ISBM PROJECT – TECHNICAL GUIDE

Dear Jokey Colleagues,
Below you will find technical information regarding the ISBM project, which we hope will help you gain a good understanding of the Injection Stretch Blow Molding technology and our Jokey Blow Jar series.

Kind regards,
Jokey Poland Team
14/01/2025

INTRODUCTION
PET PACKAGING MARKET

The PET (Polyethylene Terephthalate) packaging market is a significant segment of the global packaging industry, known for its versatility and sustainability. PET is widely used due to its excellent properties, including high strength, lightweight, transparency, and recyclability.

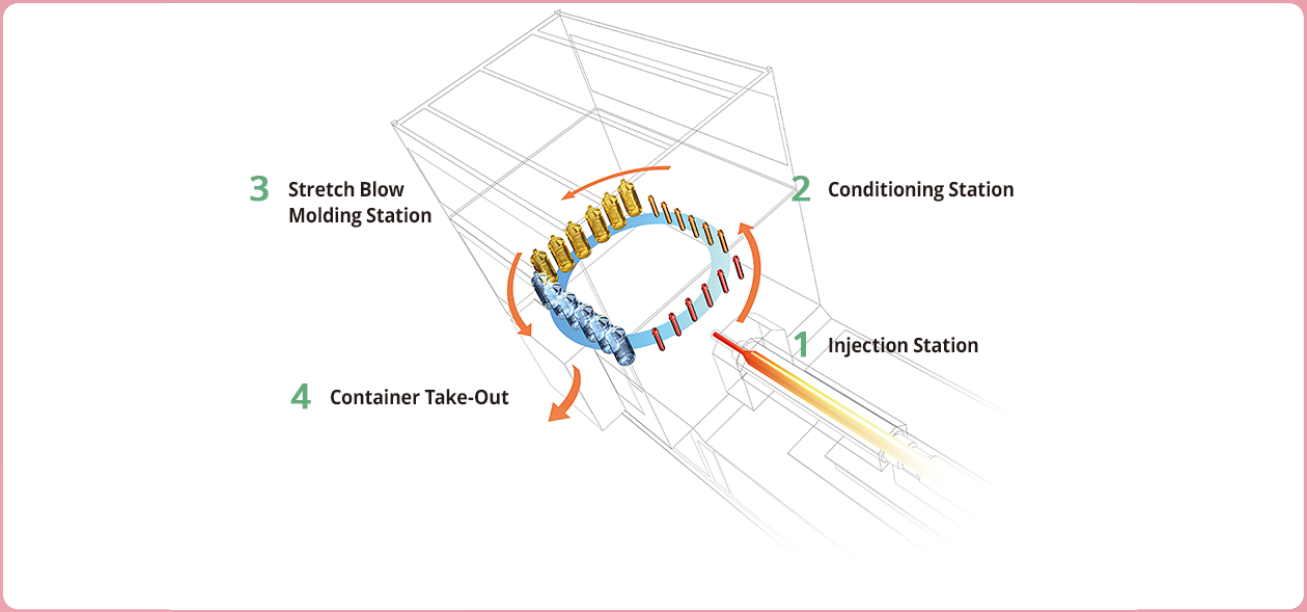
Packaging finds its application in many industries such as food, cosmetics and personal care, pharmaceuticals and dietary supplements, and household chemicals.
There are two main technologies for producing PET packaging:

- traditional blow molding from preforms – for ex. water bottles;
- Injection stretch blow molding (ISBM) – for ex. ketchup bottles, cosmetic bottles, pill jars.

PET is highly recyclable, which helps reduce waste and conserve resources. Recycled PET (rPET) can be used to produce new food packaging, ensuring a circular economy and minimizing environmental impact1. Additionally, PET's excellent barrier properties protect food from contamination and spoilage, making it a safe and reliable choice for food packaging.
Our present material supplier is one of the PET producing leaders - Indorama Company with one of production plants located in Poland.
Technical sheet for the material RAMAPET N1(S) available to download with other files.

