

Modern Technology Application In Electro Industry Parts Production

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Abstract - Various plastic parts are used by the electro industry for many different types of elements, instruments, units and other applications. Paper presents TEKCAST spin-casting technology as a modern technology for parts production used in the electro industry. The advantages of this technology are the usage of an inexpensive non-vulcanized silicone rubber for mold making. Molds can be made and prototypes or development parts cast in as little as three hours (depends on the part design). This casting technology is used for materials with casting temperature below 538 °C such as polyurethanes, polyesters and epoxy resins of plastics, and also some other types of materials including zinc, zinc alloys, tin and lead alloys of metals. TEKCAST technology can be used for producing high quality plastic parts used in the electro industry with quality equivalent to those produced by pressure die casting and plastic injection molding.

Keywords - TEKCAST spin-casting technology, electro/mechanical parts production.

I. GENERAL CHARACTERISTICS

TEKCAST technology provides complete in-house Spin-Casting Equipment Systems and it can be used as a modern technology for parts production used in the electro industry [URL1].

These systems are allowing economically production of many precise plastic and metal components - for prototype and product development, as well as, production requirements. This casting technology can be used for materials such as polyurethanes, polyesters, epoxy resins of plastics, and also for some metal alloys including zinc alloys, tin and lead alloys with casting temperature below 538 °C.

TEKCAST technology in a huge amount is reducing the expenses for development and adoption of new products. This production technology also reduces time period from the moment when the production idea is formed until the moment when the product is launch to the market. It is ideal for quickly and economically producing numerous, fully functional parts in high strength metal or plastic from any fragile computer generated stereo lithography models. Today, because of its broad versatility, low cost and simplicity, the TEKCAST Spin-Casting System is frequently adopted by companies with no previous casting experience or equipment.

Fig. 1 shows machine for implementation of TEKCAST technology molding. Mold is placed between two plates, upper and bottom. Mold hollow is the place where melted, plastic or metal material, is cast. Mold rotates and produced centrifugal force helps in material transporting in the mold hollows. Bottom plate is under the influence of pneumatic cylinder, which keeps two plates strongly attached.

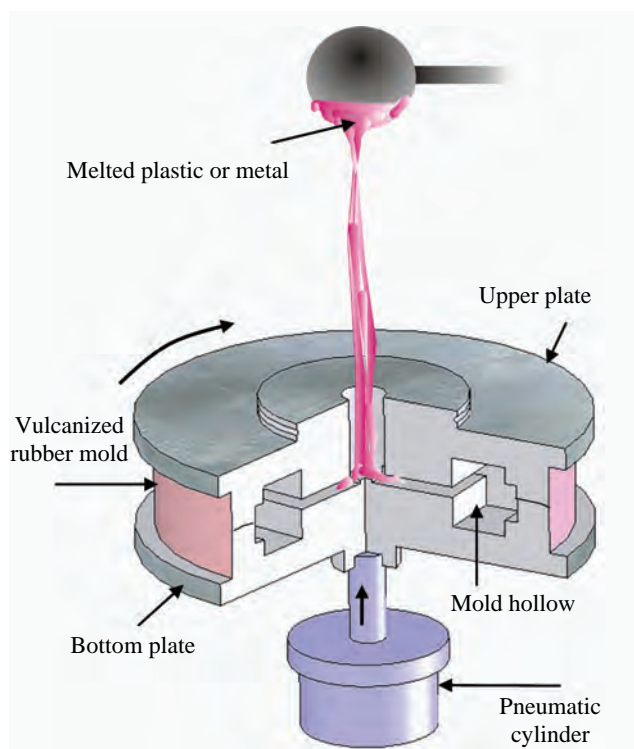


Fig.1. TEKCAST technology molding

Molds used in TEKCAST technology operation have maximal diameter of 762 mm and maximal thickness of 101.6 mm. These mold characteristics are limiting maximal dimensions of the plastic and metal parts produced with this technology (Table I).

Mold materials, molds can be made and prototypes or development parts cast in as little as three hours, or for complex parts, rarely more than one day. Design changes in size, function, fit or appearance are quickly reproduced without making or wasting a large investment in tooling or machine time.

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TABLE I

Mold diameter [mm]	Part length [mm]	Part width [mm]
228	89	64
304	127	102
381	165	127
457	229	165
510	250	190
610	292	203
762	381	279

Application of this modern technology is unlimited in various types of production industries. Spin-Casting can also be used as an alternative to plastic injection molding, using quick-setting liquid thermoset plastics and other types of materials for parts used in the many industries, including electro industry. Precision engineered industrial and electro/mechanical parts are now being produced by Tekcast's advanced Spin-Casting technology (Fig. 2). Also, using this technology a broad range of both functional and decorative plastic parts using a variety of high-strength, commercial grade thermoset plastics are produced (Fig. 3).



Fig. 2. Precision engineered industrial and electro/mechanical parts



Fig. 3. Commercial grade thermoset plastics

This technology is used by some U.S. electric motor and blower manufacturers (Fig. 4a) and also cams and levers for electro-pneumatic controls of fork-lift trucks can be made through these processes (Fig. 4b).



Fig. 4a. Parts for U.S. electric motor and blower manufacturers



Fig. 4b. Cams and levers for electro-pneumatic controls of fork-lift trucks

II. ADVANTAGES AND COMPARISON WITH OTHER AVAILABLE TECHNOLOGIES

TEKCAST Spin-Cast technology offers fine detail and close tolerances, while saving time (Fig. 5) and major costs (Fig. 6) over competitive processes, with no tooling costs to amortize.

TECKAST technology advantages compared to the other alternative production processes are given in the Table II, and in Figs. 5 and 6.

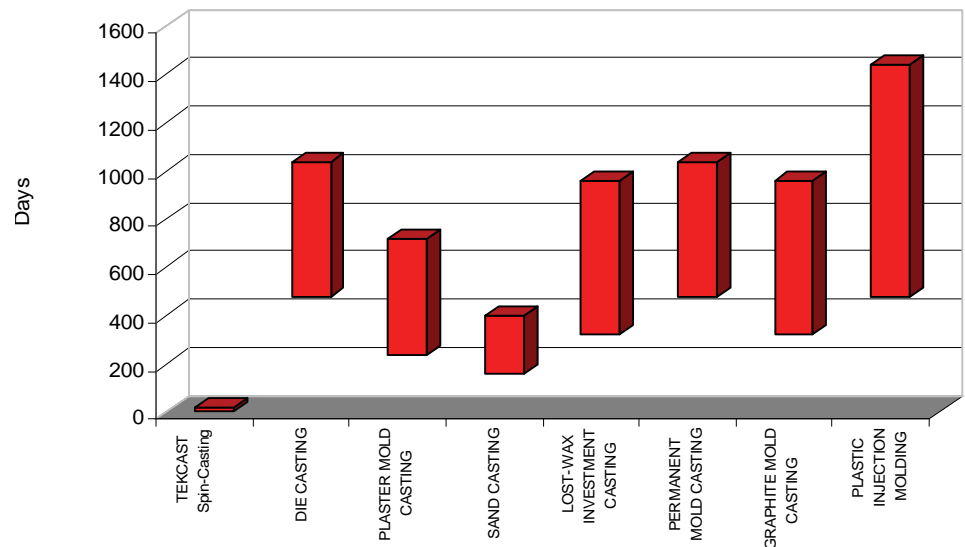


Fig. 5. Usual initial parts lead time required

TABLE II

PROCESS	TEKCAST Spin-Casting	DIE CASTING	PLASTER MOLD CASTING	SAND CASTING	LOST-WAX INVESTMENT CASTING	PERMANENT MOLD CASTING	GRAPHITE MOLD CASTING	PLASTIC INJECTION MOLDING
Type Of Molds Used	Vulcanized "TEKSIL" Rubber	Machined Tool Steel	Plaster	Sand	Ceramic	Machined Iron, Steel	Machined Graphite	Machined Aluminum, Brass or Tool Steel
Type Of Casting Materials	Polyurethane, Polyester, Epoxy, Pattern Wax, Zinc, Tin/Lead	Zinc, Aluminum, Magnesium	Most Nonferrous Metals	Most Foundry Castable Metals	Most Foundry Castable Metals	Zinc, Aluminum, Magnesium	Zinc	Most Thermo- Plastics
Economical Ordering Quantities	1 & Up	25,000* & Up	100 & Up	100 & Up	1,000 & Up	10,000* & Up	5,000 & Up	15,000* & Up
Economical Part Size (Length or Width)	<1/2" - 12" <1.25 - 30cm	<1/2" - 24" <1.25 - 60cm	<4" - 36" <10 - 90cm	<3" - 36" <7.5 - 90cm	<1" - 24" <2.5 - 60cm	<4" - 24" <10 - 60cm	<4" - 24" <10 - 60cm	<1/2" - 24" <1.25 - 60cm
Economical Part Wall Thickness	<1/8" - 1/2" .3 - 1.25cm	<1/8" - 3/4" .3 - 2cm	<1/8" - 1" .3 - 2.5cm	<1/4" - 1" .6 - 2.5cm	<1/8" - 1" .3 - 2.5cm	<1/4" - 1" .6 - 2.5cm	<1/4" - 1" .6 - 2.5cm	<1/8" - 1/2" .3 - 1.25cm
Casting Tolerances	Very Close	Closest	Close	Lowest	Very Close	Loose	Loose	Closest
Ability To Make Design Changes	Easiest	Very Difficult	Difficult	Easy	Very Difficult	Difficult	Difficult	Very Difficult
Per Part Cost	Very Low	Lowest	Very High	Very Low	Highest	Low	High	Lowest
Usual Secondary Machining Required	Very Little or None	Lowest or None	Low	Highest	Very Little or None	Low	Low	Lowest or None

