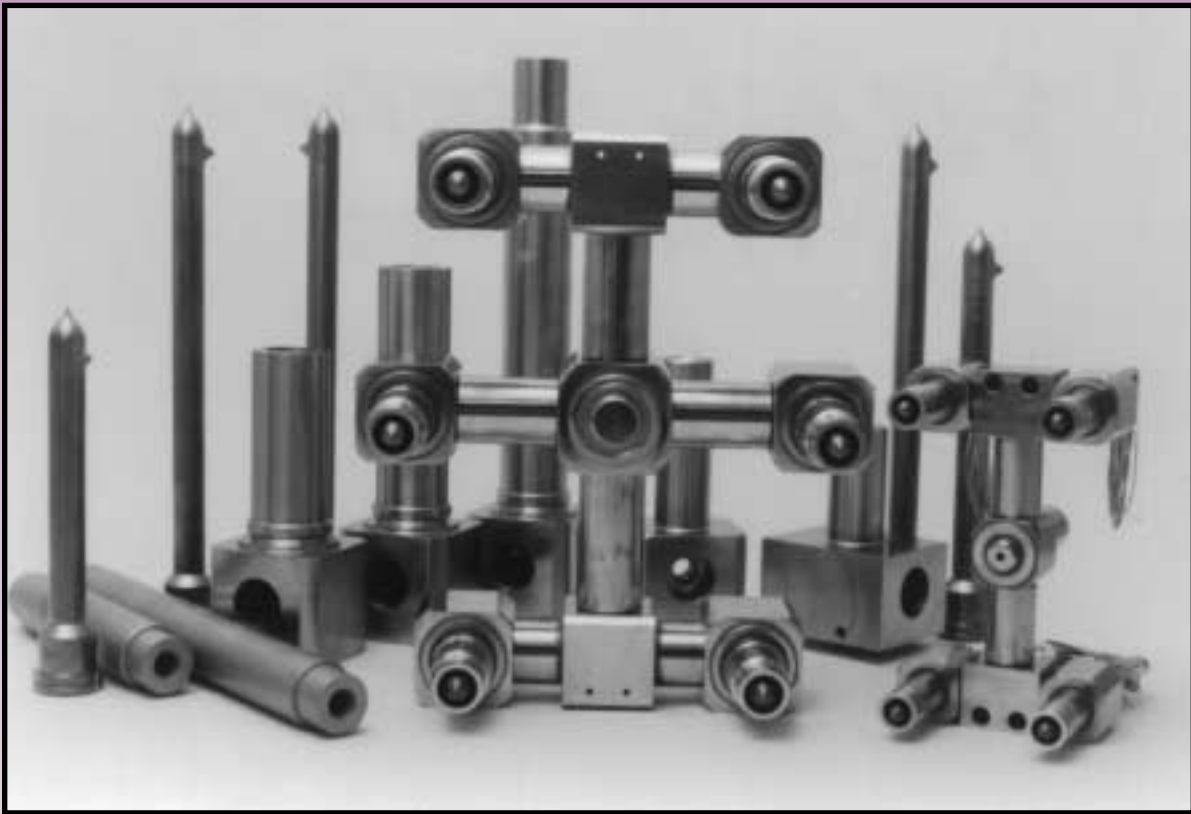


Hot Runner System

Runnerless Design



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Introduction

Rama innovation delivers the highest quality modular hot runner system available. Whatever your design requirements are, Rama's system *can* and *will* work for you. These advanced precision systems are energy efficient and very suited for retrofitting and conversion into existing molds. The modular design concept allows for unlimited cavity configurations with precise control of drop location and heat zone. For a quick-quote or to place an order, please fill out one of the associated forms at the rear of this catalog and fax to Rama for an immediate price quote. This catalog has been prepared to help you easily select the layout of the best suited molding system to fit your needs.

Every mold design starts with the number of cavities and a general plan or layout. Once this has been completed and dimensions defined, you are ready to proceed.

However, before going further in the catalog, please determine the following important dimensions. These will help you decide which components will fit your requirements.

1. Drop to drop dimensions of the cavity layout to match your mold;
2. Distance(s) between drops (bushings);
3. Choice of bushings you can use;
4. Cavity plate stack-up dimensions.

