

# JASTI dummy specification and New Rib damping material development

ISO/TC22/SC12/WG5

2012/10/23 Savannah

JASTI Co., Ltd.



# JASTI dummy specification

JASTI dummy parts are all interchangeable to 49CFR Part 572 requested specification.

JASTI follows (SAE) harmonization committee result; JASTI can supply Denton as well as FTSS Head replacement parts, Skin, Cap skin, Skull, Skull cap, etc.

JASTI use **new Plasticizer for Vinyl part** and **new Rib damping material**.

# Plasticizer for Vinyl parts

JASTI has started using DINA and DINP due to safety reasons since Pedestrian Head Foam Impactor development since 2005.

And DINA and DINP have been used for all other Vinyl parts of Hybrid-III 50<sup>th</sup>, 5F, FMH, etc. in 2008.

**No longer use DOP since middle of 2009.**

DINA and DINP safety certification from Europe, U.S.A. and Japan. (Please refer the following page)

**SANSOCIZER DINP**

SAFETY DATA SHEET No. 3512020 Jan.07.2011 Page 7/9

Autoignition Temperature	374°C
Lower Explosive Limit	0.4vol%
Upper Explosive Limit	2.9vol%
Specific Gravity	0.977 (20°C/4°C)
Solubility	Water : 0.0006mg/l (20°C) Alcohol, ether, BTX : Soluble.
Partition Coefficient: n-Octanol/Water	logPow=8.8
Decomposition Temperature	Not available
Viscosity	83mPa·s (20°C)
Relative vapour density	14.4 (Air=1)
Vapour Pressure	80Pa (20°C), 6×10 <sup>-5</sup> Pa (20°C)
Volume resistivity	2×10 <sup>11</sup> (30°C, Ω·cm)

**10. STABILITY AND REACTIVITY****STABILITY**

- Product is considered stable.

**POSSIBILITY OF HAZARDOUS REACTIONS**

- Hazardous polymerization will not occur.

**CONDITIONS TO AVOID**

- Avoid reaction with oxidizing agents.

**INCOMPATIBLE MATERIALS**

- Presence of incompatible materials.
- React with strong acids, strong oxidizers, permanganates and nitrates.
- Attack some form of plastics.

**HAZARDOUS DECOMPOSITION PRODUCTS**

- Combustion products include: carbon monoxide (CO), carbon dioxide (CO<sub>2</sub>), other pyrolysis products typical of burning organic material.

**11. TOXICOLOGICAL INFORMATION**

Acute Toxicity (Oral)	Not classified	: LD50 (rat) >=10g/kg	(Ref. 1)
Acute Toxicity (Dermal)	Not classifiable	: Not available	
Acute Toxicity (Gases)	Not subjectable	: Liquid (GHS Definition)	
Acute Toxicity (Vapours)	Not classifiable	: Not available	
Acute Toxicity (Dust)	Not subjectable	: Liquid (GHS Definition)	
Acute Toxicity (Mist)	Not classifiable	: Not available	
Skin Corrosion/ Irritation	Not classified	: Not irritating (rabbit)	(Ref. 2)
Serious Eye Damage/ Eye Irritation	Category 2B	: Slightly irritating (rabbit)	(Ref. 3)
Respiratory Sensitization	Not classifiable	: Not available	
Skin Sensitization	Not classifiable	: Not available	
Germ Cell Mutagenicity	Not classified	: Negative	(Ref. 4)
Carcinogenicity	Not classifiable	: Not available	
Reproductive Toxicity	Not classified	: Negative	(Ref. 5)
Specific Target Organ Toxicity (Single Exposure)	Not classified	: Negative	(Ref. 6, 7, 8)
Specific Target Organ Toxicity (Repeated Exposure)	Not classifiable	: Not available	
Aspiration Hazard	Not classifiable	: Not available	

**12. ECOLOGICAL INFORMATION****SANSOCIZER DINA**

SAFETY DATA SHEET No. 3511020 Jan.07.2011 Page 7/8

Germ Cell Mutagenicity	Not classified	: Negative
	1) Mouse lymphoma mutagenesis assay	: Negative
	2) Mouse micronucleus test	: Negative
	3) Chromosomal aberration test	: Negative
	4) Ames test	: Negative
Carcinogenicity	Not classifiable	: Not available
Reproductive Toxicity	Not classifiable	: Not available
Specific Target Organ Toxicity (Single Exposure)	Not classifiable	: Not available
Specific Target Organ Toxicity (Repeated Exposure)	Not classified	: Negative (rat, dog)
Aspiration Hazard	Not classifiable	: Not available

**12. ECOLOGICAL INFORMATION**

Hazardous To The Aquatic Environment (Acute)	Not classified	:
Hazardous To The Aquatic Environment (Chronic)	Not classified	:

**TOXICITY****ACUTE:**

- Tribolodon hakonensis (Fish), LC50 (96HR) >500mg/l
- Oncorhynchus mykiss (Fish), LC50 (96HR) >2.0mg/l

**CHRONIC:**

- Daphnia magna (Crustacea), NOEC (21 days) >100mg/l

**Persistence And Degradability**

- Biodegradable
- 82% after 28 day (BOD)

**Bioaccumulative Potentials**

- Highly bioaccumulative
- BCF=1102 2031 (Daphnia magna) (21 day)

**Mobility In Soil**

- Not available

**Other Adverse Effects**

- Not available

**13. DISPOSAL CONSIDERATIONS****DISPOSAL METHODS**

- All waste must be handled in accordance with local, state and federal regulations.
- Puncture containers to prevent re-use and bury at an authorized landfill.
- Legislation addressing waste disposal requirements may differ by country, state and/or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.
- A hierarchy of Controls seems to be common - the user should investigate:
  - (1) Reduction
  - (2) Reuse
  - (3) Recycling
  - (4) Disposal (if all else fails)
- This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. If it has been contaminated, it may be possible to reclaim the product by filtration, distillation or some other means. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate.

# New Rib damping material Introduction

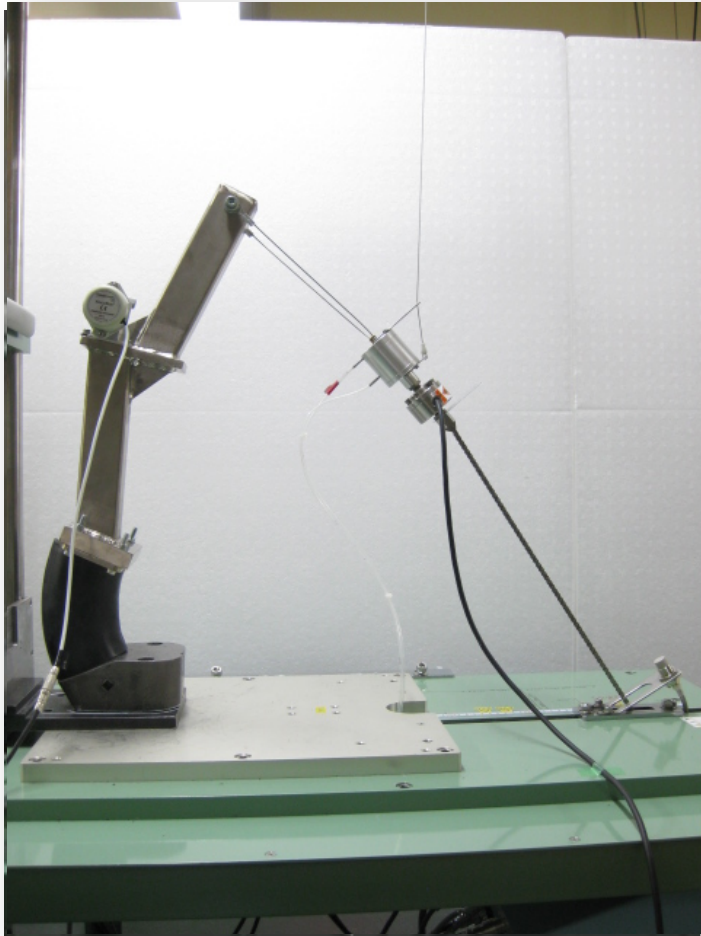
Lumbar Spine hardness influence to Chest deflection  
(Test result by ISO/TC22/SC12/WG5 2012 May Kyoto)

→50<sup>th</sup> dummy Lumbar Spine is tested **by Torso Flexion test**

→Lumbar Spine Hardness influence to Chest deflexion result.

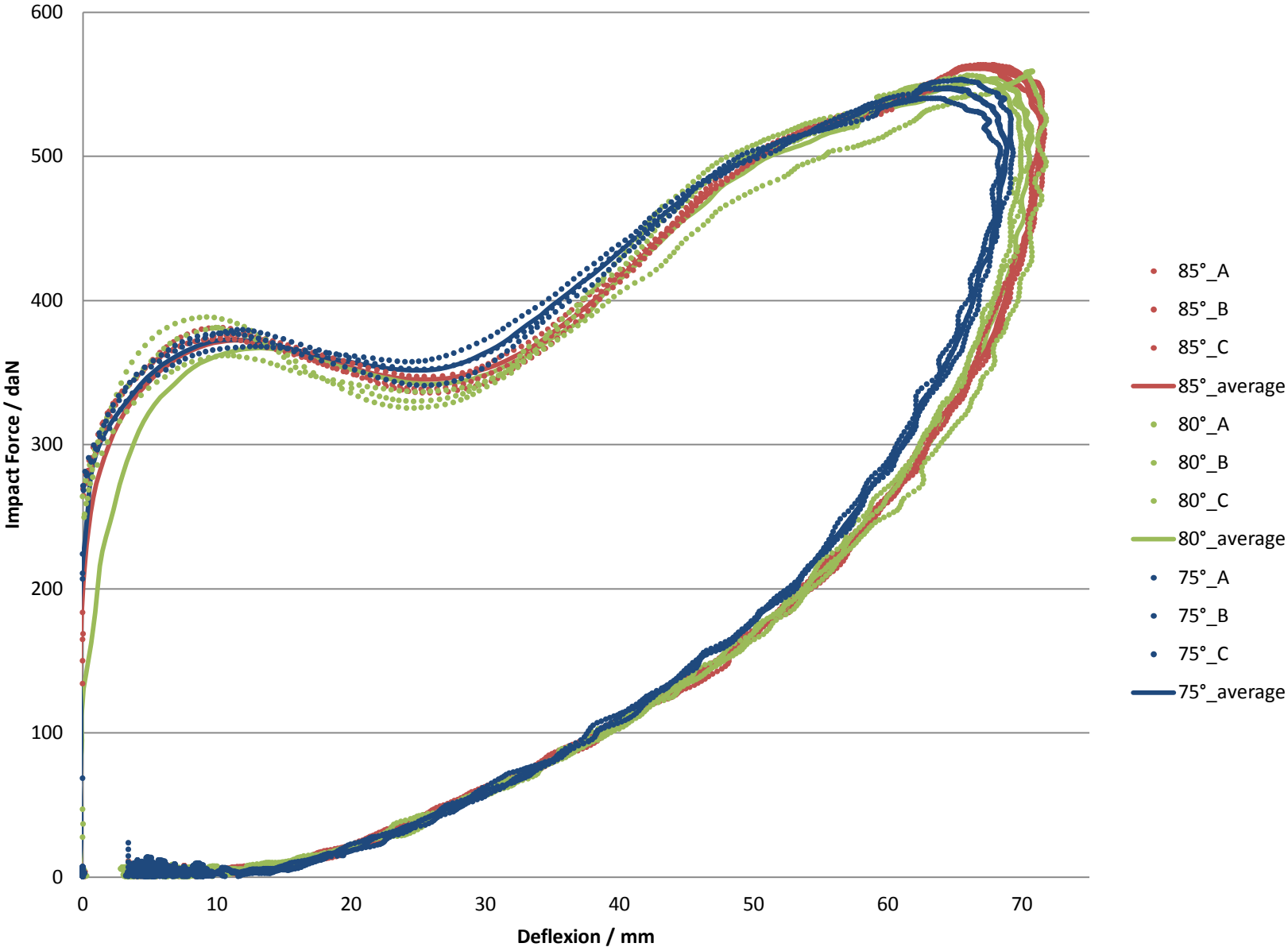
Lumbar Spine are used from **the middle of Torso Flexion test result** as former result.

# Test method

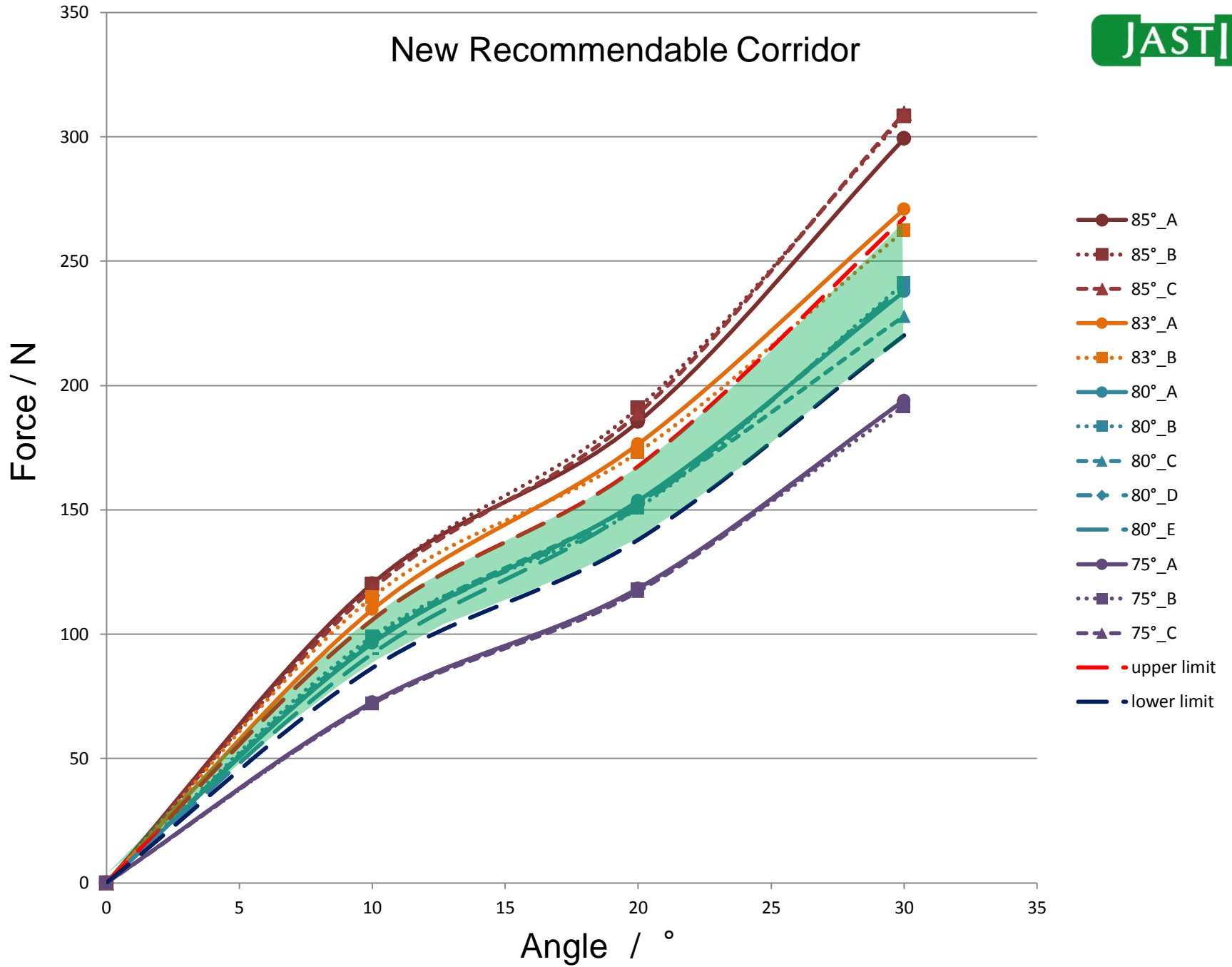


- Pelvic Adaptor+ Lumbar Spine + Spine Box attachment
- Cable torque : 1.25 N·m
- Spine Box attachment : 7.16kg
- Loaded radius: 584mm
- \* Top of Pelvic Adaptor center ~ Neck Bracket
- Initial angle : 13°
- \* Angle at top of Spine Box attachment
- Pull Angle : 30°
- \* Top center of Pelvic Adaptor ~ Pull point
- Cable to table angle at 59°  
at pull angle as 30°

# Chest Impact Test



# New Recommendable Corridor





# Background

Previous damping material are no longer available.  
Meanwhile, we manufactured Ribs from our stock .

New damping material development has started from 2008.

## Old Material;

- 1.Repeatability is not reliable.
- 2.Unstable quality; Hardness, Density, Durability,  
Heat transfer are not constant.

# Development step

## 1. First step test conditions

### 1-1. Lumbar Spine

Lumbar Spine ,Shore A 80+/-1 hardness  
as well as middle of **new recommendable corridor.**

### 1-2. Rib steel

All used Rib Steel are requested specification.

Steel material; SAE 1075

Hardness; ROCKWELL C-44-46

### 1-3 Test Room

Temperature; 20+/-1 deg. C

Humidity; 45-65%

# New Material

## Development Target

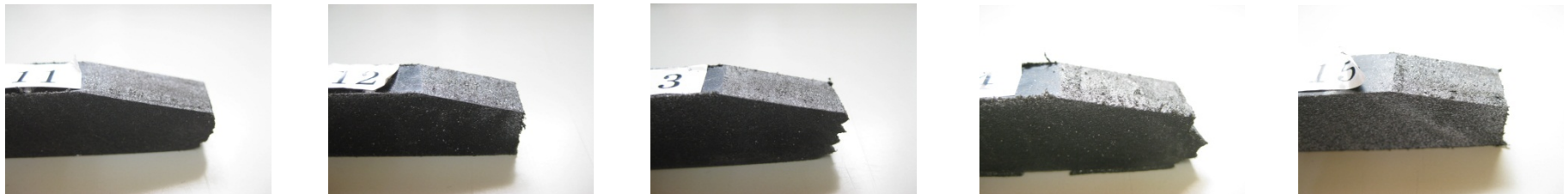
1. Material; High quality controlled production  
Mixture of contents(%) and Density, Hardness,  
mechanical strength.
2. Performance;
  - 2-1. Repeatability
  - 2-2. Durability
  - 2-3. StabilityThe performance under wider range of test temp.

# Initial Trial Products; Damping Material

## Cut Surface: A



## Cut Surface: B

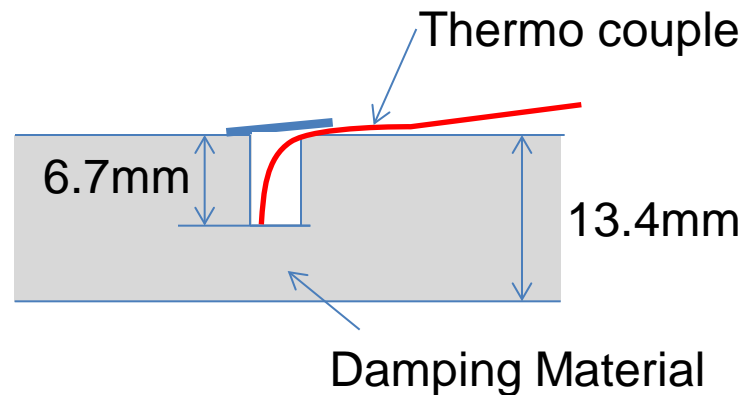


## The state after a bending test

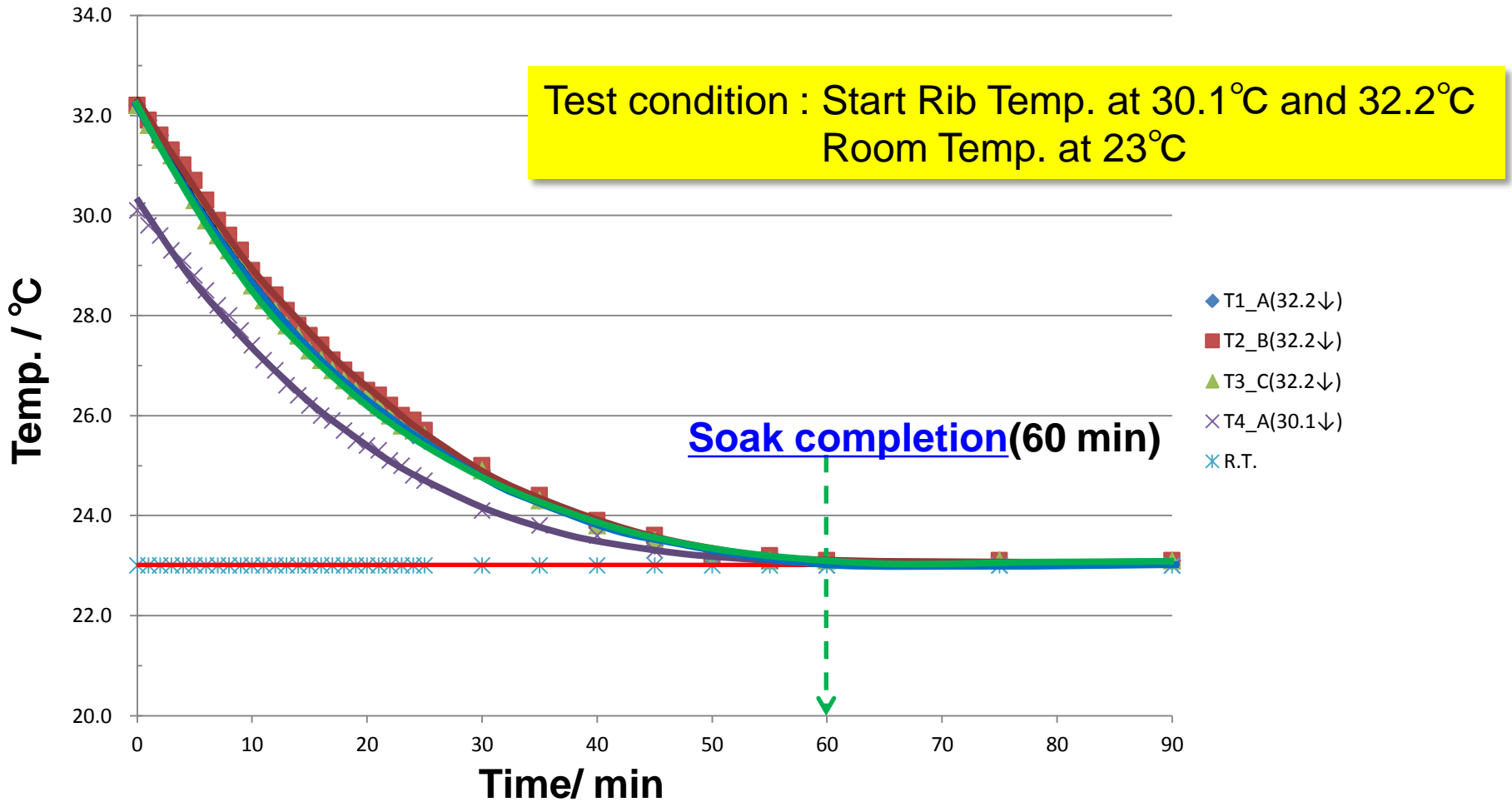


## Damping Material\_ Temperature Responsibility Test

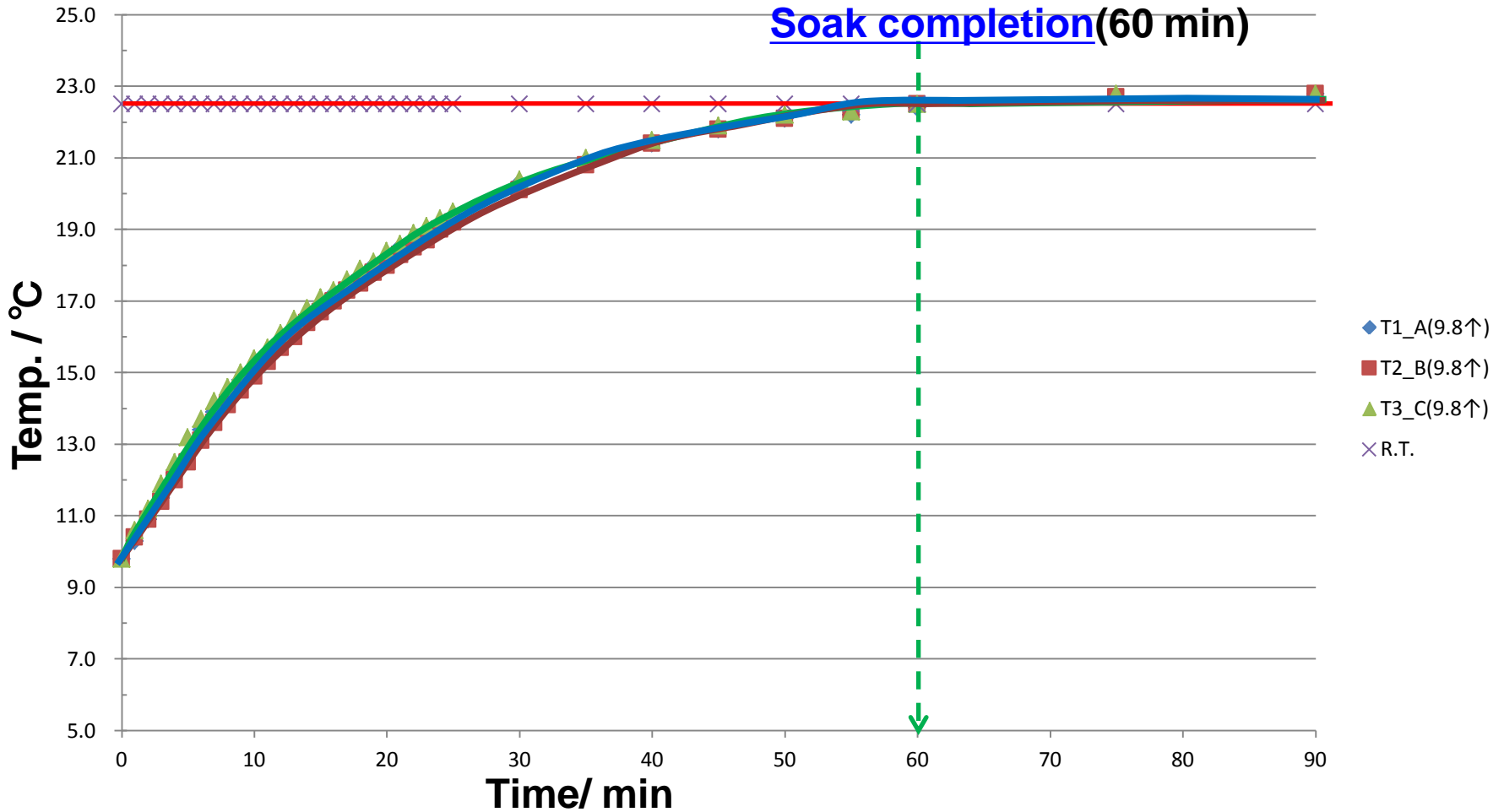
Test condition : Thickness \_13.4mm(The depth of a hole\_6.7mm)  
30°C→Room Temp.(Down)  
10°C→Room Temp.(Up)



# New Damping Material\_ Temperature Responsibility Test



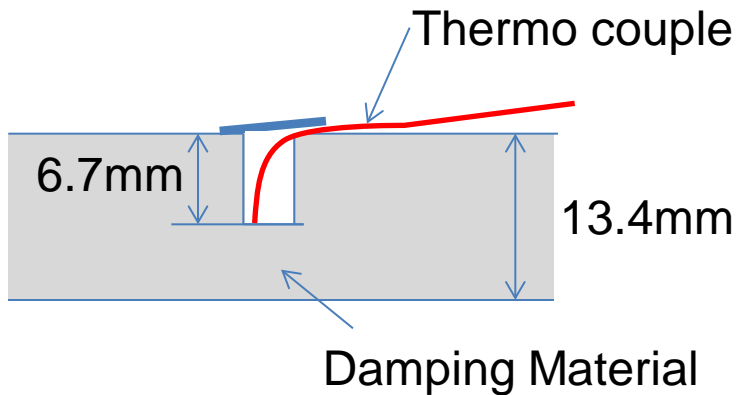
# New Damping Material\_ Temperature Responsibility Test



