

QUICK CHANGE AND ADJUSTABLE INSERT MOLD FRAME

FIELD OF INVENTION

The present invention relates to the field of injection molding whereby it disclosed a quick-change and adjustable insert mold frame that can be fitted onto any injection molding machine.

BACKGROUND OF THE INVENTION

In injection molding, the mold fabrication time of any given part design is important in the running of a manufacturing business. Hence it is always preferred to have a shorter mold fabrication time to give the shortest product development lead time for the factory. Machine and tool change setup usually takes up time to begin the manufacturing process. In order to reduce the time taken, we want to propose a new modular and less complex quick flexible mold frame for faster setup, higher productivity, hence leading to profitability of a manufacturing business.

Having a two-part frame construction for installation in the clamping unit of a typical injection molding machine is well known in the prior art. Such two-part frame facilitates the removal and installation of mold insert components of a mold assembly into the clamping unit of the injection molding machine. This process of removal and installation can be termed as “quick-change” of the mold insert. Such two-part frame usually comprises of the ejector half to mate with the ejector side of the mold assembly and the injection half to mate with the injection side of the mold assembly. The two-part frame construction comprises of components that are necessary for placement and alignment of the “sides” of a mold sub-assembly during mold change such that it reduces the time

required to remove and install the mold sub-assembly from and onto the injection molding machine.

Examples of prior art for such “quick-change” of the mold insert include US 5,350,289 and US 8,708,692. These quick-change mold inserts are designed and adapted for actual mold change during production runs and shorten the downtime of the injection molding machine when molding different products. However, those in the prior art are not so adaptable or adjustable to cater for different designed parts. With adaptability and adjustability in the design intention, it can allow us to have very quick proof of concept (POC) and testing, and very quickly move to low volume batch production, giving a first mover advantage to customers.

The present invention disclosed a quick change and adjustable insert mold frame (i.e., termed as QuciFrame and will be used throughout this writeup disclosure herein.) that is designed to accommodate different insert sizes and machine tonnage with the concept of both the standard and quick-change tool die. It uses a mold frame to accommodate different sizes of full function cold sprue mold inserts. The present invention disclosed consist of adjustable insert blocks to accommodate three (3) different core cavity insert sizes for different machine tonnage ranging from:

- (a) 50 to 100 Tonnage for part size up to 180 x 200mm (mold frame size: 300mm x 200mm x 200mm);
- (b) 80 to 200 Tonnage for part size up to 230 x 250 mm (mold frame size: 400mm x 400mm x 240mm) and
- (c) 170 to 350 Tonnage for part size up to 330 x 350 mm (mold frame size: 500 mm x 550 mm x 800mm).

Sliders and lifters can be built into the mold base for part releases, including any part eject system. Insert based direct cooling channels can also be incorporated into the mold base.

For the present invention, QuciFrame can have the following advantages:

1. Ability to have quick change insert suitable for rapid prototype tooling or for proof-of-concept (POC) and quick low volume batch production;
2. Ability to incorporate various mold insert sizes based on machine tonnage and shot size;
3. Ability to have costs savings due to the use of the same mold base and lower component counts;
4. Due to simpler design, it gives lead time reduction for rapid prototype tooling;
5. QuciFrame is fabricated with sustainability in mind since the steel material content is less than a standard mold base, and the fabrication carbon footprint is 30% lesser as compared to current mold bases;
6. QuciFrame is reusable for different molded parts thereby reducing the need for different mold base for different molded parts;
7. The use of the same mold base for different range of molded parts makes it easier for the QuciFrame to be easily available upon pre-booking or pre-order by the customer.

BRIEF DESCRIPTION OF THE DRAWINGS

The drawings attached here are to aid comprehension of the description of the invention here. The drawings are not to scale and they are to be used for merely illustrating the principles and concepts of the invention only.

To aid in comprehension of the invention, the drawings are separated into the various Figures as described below:

Figure 1 illustrates an exploded view of the various key components and functions related to the embodiment of the present invention.

Figure 2 illustrates another exploded view of the various key components and functions based on the embodiment of the present invention.

Figure 3 illustrates the perspective view of the quick change insert mold frame under closed position.

Reference numbers

1	Adapter plate (injection side)
2	Adapter plate (ejector side)
3	Aperture for alignment to mold base
4	Small aperture
5	Support Pin
6	Bushing
7	Bushing Block
8	Mold Insert Block
8a	Eject seat
8b	Core side plate
8c	Cavity side plate
9	Alignment ring on mold insert
10	Aperture on ejector side
11	Support Pin block
12	Quick change and adjustable insert mold frame

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT OF THE PRESENT INVENTION

In the following description, details are provided to describe the embodiment of the application. It shall be apparent to the person skilled in the art, however, that the embodiments may be practiced without such details.

