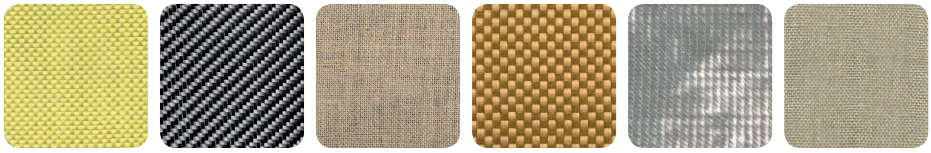
HEXION™

Combined Composite Technologies Ltd.

Product Bulletin

Composites

Optibox™ Tooling Solution for the Composite Industry - Highly Scalable, Fully Automated and Programmable



Combined Composite Technologies (CCT), a business unit of Hexion Inc. (Hexion), a global leader in thermoset resins, has developed the Optibox tool—a new tool to improve efficiency and quality in composite processing. The Optibox tool is an automated processing / programmable logic-controlled (PLC) resin curing & moulding system. Once loaded with fiber reinforcement, this self heating mould tool tracks resin filling and curing through a variety of sensors, enabling cycle time optimization. Multi-zone heat controls can be programmed to respond to sensor feedback, promoting optimized curing to achieve desired part tolerances and finish.

Applications

Processes:

- Preforms
- Prepreg moulding
- Resin infusion methods such as RTM, RTM light and VARTM

Markets:

- Small to mid-size enterprises
- Aircraft and rail interiors manufacturing
- Automotive parts manufacturing
- Technical education

Features & Benefits

- Monitors multiple variables such as:
  - Resin flow
  - Temperature profile over multiple zones
  - Extent of mould-filling
  - Gelation
  - Degree of cure
  - Vacuum level
- Applies heat in up to 20 zones for even cure at variable component / tool thicknesses
- Programmable cure cycles
- Built-in, self-contained vacuum system
- Multi-cavity mould tool option
- Flexible configuration, customizable to suit individual customer needs
- Helps optimize processing efficiency for cost and energy savings
- Helps optimize quality of end-product

Why Optibox tool?

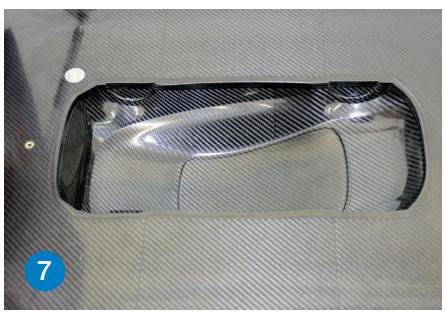
In a typical composite manufacturing practice, once the heavy two-part tool is closed, it becomes a black box. Resin is infused and heat is applied for a period of time suggested by the manufacturer, but there is no way to know what is actually happening inside the tool.

Textbook Clarity

The Optibox tool, on the other hand, is a portable, easy-to-use, single- or double-sided tool with a clear LCD display that shows exactly how filling and curing are progressing. Simple, fast, “one touch” operation supports multiple processes with interchangeable upper tool configurations that enable flexible, rigid, heated and multi-cavity functionality. Fully programmable cure cycles featuring multiple discreet heat zones, together with integrated pre-set or selectable vacuum settings, afford the user complete process control. Sensor data is logged for assured quality, and an App to facilitate remote programming and monitoring is under development. Its ease of use, convenient size, programmability and data readout make the Optibox tool the perfect interactive teaching tool to demonstrate the effects of numerous variables on resin curing.

At a Glance

1 Touch screen display
2 Manual control switches
3 Vacuum level indicator
4 Remote cure advance
5 Ethernet connectivity
6 USB port
7 Heated mould surface
8 Cure sensor
9 Vacuum port
10 Mould top face
11 Internal vacuum pump
12 Standard 220V AC inlet



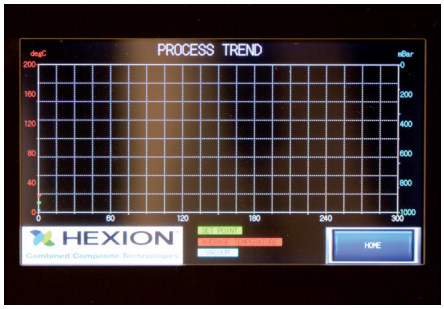
Decreased Cure Time and Other Efficiencies Ideal for Small to Mid-size Enterprises

The Optibox tool allows for efficient use of time, space, energy, expense and manpower—all important practical considerations for the smaller-scale manufacturing business, whether aiming to produce 10 or 15,000 units per year.

First off, the Optibox tool can help maximize cycle efficiency for cost and energy savings. To track curing, thermocouple probes monitor the laminate's surface area to keep temperature deviations within +/- 3 degrees, precluding hot or cool spots. As soon as curing is complete, the part can be demoulded, often ahead of the recommended schedule. Over many cycles, a few minutes saved can add up to a big boost in operational productivity.

Infrastructure costs are reduced as well: no autoclave, oven or heavy duty power supply is required, and mould and "B" faces are interchangeable. The basic Optibox tool is designed to be portable. Its standard 80 x 60 x 60 cm housing accommodates an integrated and easily interchangeable, single or multi-cavity mould tool, for increased production flexibility and tool diversity. To meet customer requirements, the device can be scaled up to accommodate larger moulds. The Optibox tool operates on standard electrical current.

Lastly, labour costs are kept to a minimum. Once programmed, its plug and play simplicity means the Optibox tool is operable by relatively unskilled labour, with speedy set-up and high-quality production.



Greater Precision for Aerospace, Rail and Automotive Parts Manufacturing: Higher Quality Through Pinpoint Control

By understanding and fine-tuning every step of the curing process, manufacturers can achieve superlative resin quality for preforms, volume assemblies, and subassemblies. Each type of sensor the Optibox tool features contributes valuable information. The mould-filling check for resin infusion indicates when and where resin has arrived at the extremes of the mould; the heat may be programmed to stay low in each zone until filling is complete. If gelation is occurring prematurely in a particular zone, the device can be programmed to lower the temperature. On the other hand, the Optibox tool can be programmed to immediately increase the temperature as soon as filling is complete, in order to achieve the fastest gel.

Hexion: Helping you make it in today's world.

Our global team produces the best in specialty chemicals and performance materials and provides the technical expertise to customize them to your exact needs. The result? Specific solutions, not generic products, leading to thousands of breakthroughs that improve bottom lines and enhance lives.

Reach Hexion CCT at:
+44 1489 585900
E-mail: cct@hexion.com

Reach our Global Customer Service network at:

U.S., Canada and Latin America
+1 888 443 9466/+1 614 986 2497
E-mail: 4information@hexion.com

Europe, Middle East, Africa and India
+800 836 43581/+40 212 534 754
E-mail: 4information.eu@hexion.com

China and Other Asia Pacific Countries
+800 820 0202/+60 3 9206 1551
+60 3 9206 1543
E-mail: 4information.ap@hexion.com

Please refer to the literature code HXN-727 when contacting us.

HEXION™

Combined Composite Technologies Ltd.
Unit 3, Trilogy, Concorde Way
Segensworth North,
Fareham, Hampshire PO15 5RL
United Kingdom

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