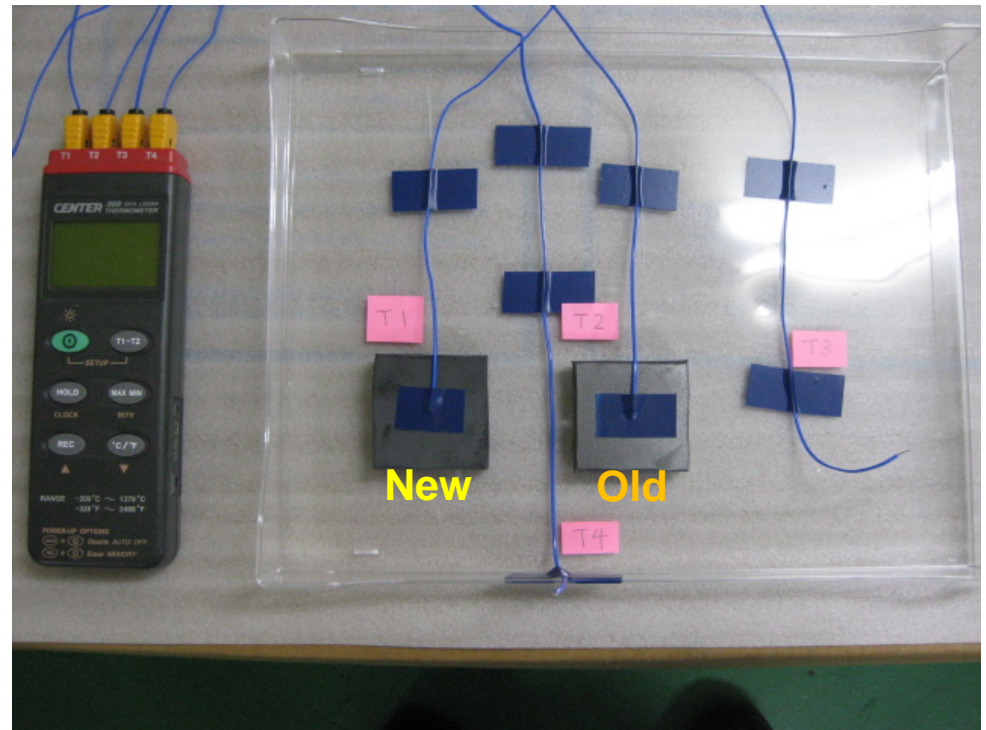
Test condition : Start Rib Temp. at 9.8°C  
Room Temp. at 22.5°C

## Damping Material\_ Temperature Adaptability(Responsibility) Test

Test condition : Thickness \_13.4mm(The depth of a hole\_6.7mm)  
30°C→Room Temp.(Down)  
10°C→Room Temp.(Up)

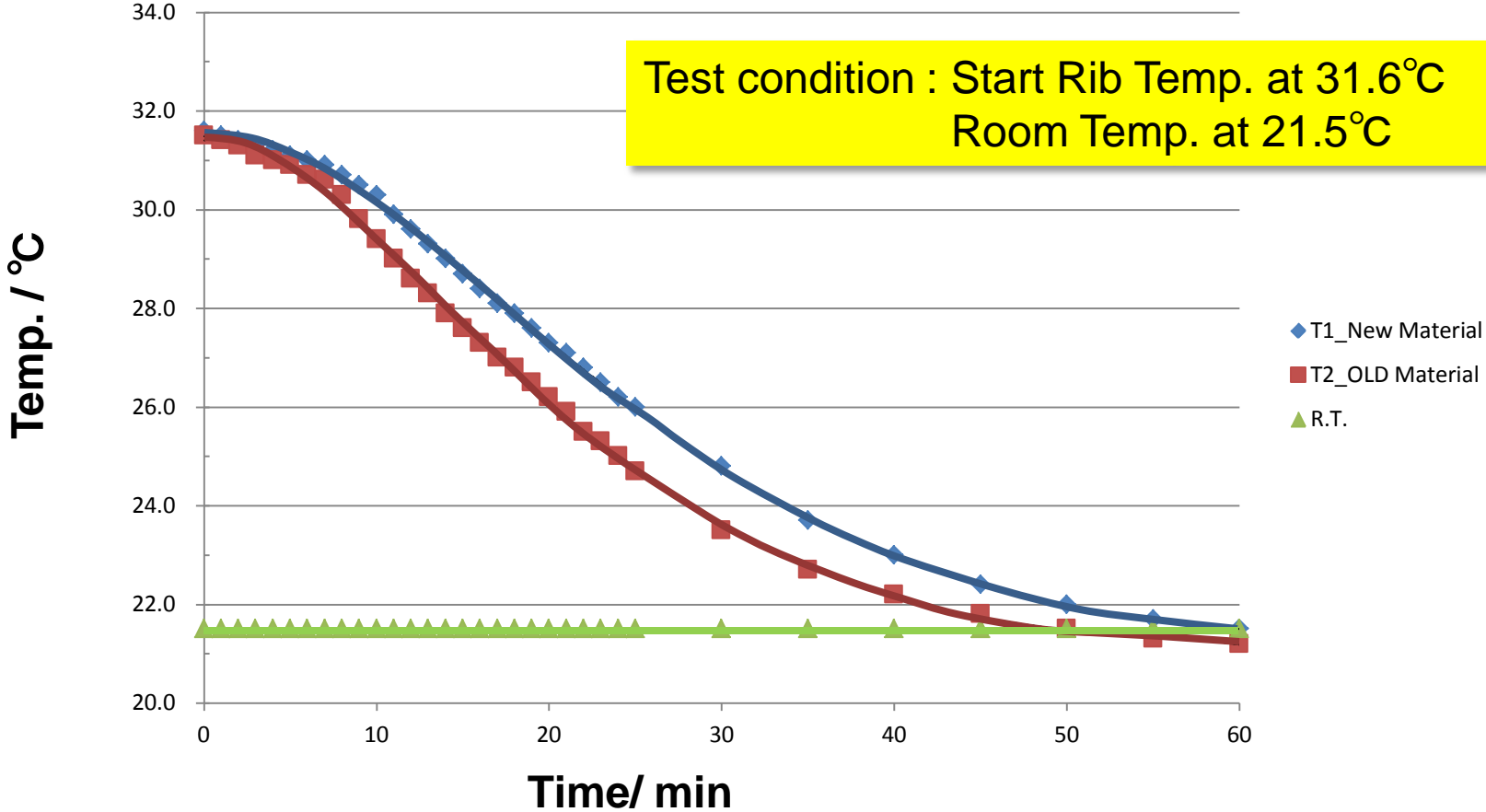


T1: New Damping Material Temp.  
T2: Old Damping Material Temp.  
T3: Room Temp.\_A  
T4: Room Temp.\_B

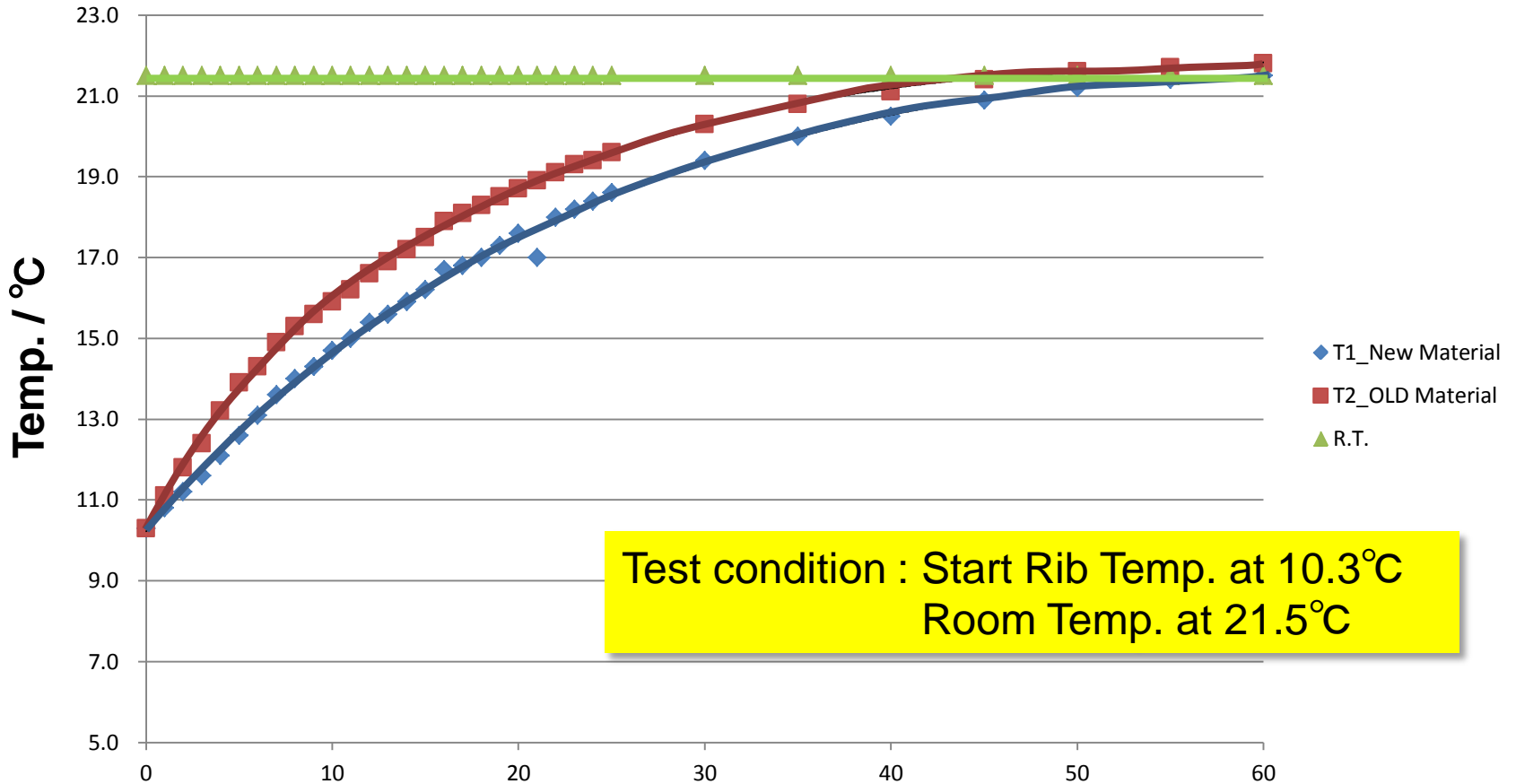




# Damping Material\_ Temperature Responsibility Test



# Damping Material\_ Temperature Responsibility Test



# Development result

1<sup>st</sup>. step ;