In addition, here are some critical areas to consider:

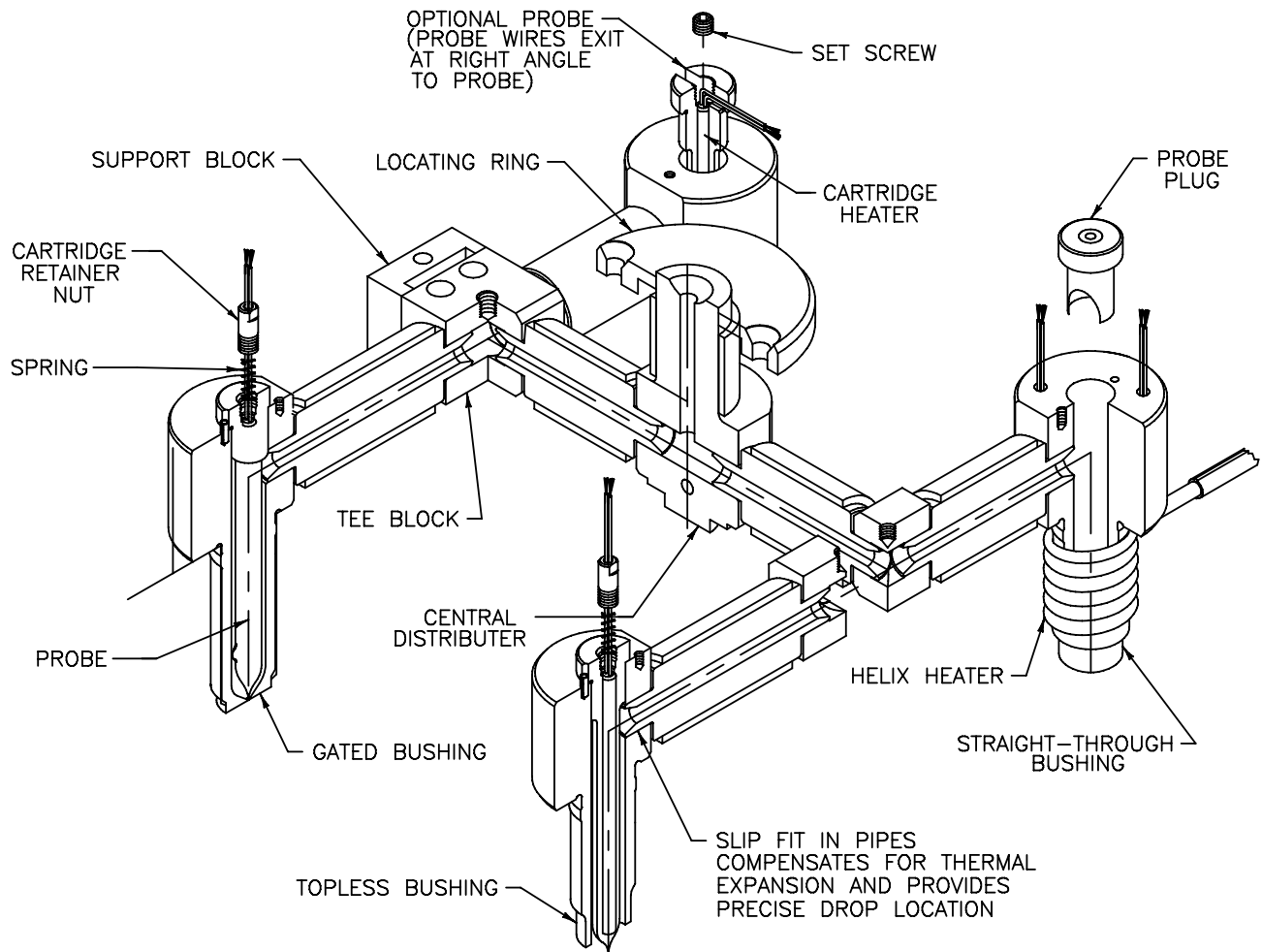
- Choice of gating will help determine the most desirable finish appearance and the least objectionable vestige location on your part.
- For large product parts it is important to have sufficient gates to match the shot weight, but remember the weld lines.
- Plates must be of sufficient thickness to accept calculated cavity pressures with safety.
- Water lines must be routed so as to avoid areas of high heat sink, which could result in the loss of heat in critical temperature zones.
- Space must be provided for power, thermocouple connections and wiring elements

Within this section you will find an isometric view of a hot runner system to help you visualize the concept. Additionally, we have prepared a cross-sectional drawing which explains "How the Plastic Flows."

