

KEPITAL H100 Introduction

[Polyacetal Homopolymer]

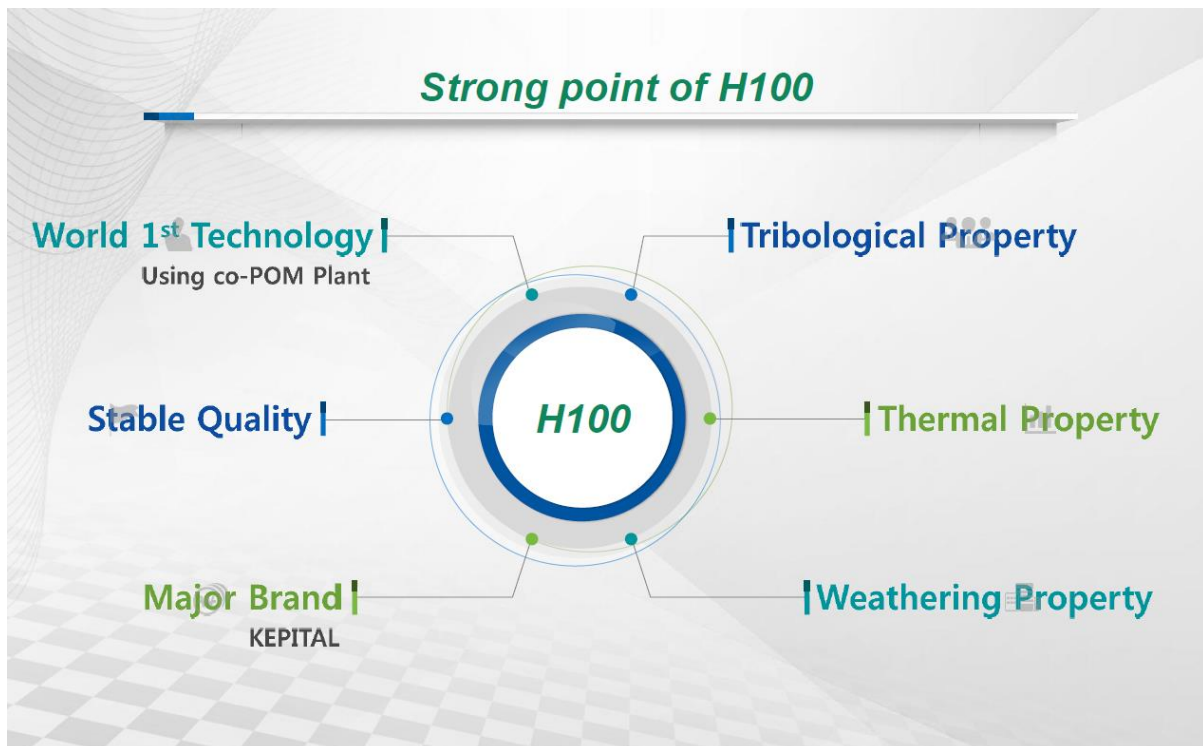
R&D Center

1. General Information

- (1) KEPITAL H100 is a new polyacetal homopolymer developed through long-term research and development by Korea Engineering Plastics., Inc. (KEP)
- (2) KEPITAL H100 exhibits better wear resistance, creep resistance, and fatigue resistance properties as it was created through our own proprietary technologies.
- (3) In addition, considering mechanical properties, KEPITAL H100 exhibits similar properties and better window process when compared to our competitor`s homopolymer.
- (4) KEPITAL H100 can be applied to various fields such as gears, bushing, housing, roller, and conveyor belts.

2. Characteristics

- (1) High viscosity and unfilled acetal homopolymer
- (2) High mechanical strength and stiffness without the need for filler reinforcements, or modifications
- (3) Toughness, high impact strength, and high elongation without the need for impact modifiers
- (4) High gear tooth strength
- (5) Improved friction and wear performance versus common steel compare to the other acetal homopolymer
- (6) Outstanding creep resistance and long-term fatigue endurance versus the other acetal homopolymer



3. General properties

The general properties of KEPITAL H100 is shown in Table 1. KEPITAL H100, a polyacetal homopolymer, exhibits not only better mechanical properties compared to polyacetal copolymer, but also similar properties to our competitor's polyacetal homopolymer.