Max. deflexion and max. impact force are passed , hysteresis can be controlled by main material.(Figure 1)

# 1<sup>st</sup>. stage test result

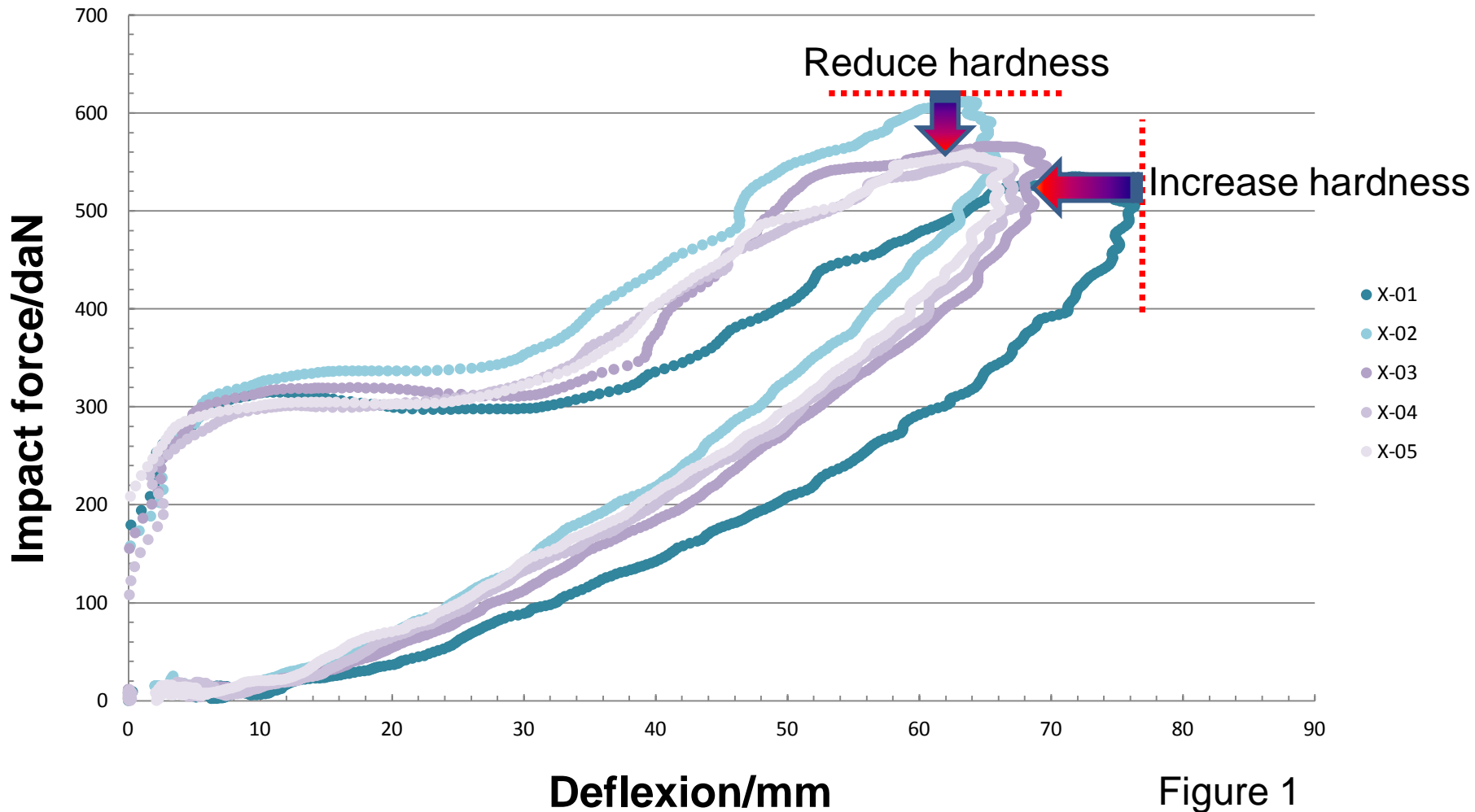


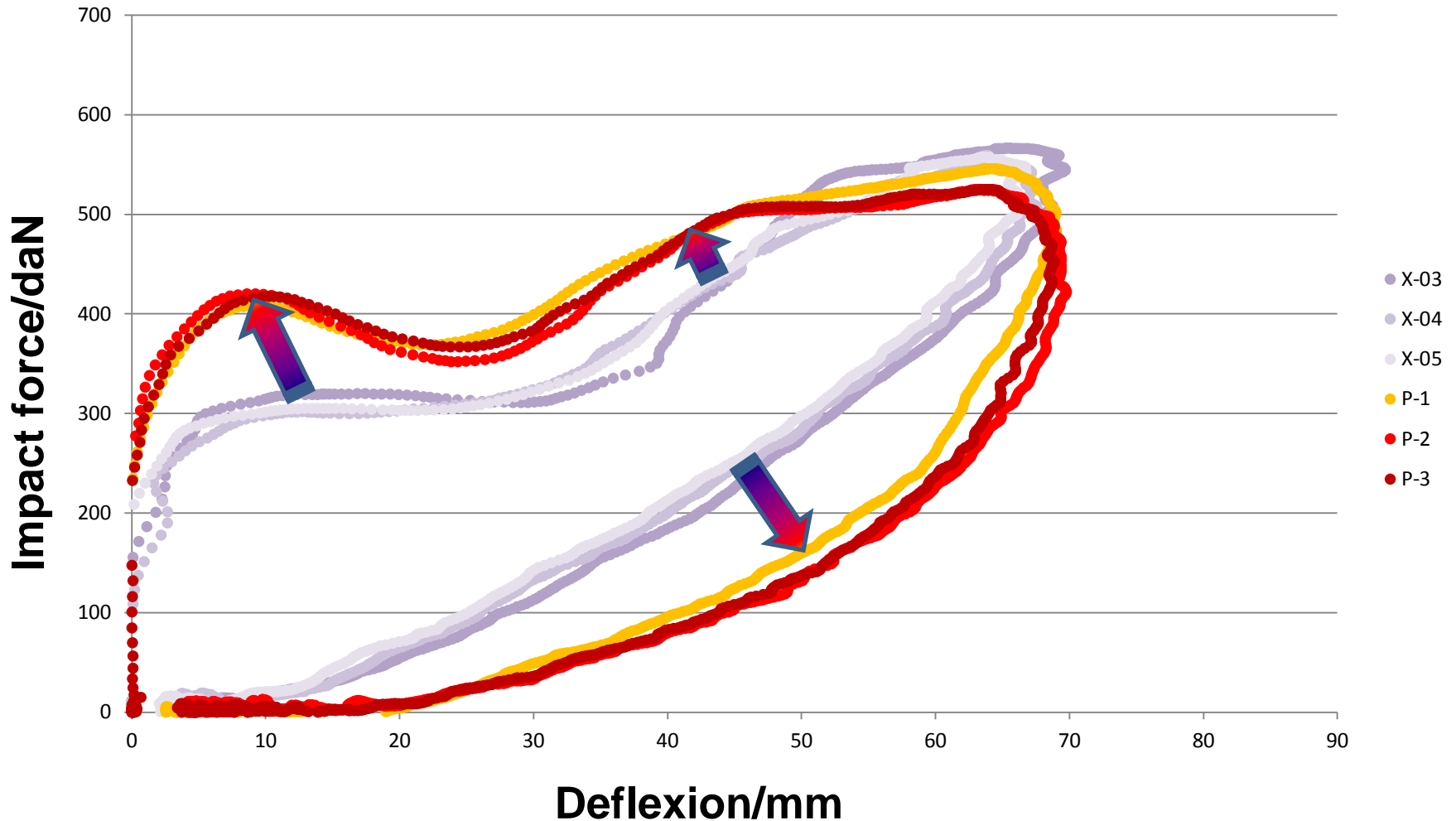
Figure 1

✘ We could develop Max. deflexion and impact force within the corridor,  
We found there are other factors to control hysteresis than hardness.

## 2<sup>nd</sup> step

Hysteresis can be controlled by using different main material. As shown Figure.2

## 2<sup>nd</sup>. stage test result



⊗ Hysteresis could be improved by changing new main contents.