The present invention relates to the field of injection molding whereby it disclosed a quick-change and adjustable insert mold frame that can be fitted onto any injection molding machine in order to facilitate ease of removal and installation of mold inserts.

Figure 1 illustrates an exploded view of the various key components and functions related to the embodiment of the present invention. As illustrated in **Figure 1**, the embodiment of the present invention consists of the adapter plate **1** that is to be fixed to the fixed platen on the injector side and adaptor plate **2** that is fixed to the movable platen on the ejector side of the injection molding machine. During the mold closed position as illustrated in **Figure 3**, there is a molding cavity in-between adapter plate **1** and **2** for shaping a molded article, whereby this includes a readily replaceable mold insert block **8** that is accessible through the sidewall of the mold for anchoring it in place and releasing it for removal. The mold insert block **8** consists of the core side plate **8b** and cavity side plate **8c** as well as the eject side **8a** just next to core side plate **8b** as illustrated in **Figure 1, 2** and **3**. Hence during the closed position as illustrated in **Figure 3**, it illustrates how the quick-change and adjustable insert mold frame denoted as **12** will look like, which is the embodiment of the present invention and which will be described more in detail herein.

Figure 1 illustrates the adapter plate **1** with an aperture **3** that is for alignment with the mold insert block **8** via the alignment ring **9**. The adapter plate **1** has support pins denoted as **5** as illustrated in **Figure 1**. There are minimum of four support pins **5** that are designed to mate with the individual bushing denoted as **6** on the other adapter plate **2** during mold closed position. **Figure 2** illustrates another exploded view of the various key components and functions related to the embodiment of the present invention, whereby it illustrates how each support pin **5** is attached to the support pin block **11** which is located at the four corners of the adapter plate **2**. At the current position as illustrated in **Figure 2**, it can accommodate a certain size for the mold insert block **8**. There are small apertures denoted as **4** which are located at adapter plate **1** and **2** respectively as illustrated in **Figure 1 and 2**. In order to fit the size of the mold insert block **8**, the position of the four support pin blocks **11** on the adapter plate **1** can be adjusted or shifted accordingly via securing the back of the pin block **11** on the small apertures **4**. Concurrently, the position of the four bushing blocks **7** (as illustrated in **Figure 1**) on the adapter plate **2** can also be adjusted to mirror the position of the four support pin blocks **11** on the adapter plate **1** side. Hence in carrying out such adjustments, the embodiment of the present invention is designed to accommodate different insert sizes and machine tonnage with the concept of both the standard and quick-change tool die. It uses a mold frame to accommodate different sizes of full function cold sprue mold inserts.

The ease of changing the position of the four support pin blocks **11** on the adapter plate **1** to mirror the position of the four bushing blocks **7** on the adapter plate **2** side enables a quick change of the mold insert, thus reducing lead time which is useful for rapid prototyping to test certain tooling part concepts or for proof-of-concepts (POC) and low volume batch production. However, the current design in the embodiment of the present

invention is limited to two (2) cavities and is for cold sprue and runner system only. Moreover, the current design in the embodiment of the present invention uses lesser steel material content as compared to a standard mold base and the fabrication carbon footprint is 30% lesser as compared to current mold bases.

While what has been described hereinabove is the preferred embodiment of the invention, those skilled in the art will understand that numerous modifications may be made without departing from the spirit and scope of the invention. The embodiments described herein are meant to be illustrative only and should not be taken as limiting the invention, which can be expressly set forth in the following claims.

CLAIMS

What is claimed is:

1. An apparatus that allows adjustability of any size of mold insert, whereby it comprises of:
 - (a) At least two adapter plates, whereby one adapter plate is fixed to the movable platen (ejector side) and one adapter plate is attached to the fixed platen (injection side) of the injection molding machine, and whereby
 - (b) The adapter plate on the fixed platen (injection side) has at least four support pins, with each support pin attached to an individual support pin block on the adapter plate, and whereby
 - (c) The other adapter plate on the movable platen (ejector side) has at least four bushings, with each bushing attached to an individual bushing block, and wherein
 - (d) During mold **closed** position,
 - i. each support pin is being designed to mate with the individual bushing on the other adapter plate on the movable platen;and wherein
 - (e) During mold **open** position,
 - i. each support pin block on the adapter plate (fixed platen injection side) can be adjusted or shifted accordingly by securing the back of each support pin block to the small apertures of the adapter plate (fixed platen injection side); and
 - ii. concurrently, the position of the four bushing blocks on the adapter plate (movable platen ejector side) can also be adjusted to mirror the position of the four support pin blocks on the adapter plate (fixed platen) side.

2. The apparatus according to claim **1**, wherein for a particular mold base size,
 - (a) The apparatus can be adapted for various mold insert sizes, whereby for each mold insert size, it can be customised to mold out parts of various sizes and dimensions, and also;
 - (b) It is reusable for different molded parts thereby reducing the need for different mold base for different molded parts.