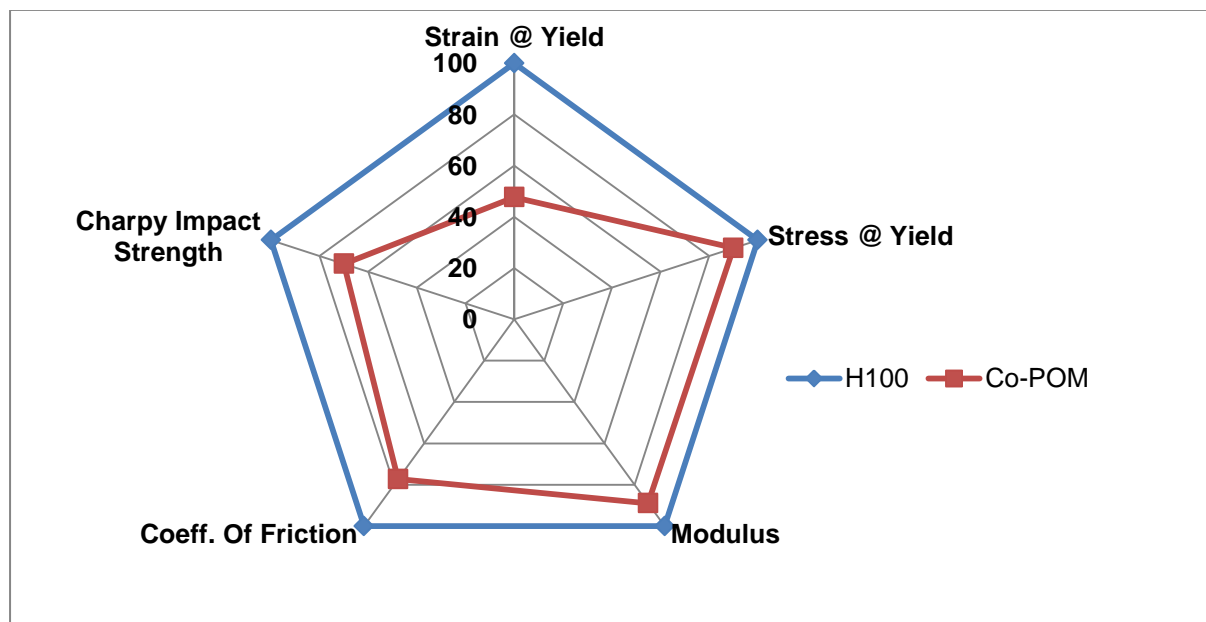
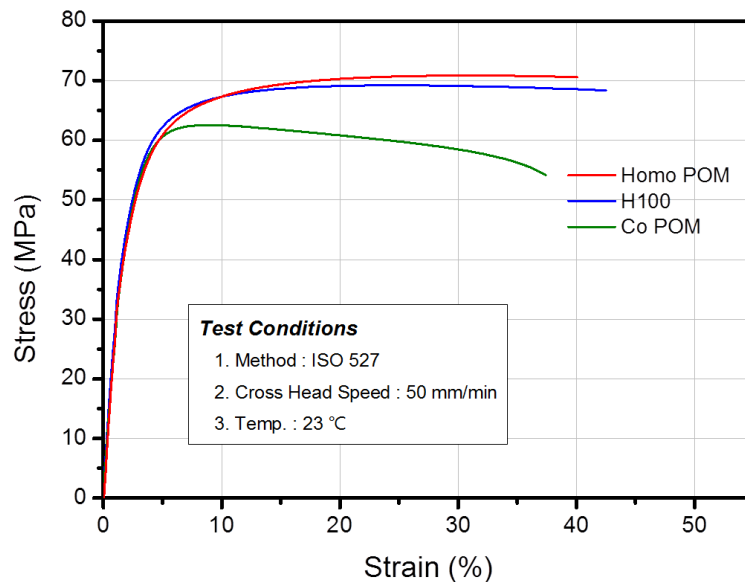


Table 1. Typical properties of KEPITAL H100

Description		Test Method	Unit	Homo POM	KEPITAL H100	Co POM (F10-02)
Physical	Density	ISO 1183	g/cm ³	1.42	1.42	1.41
Thermal	Melt index	ISO 1133	g/10min	2.5	2.2	3.0
	Melting point	ISO 11357-3	°C	177	176	165
Mechanical	Tensile strength	ISO 527	MPa	71	70	63
	Elongation at yield		%	26	21	10
	Nominal strain at break		%	40	45	40
	Tensile modulus		MPa	2,930	3,100	2,600
	Flexural strength	ISO 178	MPa	92	92	83
	Flexural modulus		MPa	2,730	2,750	2,400
	Charpy impact strength (notched, 23°C)	ISO 179/1eA	kJ/m ²	14	11	7
	Izod impact strength (un-notched, 23°C)	ISO 180	kJ/m ²	297	305	263
	L type impact strength	R=0	kJ/m ²	16	19	14
		R=1	kJ/m ²	75	89	57

