Ciject™ Infusion Equipment: Overview

Introduction to Ciject™ Infusion Equipment

As the resin infusion process has become more widespread so the need to mechanise the handling, mixing and delivery of the resin has become more important. The traditional technique of hand-mixing bulk resin becomes impractical and potentially risky when using the process on any significant scale. Problems with mixing consistency, potential bulk-exotherm and high levels of waste can have a significant impact on the viability of the process.

A meter-mixing machine can be used to simply dispense mixed resin ‘on demand’ into a suitable container but Composite Integration have taken the technology a step further by pioneering the development of systems capable of injecting ‘directly’ into the infusion process.

Pressure sensors positioned strategically in the mould feedback to the injection machine and enable the process to be completely ‘closed’ with fully automatic quantity and flow-rate control.

The advantages of ‘directly injecting’ include:

- Process repeatability (systemisation leads the operator through the various process stages)
- Resin is delivered to the mould at the optimum pressure (not dependant on pipe length, diameter or hydrostatic head)
- No bulk-exotherm risk (resin is mixed on-demand)
- No manual resin mixing (manual contact with liquid resin is avoided)
- Internal in-line mixing avoids air entrapment in resin
- Waste reduction (no need to fill bulk feed containers with potentially excess resin)
- Possibility to record process data
Option 1: Standard Ciject™ machine used to feed mixed resin into intermediate holding tank
This option has been the ‘conventional’ way of using a meter-mixing machine for infusion. The machine is simply used to maintain a constant level of mixed resin in the tank and the infusion pipe-work feeds the resin from the tank to the mould.
The machine can be relatively standard (Ciject Zero™ or Ciject One™) and can have an additional ultrasonic ‘Level Sensing’ option to automatically stop/start the pumps (to maintain a constant level of mixed resin in the tank)
The machine can include an on-board tank or the customer can use their own container as necessary.
To provide pricing for this we need to know the size of tank needed (or if the customer is to supply the tank) and the general level of sophistication needed on the machine (e.g. any other options required)
We also need to consider if the output of the machine will be high enough to maintain resin flow at the appropriate rate (often very high output is required only at the start of the infusion and this can be accommodated by pre-filling the tank)
(see standard Ciject™ data sheets)

Option 2: Standard Ciject™ Machine used to inject directly into the infusion
Standard Ciject™ machines can be used to feed resin directly into an infusion process with some simple modifications. These standard machines include a mix-head mounted pressure sensor. This sensor can be disconnected and the cable extended to read a sensor mounted in the actual laminate.
With correct configuration, this can provide an excellent method of control and allows resin to be injected at the optimum rate and under full control.
If using a standard machine with a single pump-set the maximum output is limited (depending on resin viscosity etc) to a maximum of approximately 10kg/min.
(see standard Ciject™ data sheets)

Option 3: Higher output machines specifically designed for ‘Direct Infusion’
We have developed a series of more sophisticated equipment that is specifically designed for infusion.

The Ciject™ Four is based around a double pump system that can provide fluid output up to 15kg/min plus a level of process security during the infusion (each pump/mix head can be shut-down and flushed if necessary during the infusion)
Multiple In-Mould Pressure Sensors (IMPS) can be connected to the machine.
The specification can be adapted and the control system can be configured to suit the particular parameters of the customer’s process.
(see Ciject™ Four data sheet)

The Ciject™ Five uses precision gear-pumps to enable higher fluid output levels and is specified for the very largest applications. Combining high flow rates, integration with the IMPS sensing system and with unrivalled levels of control and monitoring, the Ciject Five is the most sophisticated unit in the Ciject infusion range.
(see Ciject™ Five data sheet)

Note: All specifications are subject to change without notice: