

## The BINDER for thermal debinding systems, capable of being recycled up to 10 times!

- Just regrind the sprue, runner and unwanted green parts then reuse!
- Use 100% reground material without the need for fresh feedstock!
- No change in the shrinkage ratio or physical properties!
- No change in mouldability!
- No need to modify debinding and sintering setup!

## Binder system design

### Characteristics required for Binder

- **High flowability at molding temperature**  
Binder design considering the viscosity at around the molding temperature.
- **High expansion property in the mold during injection moulding**  
Wide moulding condition range because of the Barus Effect. (Fig.1 and 2)
- **High thermal decomposition property in the de-binding process**  
There is no effect on the sinter quality, because there is no residue after de-binding. (Fig.3)

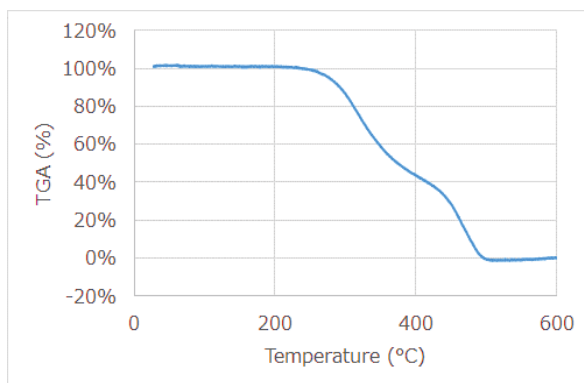


Fig.3 TGA Curve of Binder

※All components are vaporized at around 500°C.

The flow amount  $F$ , when the load  $S$  is applied to the thermoplastic fluid, is given as following equation.

$$F = aS^n$$

Here,  $a$  is the flow characteristic at load=1,  $n$  is Barus effect.

### Barus effect

### Image of flow behavior

### Impact on the injection process

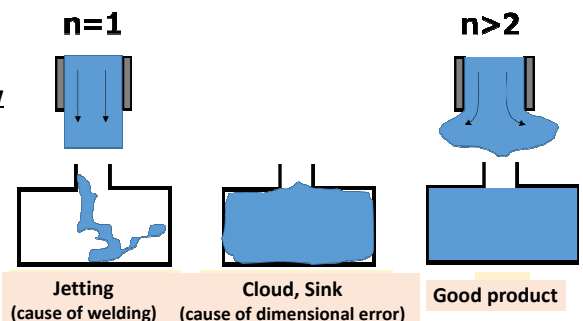


Fig.1 Schematic of the relationship between  $n$  value and flow characteristic

※Since larger  $n$  value, material expands in the mould, dense green part is obtained.

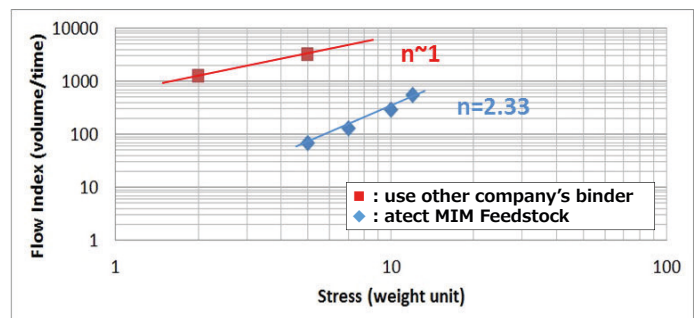


Fig.2 Flow characteristic compared with pellets using the other company's binder

※With our binder, it is possible to obtain precise green part because material easily expands in the mould.