3.1. Stress-strain curve(S-S curve)

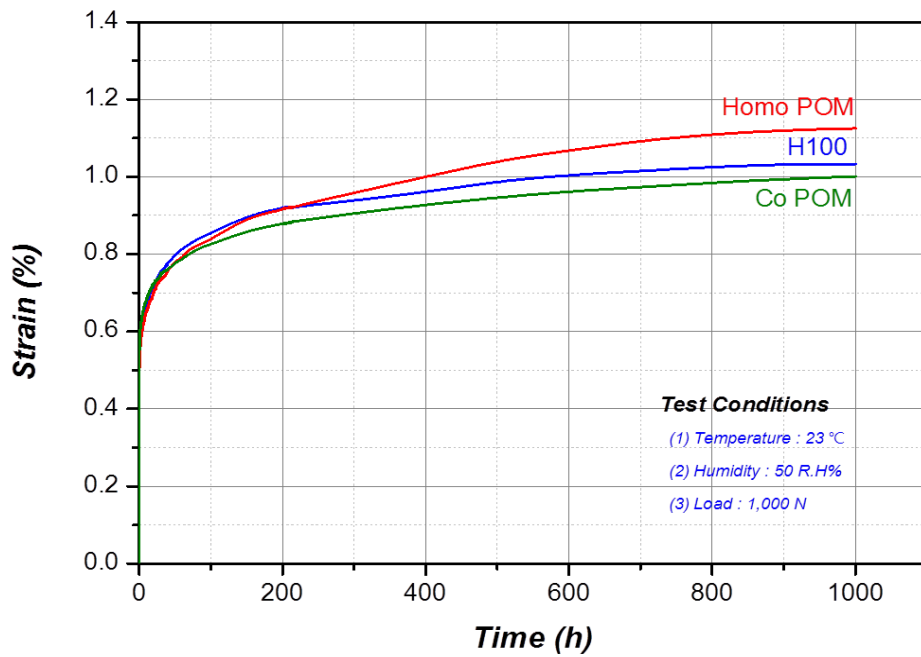
Tensile stress-strain curve of KEPITAL H100 is shown in Figure 1. Maximum stress is referred to as tensile strength and strain at break is referred to as tensile elongation on the S-S curve. KEPITAL H100 exhibits not only better tensile properties compared to polyacetal copolymer, but also similar properties to our competitor's polyacetal homopolymer.



[Figure 1] Tensile stress-strain curve(S-S curve) of KEPITAL H100

3.2. Creep resistance

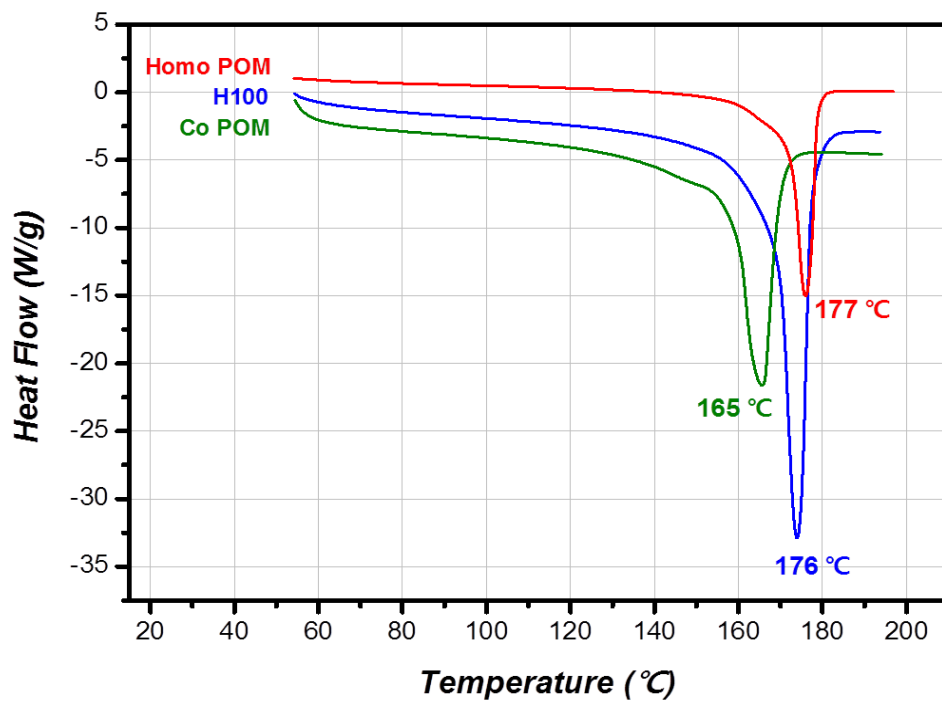
Tensile creep resistance of KEPITAL H100 is shown in Figure 2. Creep deformation occurs due to constant stress over long periods. As such, creep resistance properties are inversely proportional to deformation. KEPITAL H100 exhibits not only better creep resistance properties compared to polyacetal copolymer, but also slightly superior properties to our competitor's polyacetal homopolymer.