Rama hot runner systems are designed for simple installation, easy maintenance, pre-

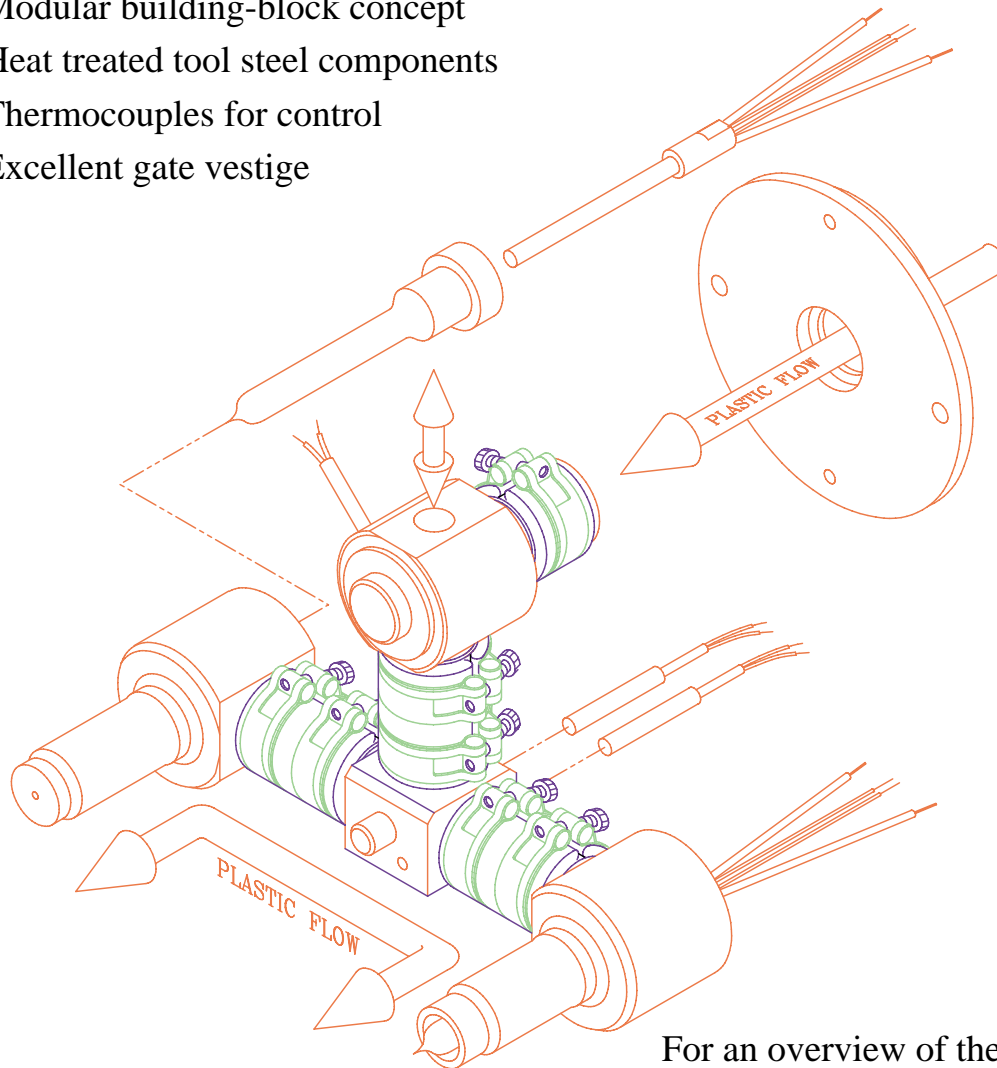
Modular System Features

cise control of drop location and heat zones and leak-proof operation. The manifold relies on a unique, modular, precision machined, reduced mass design, to provide the most energy-efficient system available in the industry. After the system is assembled, it is extremely easy to install and requires minimal stack height in the hot-side mold base plates. All of these top quality features are available at extremely competitive prices with guaranteed fast delivery.



