CLAIMS

What is claimed is:

1. A cavity mold system comprising:

a cavity mold comprising:

two or more sub-molds; and

one or more gasket disposed between two adjacent sub-molds; wherein the gasket seals heating and cooling mediums when the cavity mold is assembled;

wherein each of the two or more sub-molds comprises:

an outer casing;

an inner casing on which a molded item is formed, wherein the cavity mold is assembled, a cavity is formed in the space between the outer casing and the inner casing;

at least one heating/cooling mediums input pipe that is fluidly coupled with heating and cooling medium sources and the cavity, wherein heating and cooling mediums are pumped or compressed via the at least one heating/cooling mediums input pipe into the cavity, thereby the heating and cooling mediums pass through the cavity of the cavity mold; and

at least one heating/cooling mediums return pipe that is fluidly coupled with the heating and cooling medium sources and the cavity, wherein the heating and cooling mediums are pumped via the at least one heating/cooling mediums return pipe out of the cavity; and

wherein at least one of the two or more sub-molds further comprises a feed channel being through the outer casing and the inner casing; wherein the feed channel allows molding materials to be fed into the inside of the inner casing;

a rotational frame subsystem comprising:

an inner frame serving as a secondary rotating carriage supporting the cavity mold and opening/closing the cavity mold;

an outer frame serving as a primary rotating carriage; wherein the inner frame is disposed within the outer frame;

a support structure;

an inner frame driving motor being disposed onto the outer frame, and being mechanically coupled with the inner frame; wherein the inner frame driving motor revolves the inner frame as the secondary rotation; and

an outer frame driving motor being disposed onto the support structure via a motor joint, and mechanically coupled with the outer frame, where the outer frame driving motor revolves the outer frame as the main rotation; and

a first multi-pipe rotary joint being mounted on the support structure and connecting the outer frame to the support structure;

a second multi-pipe rotary joint being mounted on an inner frame and connecting the outer frame and the inner frame; wherein the first multi-pipe rotary joint allows pipes for input medium and return medium to be fed along a member of the outer frame to the second multi-pipe rotary joint; wherein the second multi-pipe rotary joint is fluidly coupled with the heating/cooling medium input pipe so that the heating/cooling input medium is fed into the cavity of the cavity mold; and wherein the second multi-pipe rotary joint is also fluidly coupled with the heating/cooling medium return pipe so that the heating/cooling return medium from the cavity of the cavity mold is returned to the first multi-pipe rotary joint; and

a heating and cooling medium subsystem for providing the heating and cooling mediums and controlling the temperatures of the heating and cooling mediums.

2. The cavity mold system of claim 1, wherein the rotational frame subsystem further comprises a guide rod being fitted onto the inner frame, wherein the cavity mold slides along the guide rod to ensure accurate mating of the sub-molds.

3. The cavity mold system of claim 1, wherein the inner frame driving motor is electrically coupled with an electrical supply panel by a power cable that is fitted along the outer frame, and the power cable passes an electrical slip ring that is fitted in the motor joint being disposed onto the support structure.

4. The cavity mold system of claim 1, wherein the rotational frame subsystem further comprises means for opening and closing the sub-molds of the cavity molds.

5. The cavity mold system of claim 1, wherein the heating and cooling medium subsystem comprises:

a heating medium storage tank for storing the heating medium;

a heating medium pump being disposed downstream of the heating medium storage tank;

a heating medium metering means being disposed downstream of the heating medium pump; wherein the heating medium metering means monitors the temperature, volume and density of the heating medium passing through and feeds data to a PLC;

a heating medium control valve being disposed downstream of the heating medium metering means; wherein the heating medium control valve adjusts the flow of the heating medium based on the PLC output command;

a cooling medium storage tank for storing the cooling medium;

a cooling medium pump being disposed downstream of the cooling medium storage tank;

a cooling medium metering means being disposed downstream of the cooling medium pump; wherein the cooling medium metering means monitors the temperature, volume and density of the cooling medium passing through and feeds data to the PLC;

a cooling medium control valve being disposed downstream of the cooling medium metering means; wherein the cooling medium control valve adjusts the flow of the cooling medium based on the PLC output command;

an inline mixer being disposed downstream of both the heating medium control valve and the cooling medium control valve; wherein the inline mixer mixes the heating and cooling mediums are mixed to give a desired temperature to a heating/cooling input medium;

a heating medium return control valve being disposed downstream of the first multi-pipe rotary joint; wherein the heating medium return control valve is controlled by the PLC to direct the heating return medium to the heating medium storage tank; and

a cooling medium return control valve being disposed downstream of the first multi-pipe rotary joint; wherein the cooling medium return control valve is controlled by the PLC to direct the cooling return medium to the cooling medium storage tank.

6. The cavity mold system of claim 5, wherein the heating medium metering means and the cooling medium metering means are a Coriolis meter.

7. The cavity mold system of claim 1, wherein the first or second multi-pipe rotary joint comprises:

an upper flanged both ends tube;

three swivel connectors;

supports; wherein the three swivel connectors are mounted on the supports and disposed within the upper flanged both ends tube; and

a slew bearing being disposed between the upper flanged both ends tube when the joints are assembled.

8. The cavity mold system of claim 1, wherein the first or second multi-pipe rotary joint comprises:

an input pipe insert being fitted over a hydraulic/pneumatic line, and fed by the heating/cooling medium input pipe for carrying the input heating and cooling mediums;

a return pipe insert being fitted over the input pipe insert, and fed by the heating/cooling medium return pipe for carrying the return heating and cooling mediums;

thereby the first and second multi-pipe rotary joints have a pipe within pipe configuration.

9. The cavity mold system of claim 1, wherein each of the two or more sub-molds further comprises:

at least two isolation valves for regulating the heating or cooling medium flows; wherein one of the at least two isolation valves is disposed on the at least one heating/cooling mediums input pipe, and one of the at least two isolation valves is disposed at least one heating/cooling mediums return pipe.

10. The cavity mold system of claim 1 or claim 9, wherein each of the two or more sub-molds further comprises:

at least one temperature sensor being disposed on the outer casing and inside the cavity for recording the temperature of the heating and cooling mediums.

11. The cavity mold system of claim 1, wherein the feed channel serves as a vent to release any pressure inside the cavity mold.

12. The cavity mold system of claim 1, wherein each of the two or more sub-molds further comprises at least two bushes being provided on the mold flange of the sub-molds for allowing a guide rod to ensure accurate alignment of the sub-molds.

13. The cavity mold system of claim 1, wherein the inner casing and the outer casing are capable of being assembled and disassembled;

thereby the inner casing is replaceable.

14. The cavity mold system of claim 1, wherein the inner casing and the outer casing are fixed together.

15. The cavity mold system of claim 9, wherein the at least two isolation valves enable removal or replacement of the cavity mold.