[Figure 2] Tensile creep resistance of KEPITAL H100

4. Thermal properties

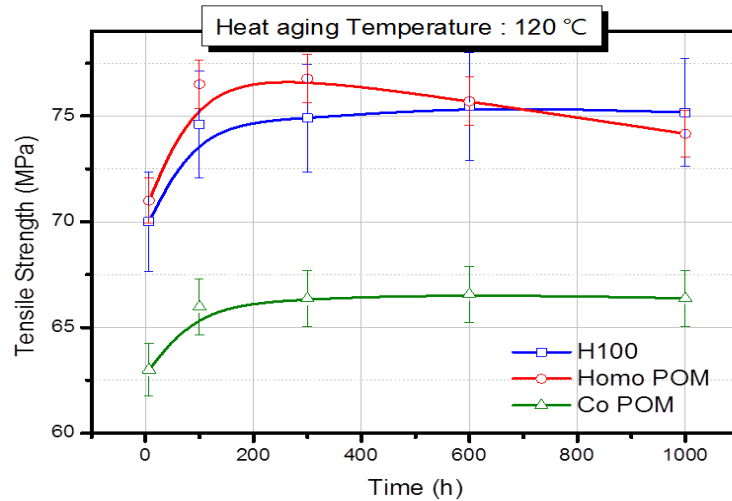
4.1. Melting point



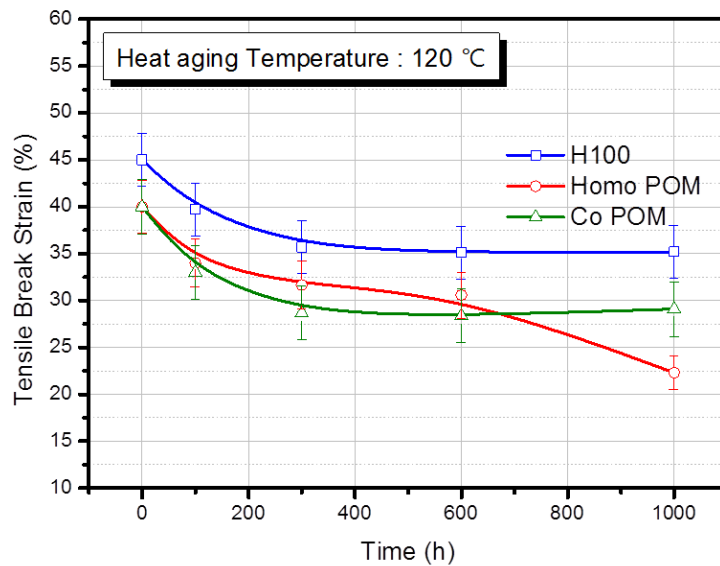
[Figure 3] DSC curve of KEPITAL H100

4.2. Heat resistance

Heat resistance properties of KEPITAL H100 are shown in Figures 4, 5, and 6. KEPITAL H100 exhibits not only less significant changes of tensile strength and elongation compared to polyacetal copolymer but also less loss of color when stored at 120 °C compared to our competitor's polyacetal homopolymer.



[Figure 4] Tensile strength change of KEPITAL H100 at 120 °C
(Test machine : UL Spec. Oven)



[Figure 5] Tensile elongation change of KEPITAL H100 at 120 °C
(Test machine : UL Spec. Oven)



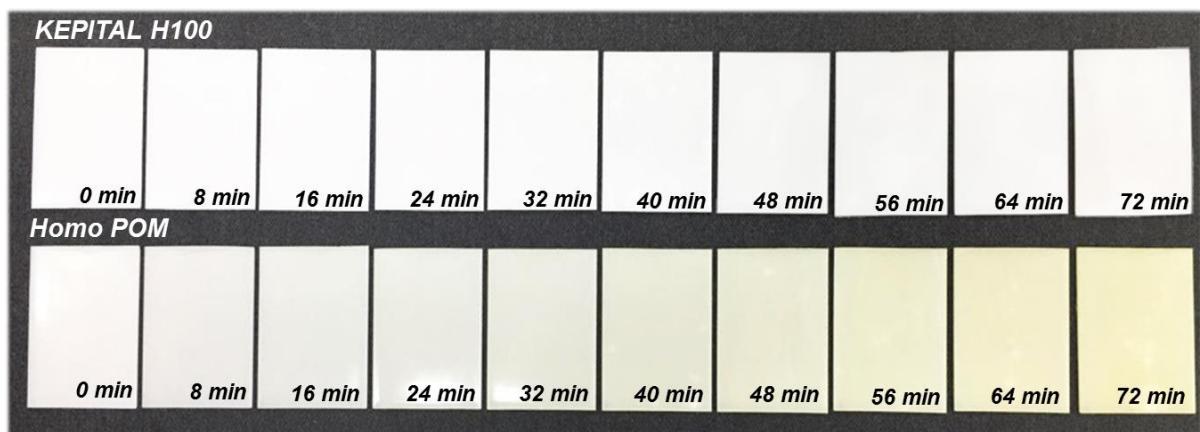
[Figure 6] Heat resistance (color change) of KEPITAL H100

Test conditions

- Test machine: UL Spec. Oven
- Test specimen: ISO tensile type
- Test temperature: 140 °C
- Test duration: 1 week

4.3. Heat resistance during injection molding

Heat resistance properties of KEPITAL H100 during injection molding are shown in Figure 7. KEPITAL H100 exhibits superior color differences during injection molding when compared to our competitor's polyacetal homopolymer.