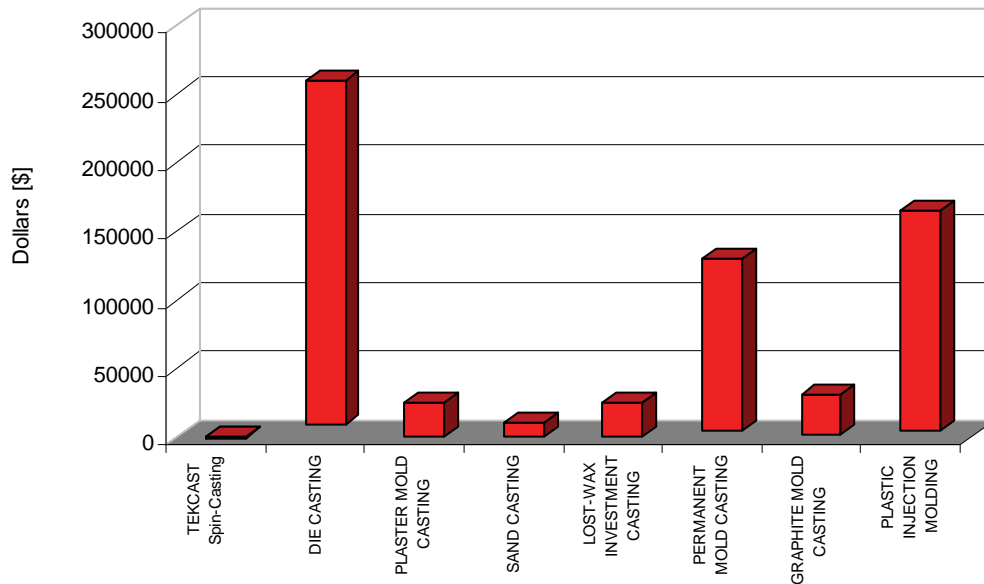


Fig. 6. Average cost of mold tooling

III. CONCLUSION

TEKCAST's development of its own high performance TEKSIL silicone rubber mold formulations opened the Spin-Casting frontier to the use of industrial quality, commercially available plastics and metals.

TEKCAST technology can be adopted as a modern way to manufacture variety plastic and metal parts used in the electro industry.

The TEKCAST Spin-Casting system provides high precision, close tolerances and faithful reproduction of detail. It can be used with alloys, to produce high quality parts equivalent to those produced by pressure die casting. Spin-Casting can also be used as an alternative to plastic injection molding, using quick-setting liquid thermoset plastics. It is also ideal for making wax patterns for investment casting.

If we compare TECKAST Spin-Casting with technologies which are using single-application molds, t.e. sand-mixture molds (sand casting and lost-wax investment casting) [1], [2], we can mark following advantages:

- There is no need for additional mechanical treatment of the products.
- Molds can be used for many casting cycles, which is very suitable for the serial production cases.
- Shorten time period from the start up of preparation processes (mold manufacturing) until first products are molded etc.

Compared to the technologies which can use one mold for serial parts production (die casting, permanent mold casting, plastic injection molding), TECKAST Spin-Casting has the following characteristics:

- Similar characteristics taking into consideration surface quality and dimensions accuracy of the products.
- TECKAST silicone molds can be made by low-qualification workers, for a short time period (from few hours to several days), and, which is very important, with much less expenses compared to above mentioned technologies. It is very important to point out that TECKAST casting equipment can be bought for the price which is equivalent to the price for only one complex mold for permanent mold casting or plastic injection molding. While plastic injection molding is economically justified only for large assembly-line production, TECKAST Spin-Casting can be implemented for serial production with much smaller number of produced parts.
- TECKAST casting equipment can be placed in a very small space.

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[URL1] <http://www.tekcast.com>.