Modular System Features

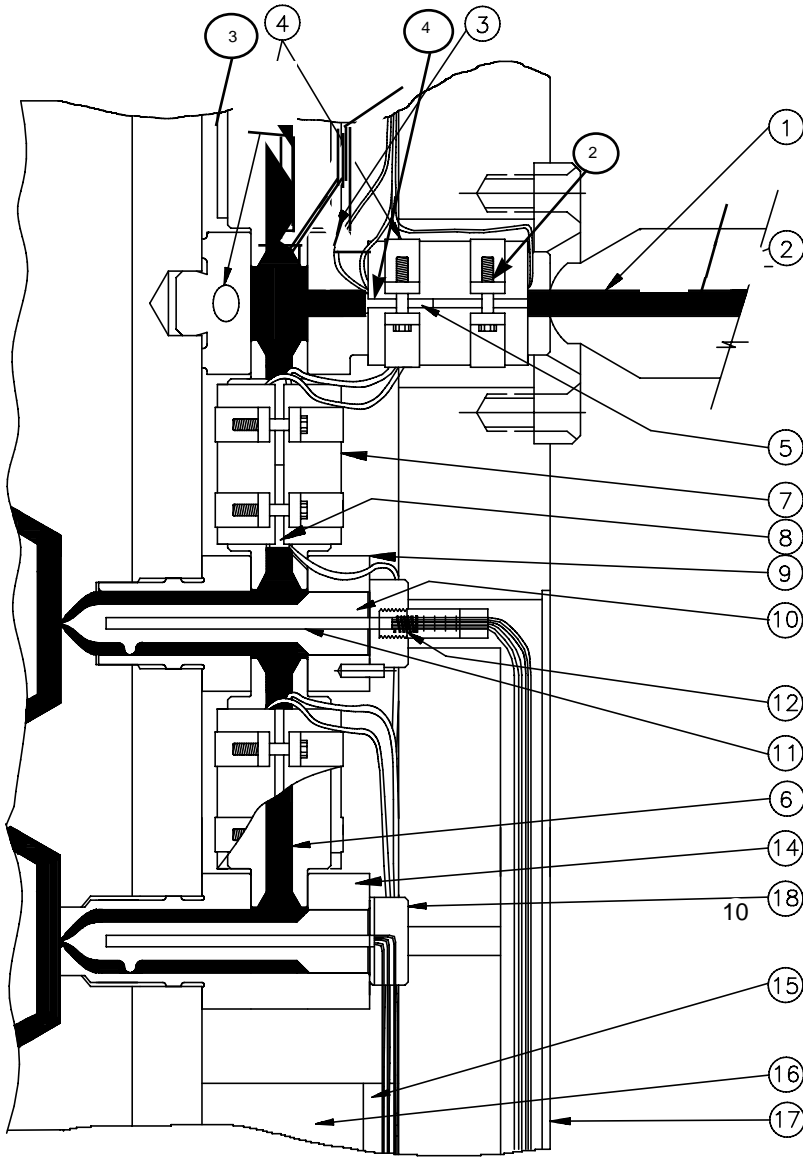
- Off the shelf designs
- Internally & externally heated
- Energy-efficient
- Probe heaters replaced with ease
- Fast and complete color changes
- Leak-proof design
- Adjustable probes
- Modular building-block concept
- Heat treated tool steel components
- Thermocouples for control
- Excellent gate vestige
- Minimum heat loss from system to mold
- Easy assembly into mold
- No “O” ring seals
- No need to calculate thermal expansion
- No centering pins to block flow
- No water effecting material flow
- No heat sink from machine nozzle



For an overview of the Rama modular hot runner system refer to this exploded view. For clarity, certain components have been omitted.

Plastic Melt Flow Path

How Does the Plastic Flow?



To answer this question, a hypothetical system is shown here and the flow sequence explained.

Molten plastic flows from the machine nozzle (1) into the central distributor (2) which is heated by a cartridge heater (3) and a band heater (4). The temperature is controlled by a thermocouple (5) in the central distributor or under the band heater. The plastic then flows through the standard pipes (6) which are heated externally by mica band heaters (7) and temperature controlled by a thermocouple (8).

From the standard pipes the plastic flows into the topless bushing (9) and around the probe (10) which is internally heated by a cartridge heater (11). The heater is secured in close contact with the flat bottom hole in the probe by a spring-loaded retainer (12).

As an alternate for the topless bushing, a gated bushing (14) can be used. Thermocouple and heater leadwires are positioned along a lead-wire raceway (15) cut in the spacer plate (16), leadwires for probe heaters follow a raceway cut in the top clamping plate (17).

Tests have been completed to determine the correct wattage for the mica band and the cartridge heaters used in the system. The result is a precisely controlled temperature balanced runnerless system for any standard molding resin requiring working temperatures up to 700°F.