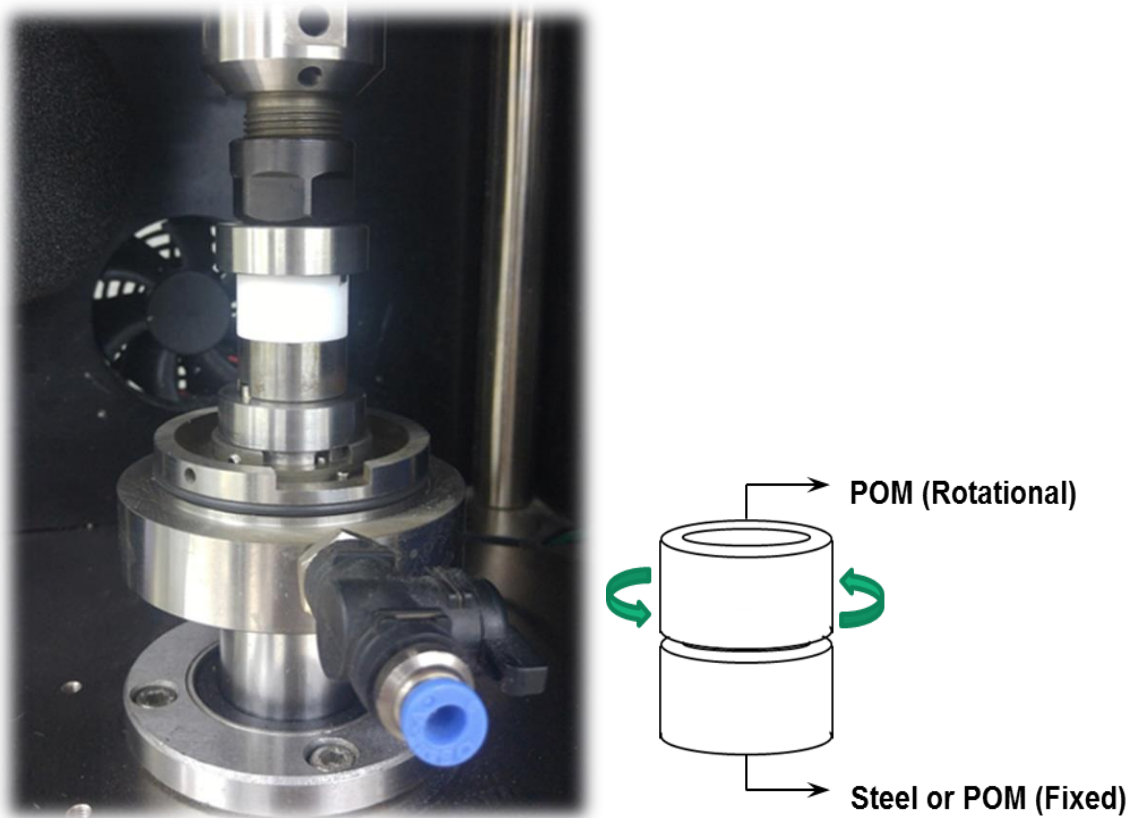


[Figure 7] Color change of KEPITAL H100 during injection molding

Test conditions

- Injection temp. (°C) : [Nozzle] 220 / 220 /220 /220 [Hopper]
- Retention time in injection machine : total 72 min
- Capacity of injection machine : 100 Ton

5. Tribological properties



[Figure 8] Test method of Ring-on-Ring Type(Thrust Washer)

$$V_s = \frac{V}{P \cdot L}$$

V_s : specific wear amount ($\text{mm}^3/\text{N}\cdot\text{km}$)