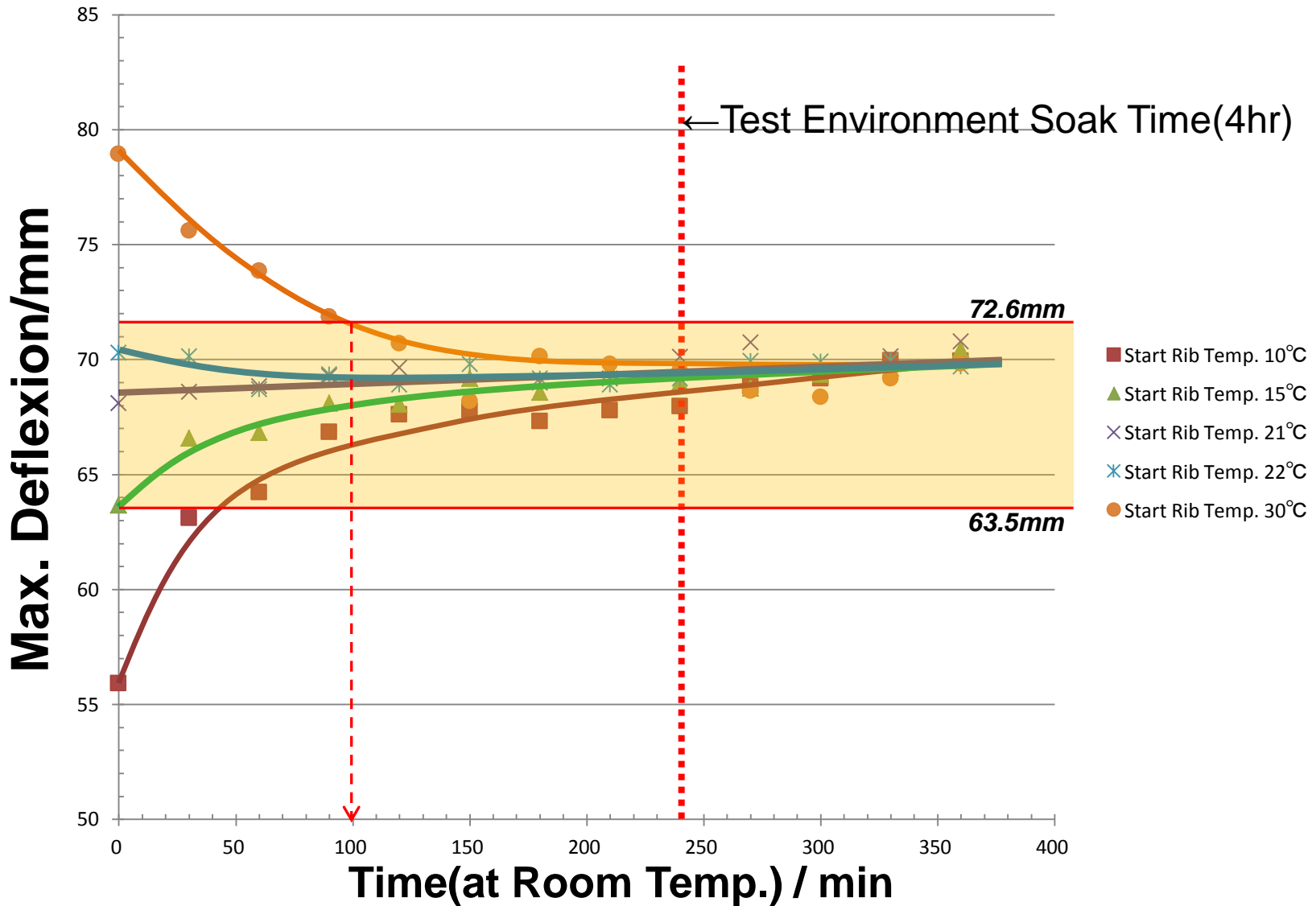
Max. deflexion and impact force can be changed by damping material hardness

Hysteresis can be controlled by used main material.

# Damping Material

	<b>Main material</b>
<b>Old Damping Material</b>	<b>PVC + Carbon</b>
<b>New Damping Material</b>	<b>Rubber + Cross Linking Polymer</b>

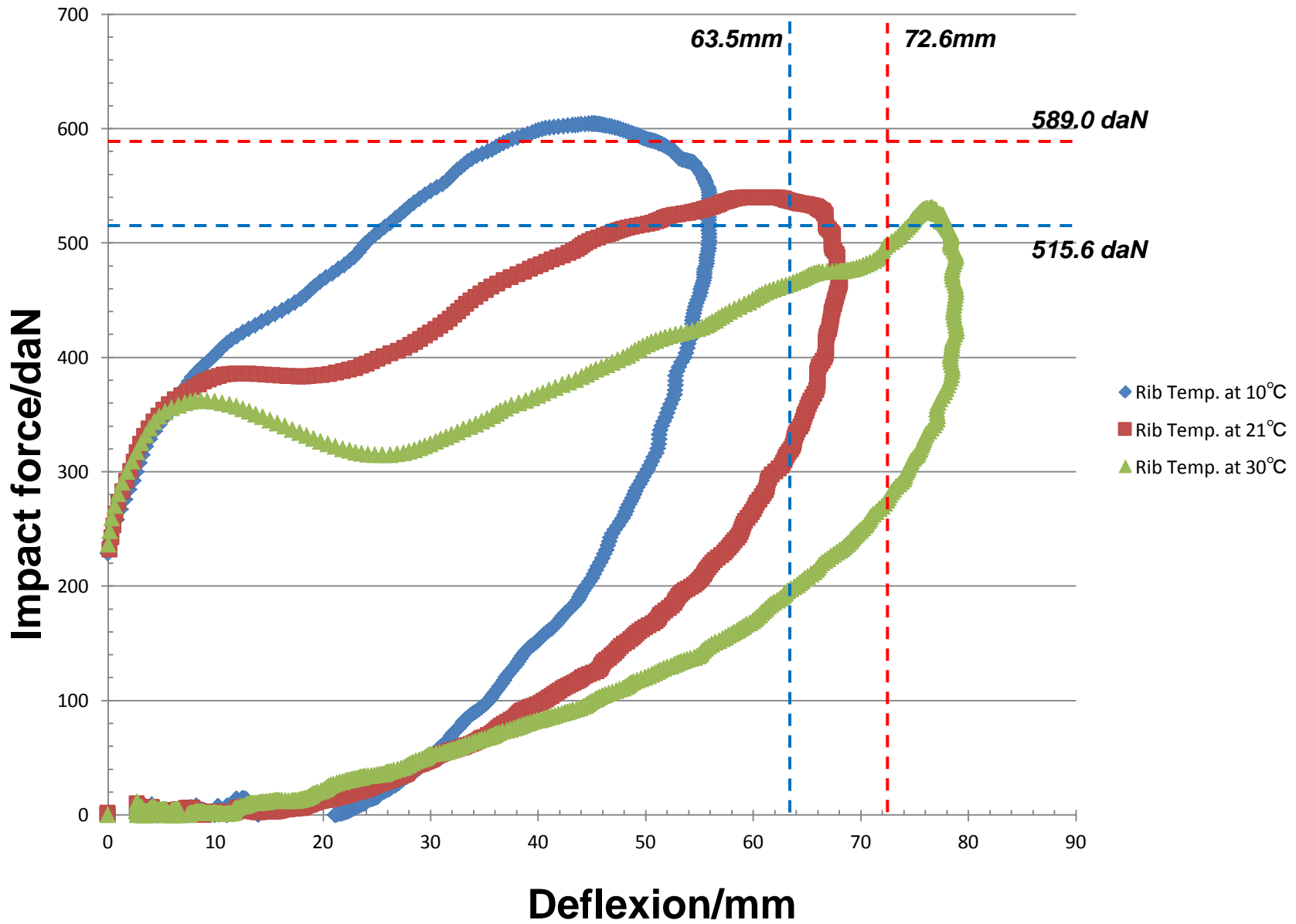
# Damping Material\_ Temperature Responsibility Test