THE ISBM TECHNOLOGY

ISBM stands for Injection Stretch Blow Molding technology. It is a one-step process consisting of four stages – injection, conditioning, stretch blow molding and take-out. Everything is made on one machine in one production cycle.



Scheme 1. ISBM process presented by Nissei ASB.

ISBM stands for Injection Stretch Blow Molding technology. It is a one-step process consisting of four stages – injection, conditioning, stretch blow molding and take-out. Everything is made on one machine in one production cycle.

https://www.nisseiasb.co.jp/en/solutions/1step/

In the link below, you will find a video that clearly illustrates and explains the working principle of the machine.

https://www.youtube.com/watch?v=g1ECkY5B3Os&t=49s

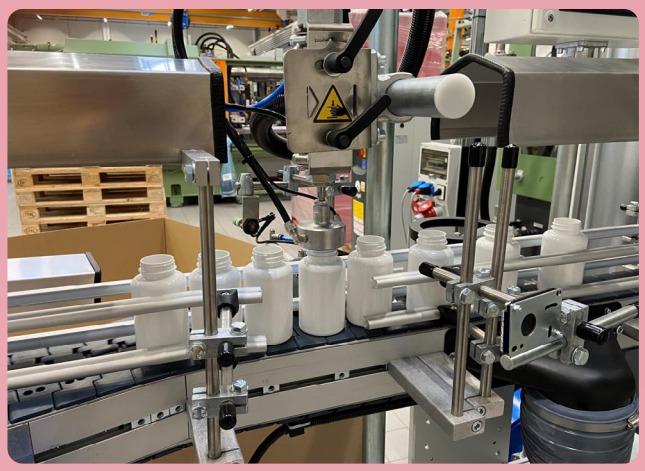
The ASB 70DPH machine is the most universal in Nissei's entire range. We can build molds with up to 12 cavities and produce containers with capacities ranging from 0.10L to 10.00L while keeping other parameters such as thread, neck, and body diameter, and others, as detailed in the table on the next page.

THE ASB 70DPH MACHINE

Products Specification		Unit	ASB-70DPH v4										
Cavity Number		cavity	1	2	3	4	5	6	7	8	(9)	10	(12)
Max. Capacity*8		L	10.0	4.5	3.5(4.5)	3.0	1.8	1.0	0.60	0.40	0.35	0.25	0.10
Max. Thread Diameter	T	mm	149(158)	120	99(111)	95	73(77)	57(60)	42	36	34	27	18
Max. Neck Diameter	E	mm	145(154)	118	96(108)	93	70(74)	55(57)	40	34	32	25	16
Max. Support Ring Diameter	SR	mm	149(158)	120	99(111)	94	73(77)	58(60)	42	36	36	27	18
Max. Body Diameter*7	BD	mm	204	153	130	120	99	79	66(68)	54	53	45(47)	37
Max. Cavity Width*7	WD	mm	204	153	130(147)	123	99(101)	79	66(68)	54	43	45(47)	37
Max. Height	HB	mm						350					
Max. Weight*1 ( )*2		g	311(552)	156(276)	104(184)	78(138)	62(110)	52(92)	44(78)	39(69)	35(61)	31(55)	26(46)

Scheme 2. Key specification details for ASB-70DP

Pic.1. Machine ASB 70DPH running in JPL plant.



Pic.2. Leak test of the jars with compressed air.

MOLDS CONSTRUCTION

In the ISBM process, from product possibilities point of view, most important are: Injection mold – where the preform (the initial form of the packaging) is injected. The thread and the weight of the packaging are determined here.

Blow mold – Stretch and blow the preform – packaging get a right shape and dimensions.

Scheme 3. Injected preform – source Nissei ASB

Scheme 4. Stretch and blow – source Nissei ASB

For one injection mold, we can create several blow molds. This way, we can relatively easily expand our product portfolio using the existing injection mold, which accounts for over 70% of the total set cost. However, it is important to remember a few limitations such as:

- The same thread size and type;
- The height and width of the bottle (resulting from the distance between the forming cavities);
- Similar weight.

