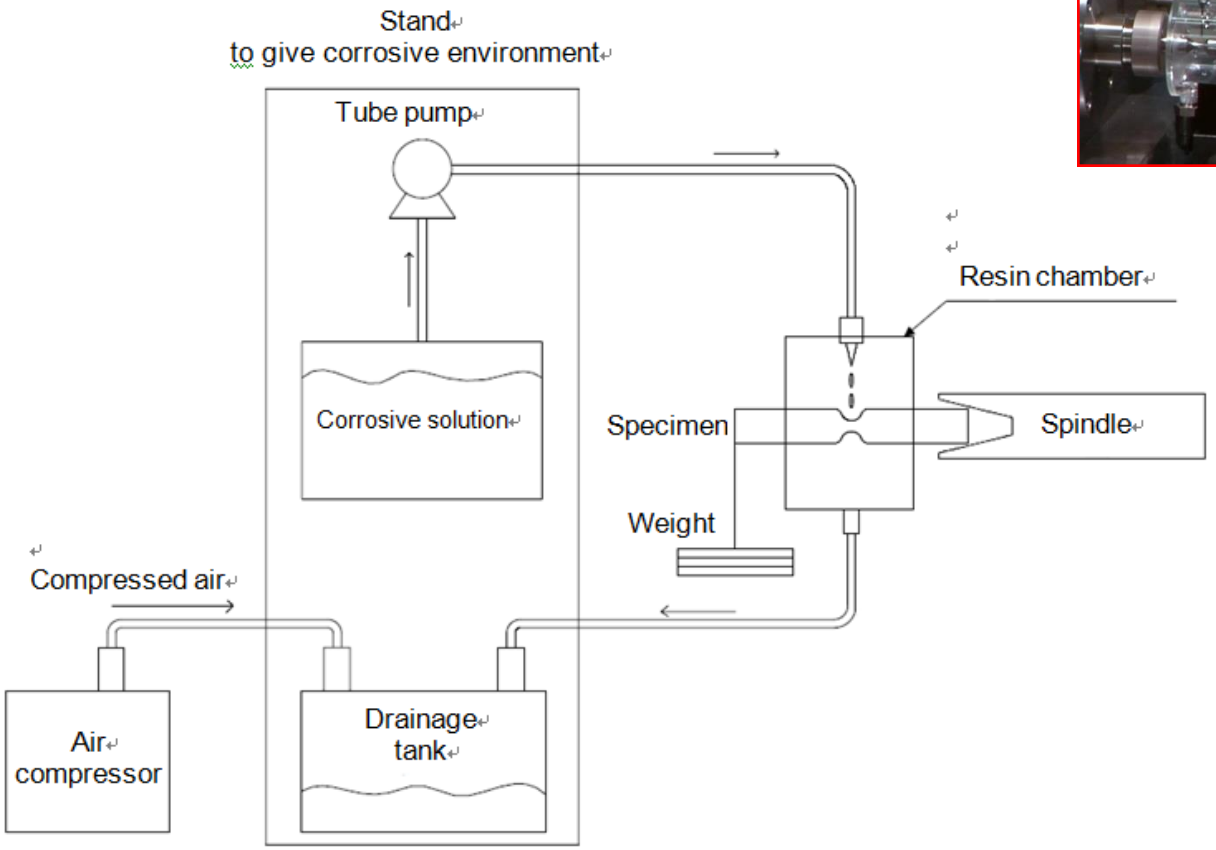
GIGA QUAD
<Main environmental options>

Corrosive environmental unit





Schematics of corrosion fatigue testing machine

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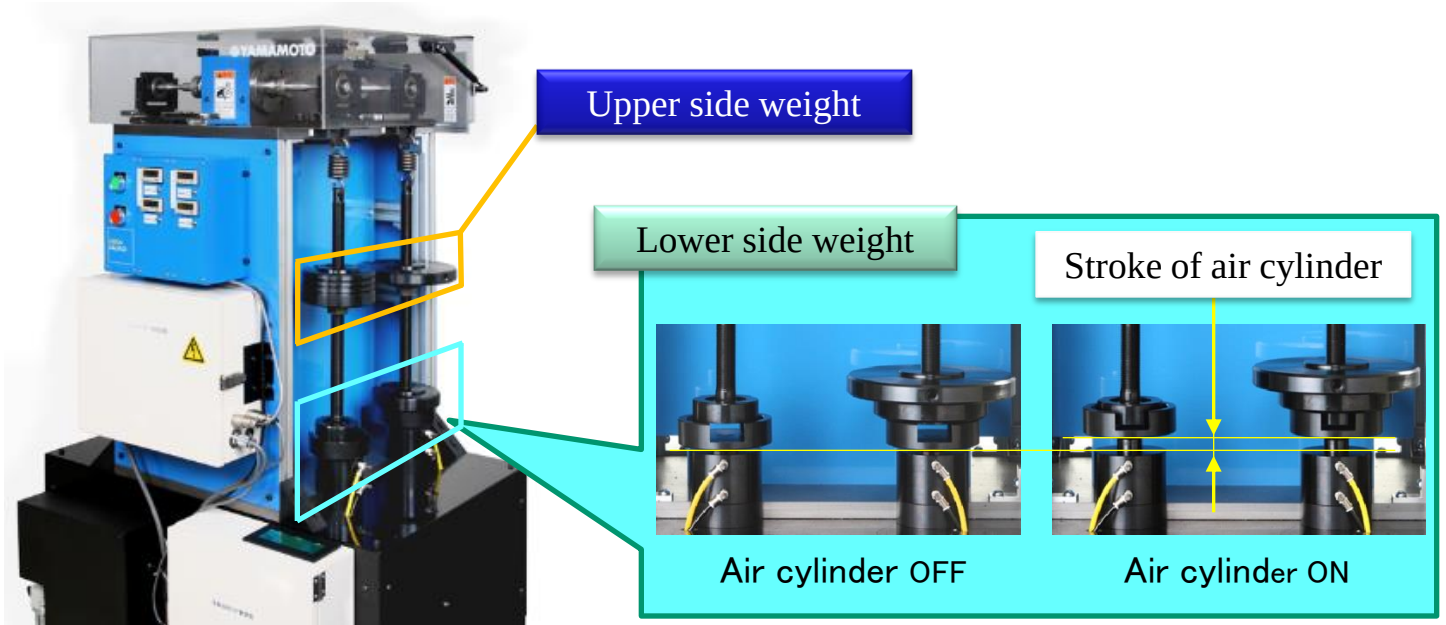
GIGA QUAD
<Main environmental options>

2-step variable loading unit



Maxmum load	Range of variable load		
	Diameter of the critical section	Upper side load (MPa)	Lower side load (MPa)
80kg x 4 points	ϕ 6 mm	173～2491	111～2274
	ϕ 8 mm	73～1050	47～959

Concluding Remarks

The high performance fatigue testing machine in rotating bending “GIGA QUAD” has been developed in this work.

Based on a lot of experimental results, the fundamental performance of this testing machine was confirmed.

Actually, GIGA QUAD are already being used at many laboratories in universities and industries in JAPAN and several countries.

Thus, every customer has informed that GIGA QUAD is successfully used to obtain a number of fatigue data under many environments within a reasonable short period.

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Thank you
for your attention.

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