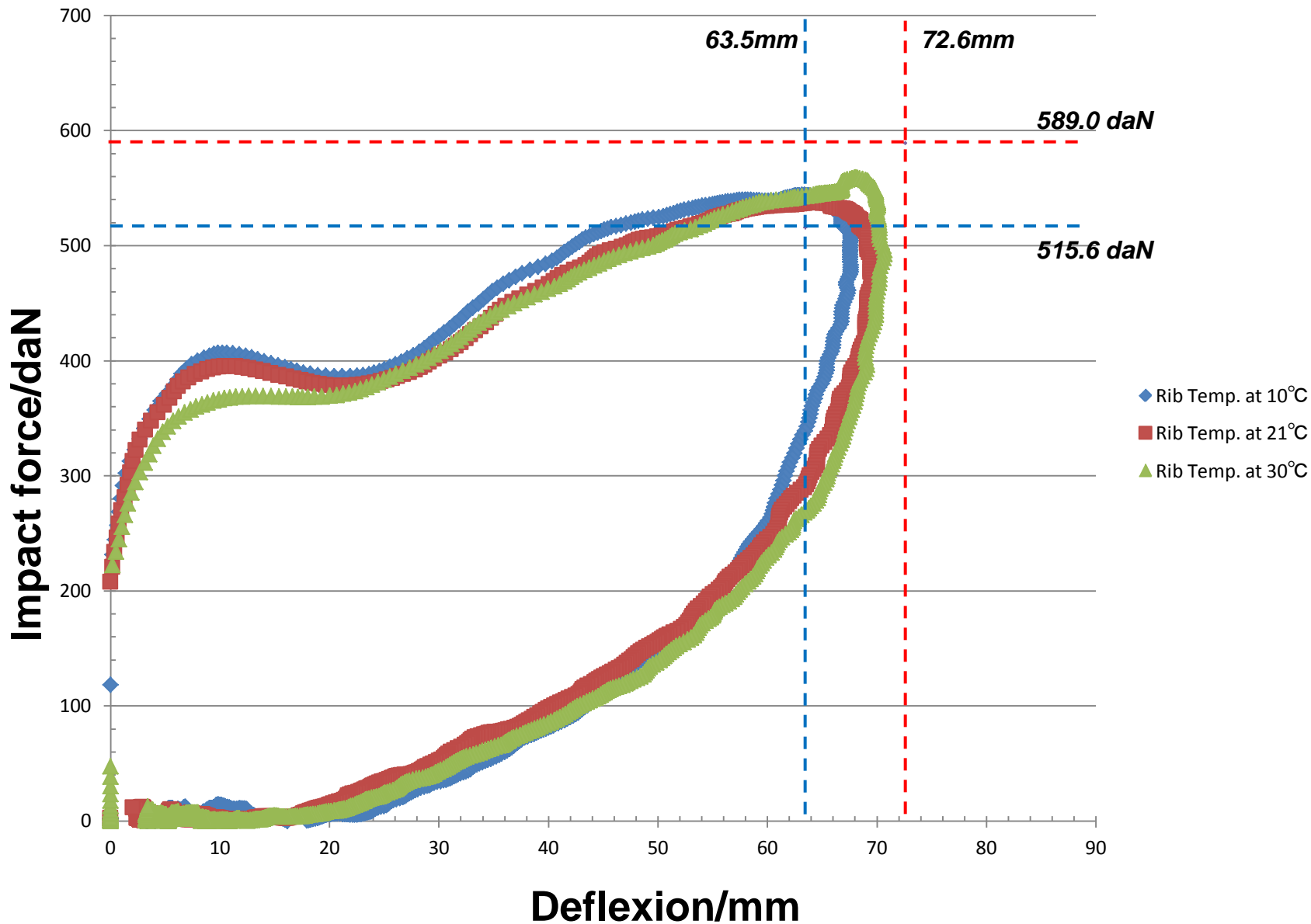
※1 The value stable in the examination of 30min interval is acquired. (Room Temp.21°C)  
 ※2 Temperature follows enough within the Soak time.



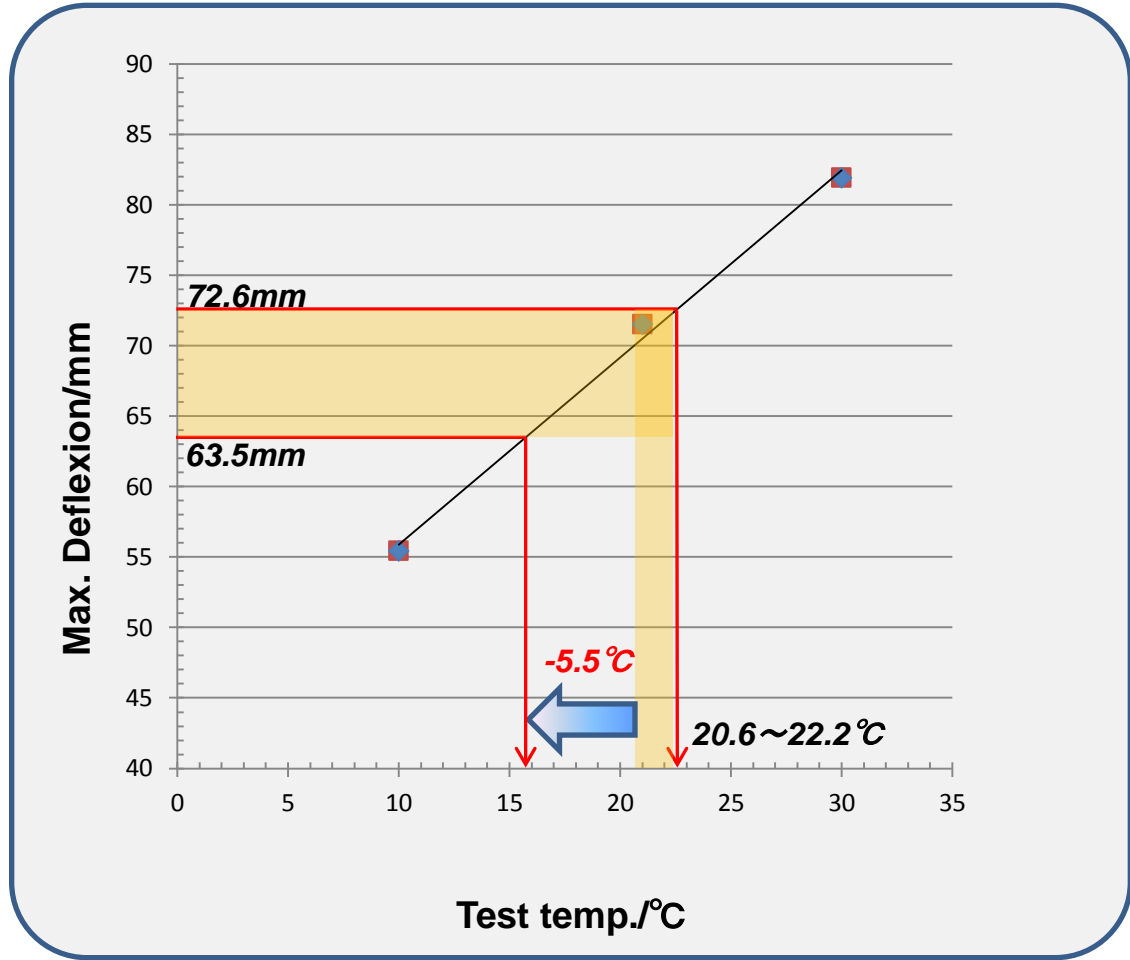
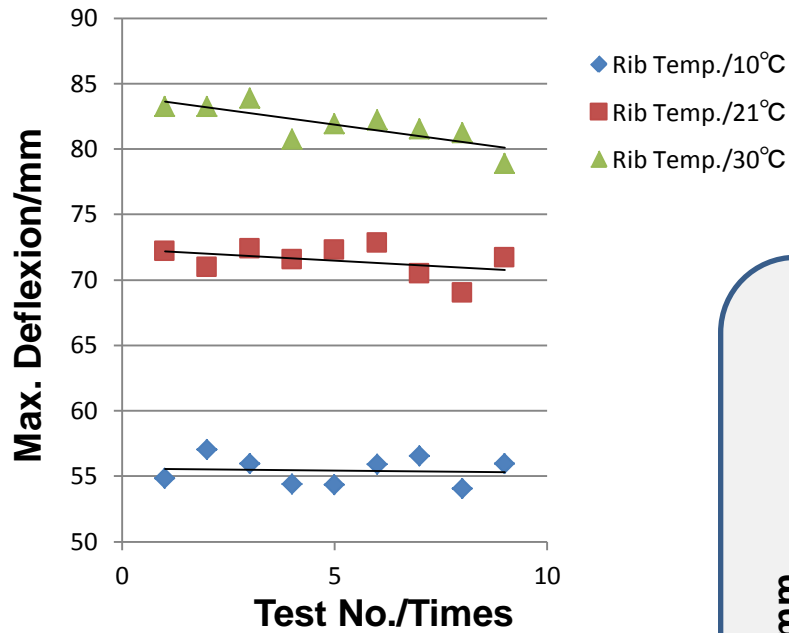
# Test Result\_Start time