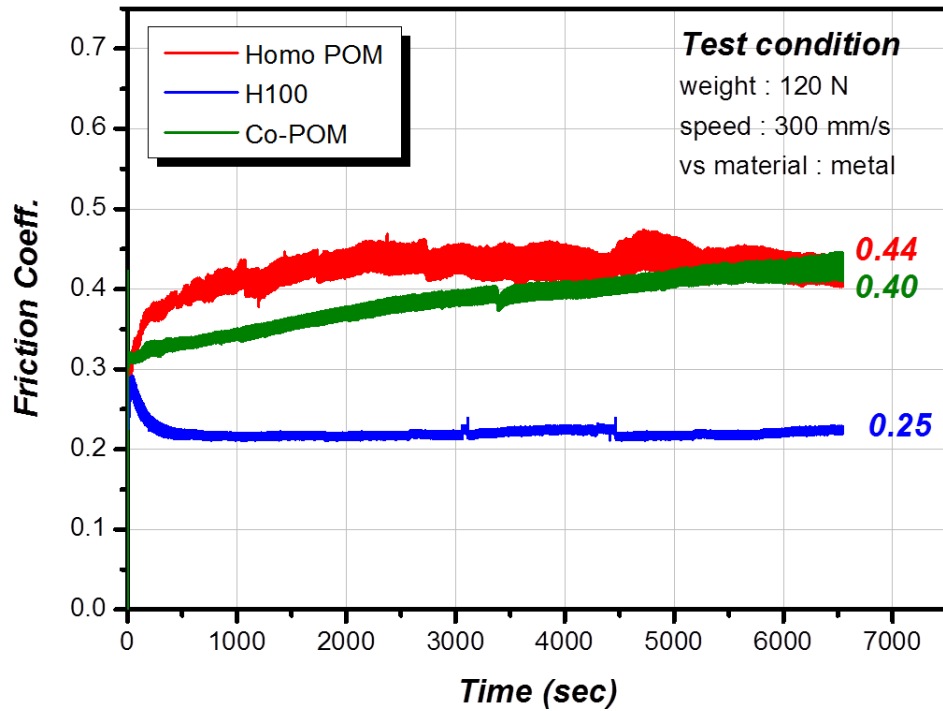
V : amount of wear (mm^3)

P : testing load (N)

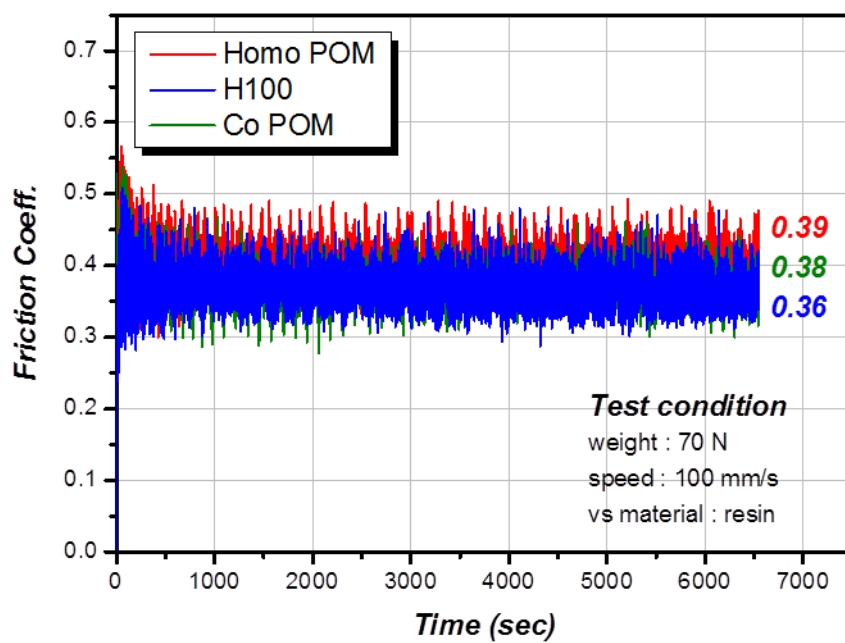
L : average sliding distance (km)

Wear and friction resistance properties of plastics generally change contingent upon pressure, operation speed, temperature, and humidity. The tribological test method is shown in Figure 8.

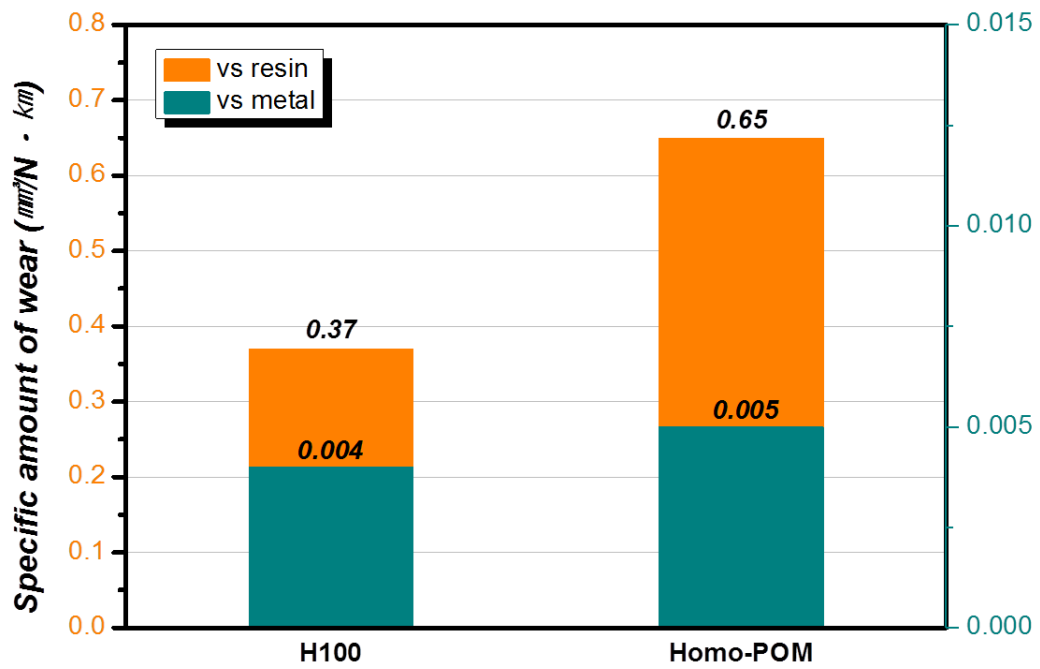
The test results of wear and friction resistance properties (dynamic friction coefficient, specific wear loss, PV limit) are also shown in Figures 9, 10, 11, and 12. KEPITAL H100's wear resistance properties versus metal (S45C) are far more superior than polyacetal copolymer and our competitor's polyacetal homopolymer. Moreover, the wear resistance properties of KEPITAL H100 against itself are also slightly better than the aforementioned.