Additionally, we can use replaceable pins to change the weight of the packaging, which allow for the creation of lighter versions of the packaging using the same injection mold.
As mentioned earlier, ISBM technology provides us with extensive possibilities for building product portfolio. By using the same injection mold (preform) with a given weight, we can produce jars with different geometries (various blow molds). We utilized this fact to create our portfolio, thereby forming a so-called “family” of jars.
Basing on Jokey Blow Jar

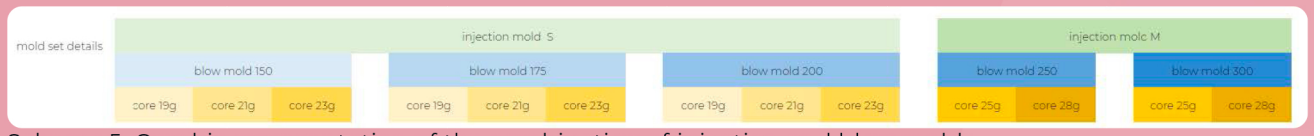
JBJ150, JBJ175, JBJ200

Injection mold with 38/400 thread, 8 cavities, nominal weight 23.00g -> 3 blow molds: 150ml, 175ml, and 200ml

JBJ250, JBJ300

Injection mold with 45/400 thread, 7 cavities, nominal weight 28.00g -> 2 blow molds: 250ml and 300ml.

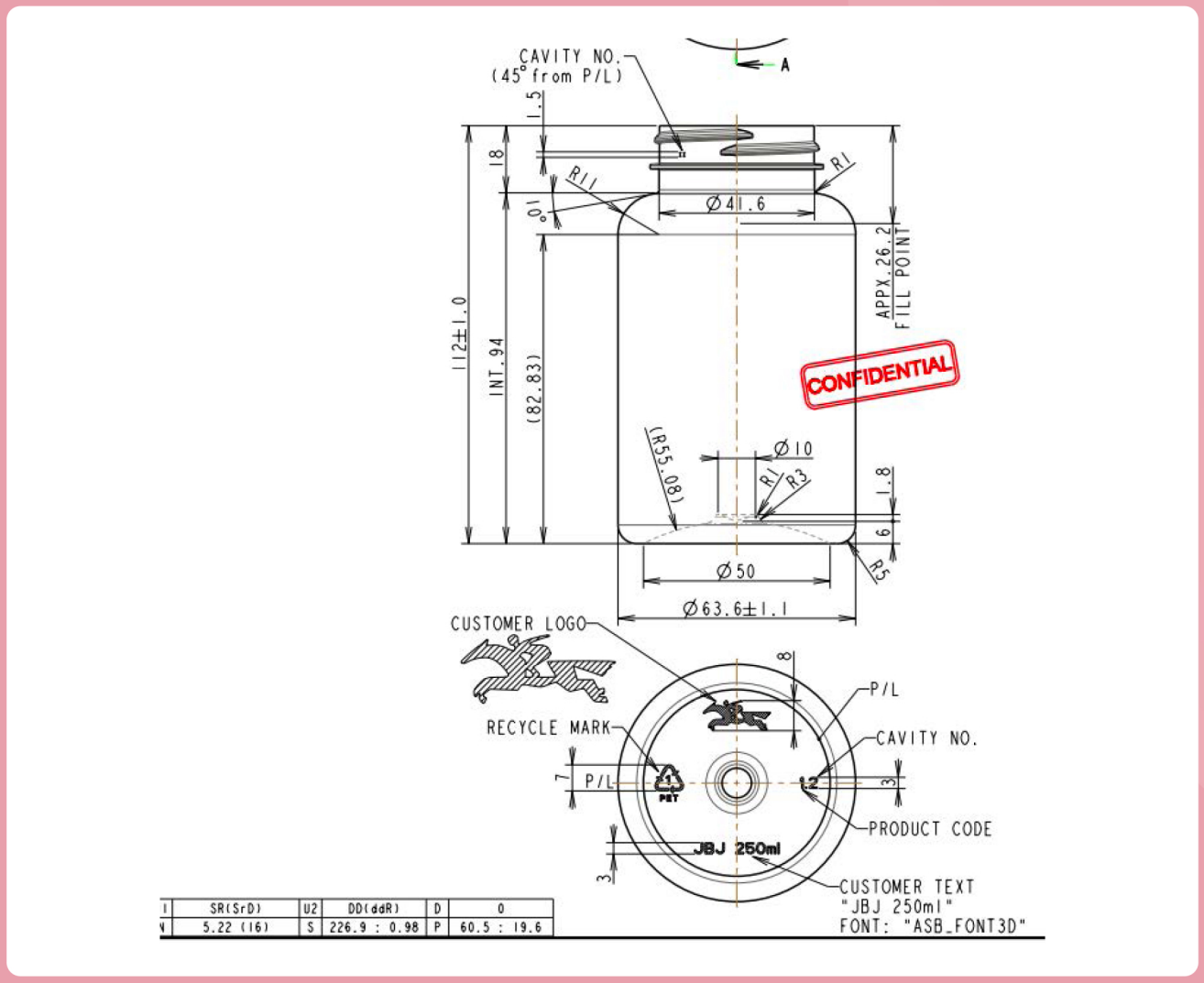
The final topic concerns the cores used to adjust the weight by approximately 15% compared to the original preform weight. Thanks to this design, we were able to produce lighter versions without investing in new injection and blow molds. The above information is presented in the diagram below.