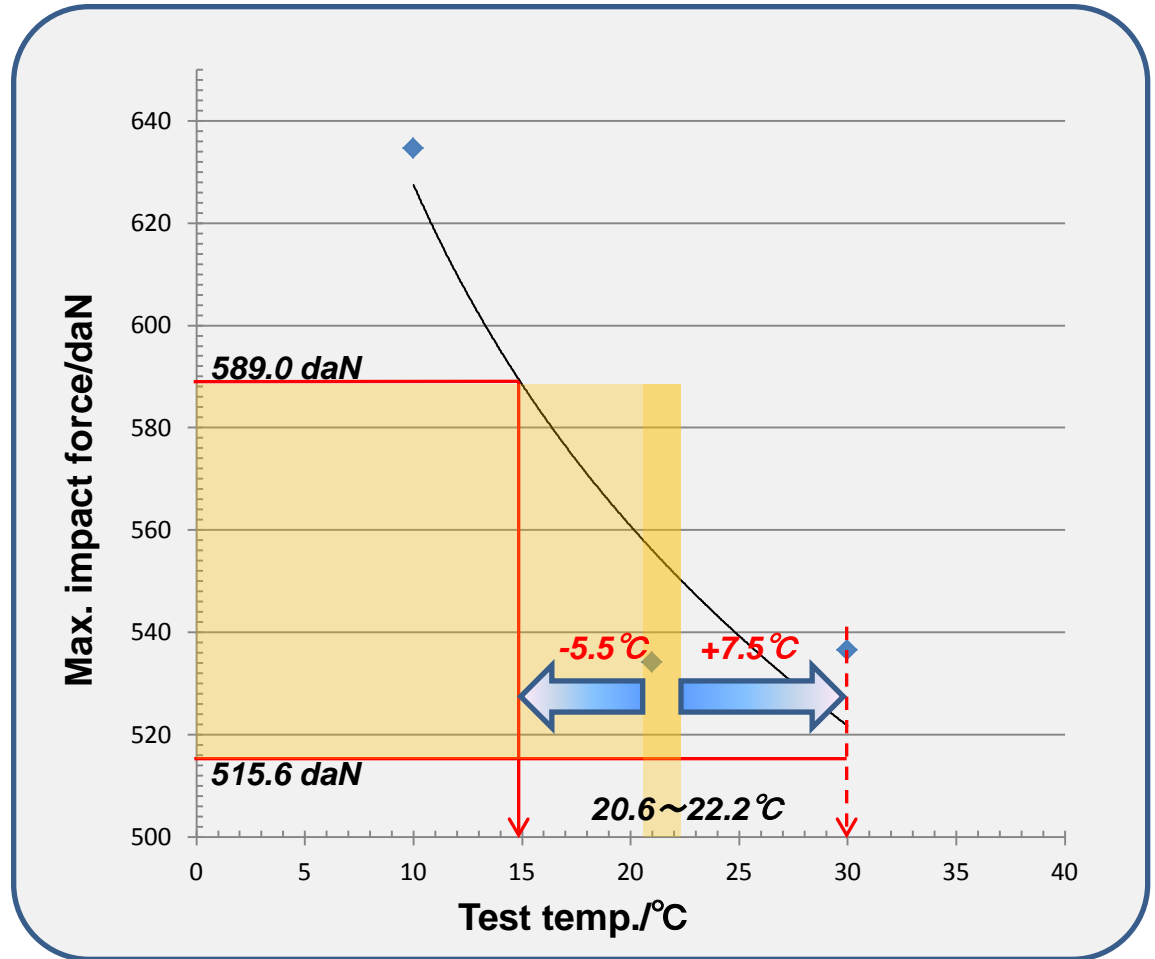
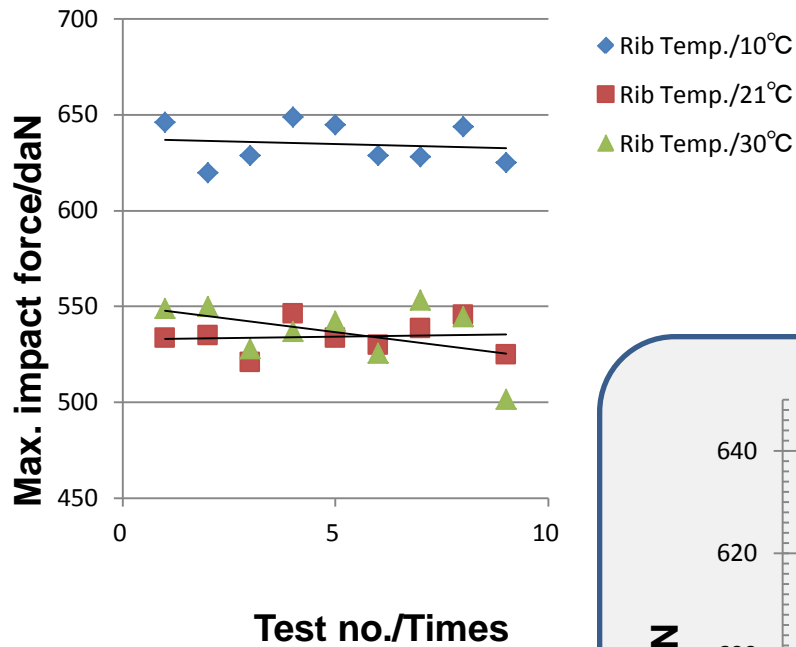


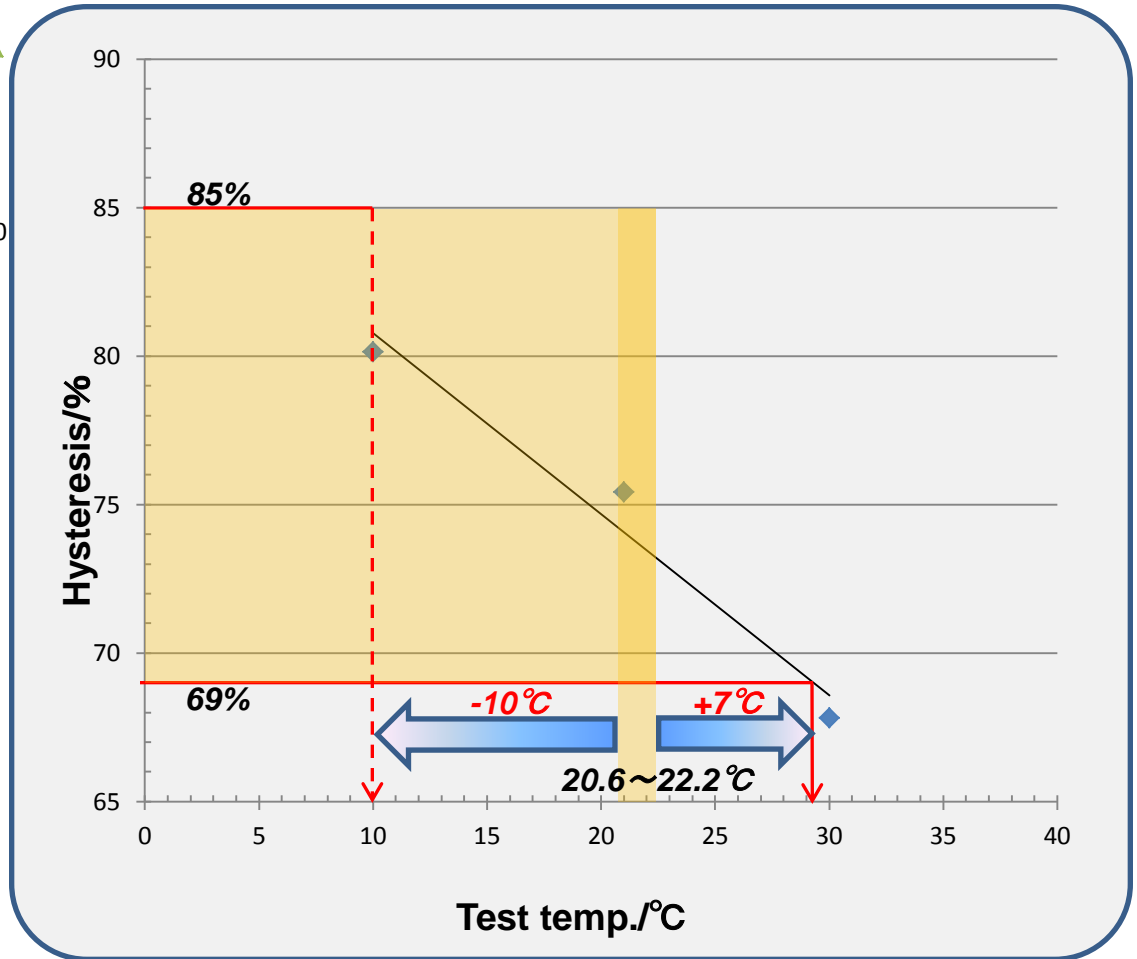
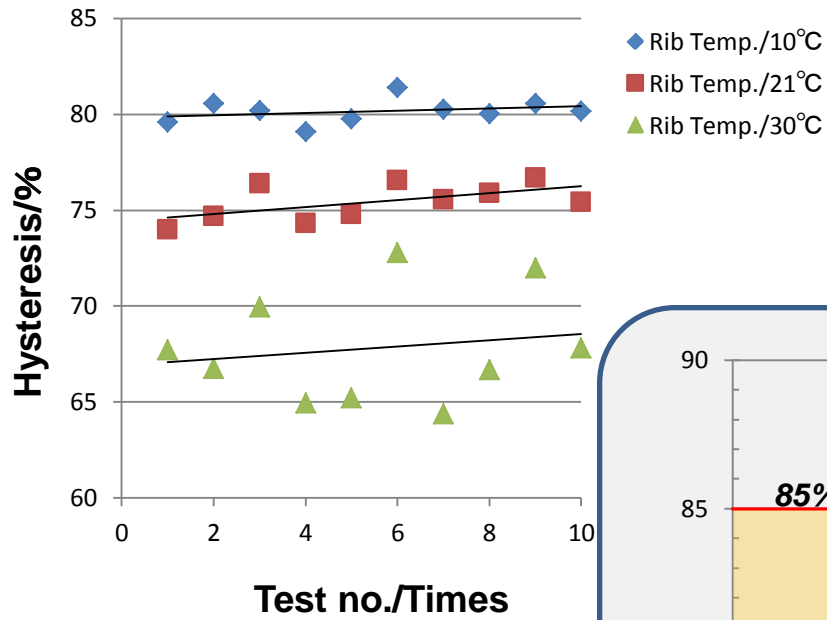
# Test Result\_120min



# H-III dummies used new Rib damping material performance







# Rib set temp. vs H-III Corridor

1. Max. Deflexion (63.5 – 7206mm)

15.1 – 22.2 deg C

2. Max. Impact Force (515.6 – 589.0 daN)

15.1 – 29.7 deg C

3. Hysteresis (69 – 85 %)

10.6 – 29.2 deg C

**New damping material; 15.1 – 22.2 deg C**

# Thank You

.



# JASTI New dummy development (For your reference)

- World SID 50

	Aug	Sep.	Oct.	Nov.	Dec.	2013 Jan.	Feb.
Head ass'y	3D review	Mold production	Mold refine and correction	Trial production			
Other Molds			Mold review and refine	Trial production			
Metal parts		5 sets trial production	Production	Assemble			
Rib			Damping material study	Trial production	Production and test		
Others							
Sensors				Sensor works with sensor manufacture			

- All listed parts have been developed under latest ISO data base on
- Sep. 2012.
- World SID 5F and others dummy development will follows in 2013