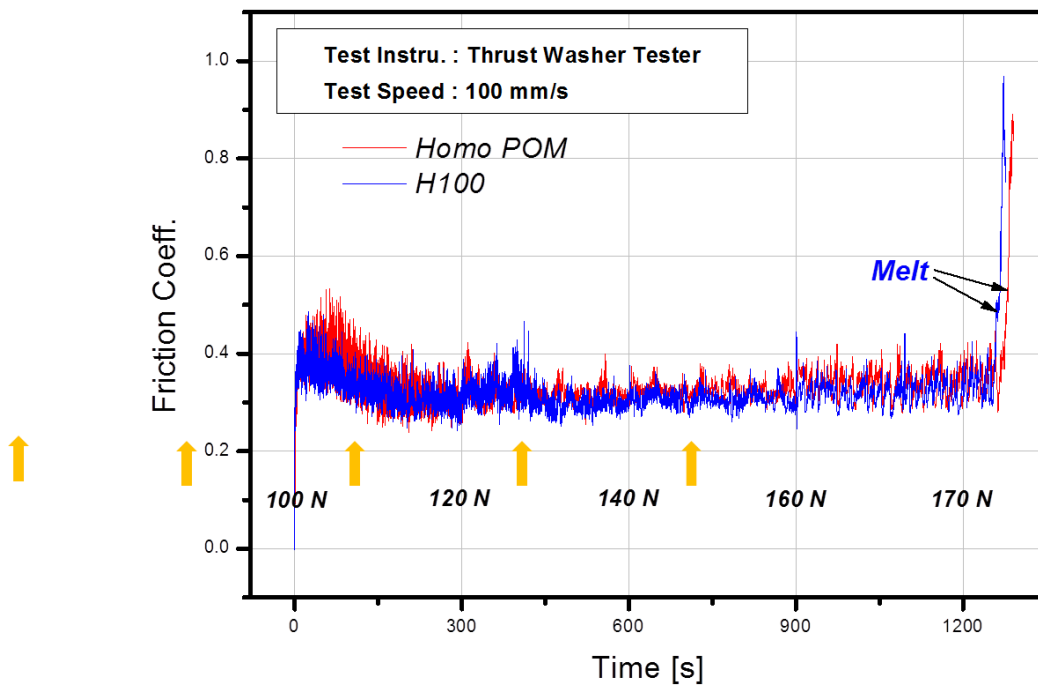
[Figure 9] Dynamic friction coefficient of KEPITAL H100 [resin vs. metal(S45C)]



[Figure 10] Dynamic friction coefficient of KEPITAL H100 (resin vs. resin)



[Figure 11] Specific wear loss of KEPITAL H100



[Figure 12] PV limit of KEPITAL H100

6. Gear tooth strength

Test results of gear tooth strength of KEPITAL H100 are shown in Table 2. The gear tooth strength of KEPITAL H100 is similar to our competitor's polyacetal homopolymer.