Scheme 5. Graphic representation of the combination of injection and blow molds along with pins for changing weight.

The mold supplier always offers technical support along with an analysis to determine whether a given idea is physically feasible.

Below presented a detailed technical drawing for one of the JBJ series PET jar.



Scheme 6. Technical drawing for the JBJ250 jar

JCCS – PP CAPS

A major advantage in the market is offering a complete package, which includes both the jar and the closure. Therefore, our investment included two injection molds for two sizes of caps:

JCCS38 - dedicated for smaller jars of 150ml, 175ml, and 200ml, with a 38/400 thread.

JCCS45 - dedicated for jars of 250ml and 300ml.

In the dietary supplements industry, the delivery of caps with an induction liner is required. For this purpose, a special robot for assembling the liners was ordered.
At the client's production process, the jars are capped and pass through an induction sealer, which seals the foil layer to the bottle thread, creating a protective barrier.

Scheme 7. Part of TDS of JCCS38

Pic. 3 Samples of inducted liners (source: supplier)

Pic. 4 Induction inserts for JCCS38

There are different types available on the market; we are starting with a two-piece liner made of cardboard and aluminum. The cardboard part stay in the cap after sealing.

PACKAGING SYSTEM

The packaging system for caps consists of 16 cartons on a pallet with a height of 2.00m. After the liner is installed by the robot, the caps freely fall into the carton.

For PET jars, there are two packaging systems available on the market:

1. Cardboard trays with a foil separator - our current system, height of 1,24m;
2 cardboard per layer.

Pic. 5&6 Present packaging system for JBJ PET jars

2. Packaging in plastic bags - in Q2, we will receive a rental DB112 machine from Delta Engineering. This will be a fully automated line and is our target packaging system

Details regarding quantities per pallet and more are included in Technical Data Sheets.

RPET
(RECYCLED POLYETHYLENE TEREPHTHALATE)

rPET is a sustainable material made from recycled PET plastics, such as used beverage bottles. It is widely used due to its environmental benefits, including reducing the need for new plastic production and lowering carbon emissions
rPET is PET that has been recycled and reprocessed. The process involves collecting post-consumer PET products, breaking them down into flakes, and then melting and transforming these flakes into new rPET products. Key characteristics include environmental impact:

- Environmental Impact: rPET has a significantly lower carbon footprint compared to virgin PET production
- Resource Conservation: Using rPET reduces the need for new petroleum-based raw materials, conserving natural resources
- Waste Reduction: rPET helps divert plastic waste from landfills and oceans, promoting a circular economy

The material is well-known and widely used in the food industry. The price of the material is about 25% more expensive compared to virgin.

MATERIAL TO DOWNLOAD

Technical Data Sheets, machine specification and presentation are available to download from link below:

https://nextcloud.jokey.com/index.php/s/SGS5LM2WnP7SpyR

password: ISBMproject