Table 2. Gear tooth strength of KEPITAL H100

Unit	Homo POM	KEPITAL H100	Co POM (F10-02)
kgf·cm	129	131	120

7. Injection molding guide

7.1. Standard molding conditions

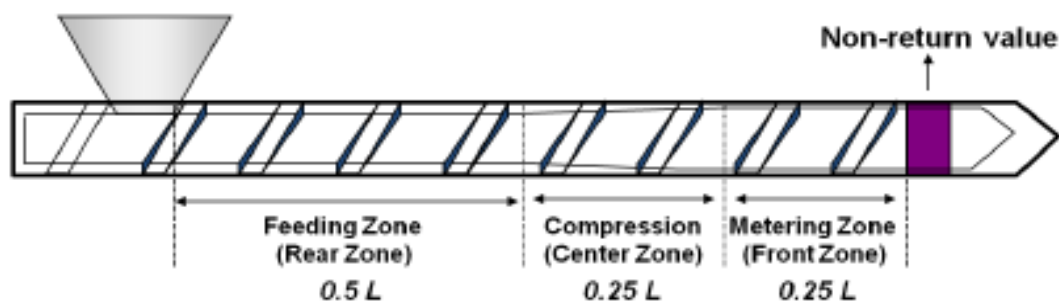
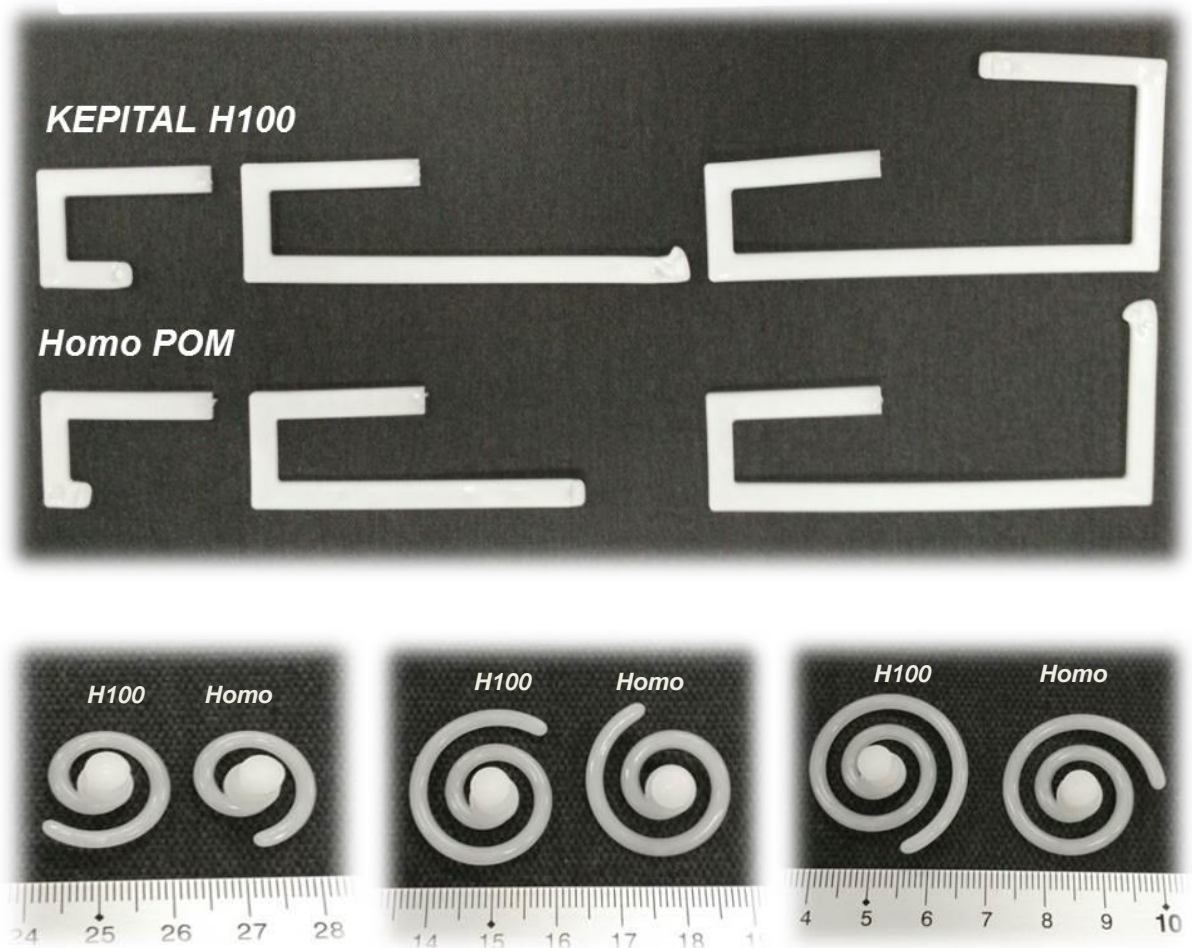


Table 3. Standard molding conditions of KEPITAL H100

Classification		KEPITAL H100	Remark
Pre-drying		80 °C ~ 100 °C (176 °F ~ 212 °F), 3 h ~ 4 h	
Cylinder temperature	Feeding part	180 °C ~ 190 °C (356 °F ~ 374 °F)	
	Compression part	190 °C ~ 200 °C (374 °F ~ 392 °F)	
	Metering part	200 °C ~ 210 °C (392 °F ~ 410 °F)	
	Nozzle part	190 °C ~ 220 °C (374 °F ~ 428 °F)	
Mold temperature		60 °C ~ 90 °C (140 °F ~ 194 °F)	

7.2. Flowability

Flowability of KEPITAL H100 is shown in Figure 13. The flowability of KEPITAL H100 is similar to our competitor's polyacetal homopolymer



[Figure 13] Flowability of KEPITAL H100
(Test conditions)

- Injection pressure: 400, 800 & 1,200 kg/cm²
- Injection speed: 20 mm/s
- Injection time : 3 s

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