

Vacuum casting systems







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Introduction to vacuum casting

Vacuum casting allows the production of small batches of high quality mouldings in a range of polyurethane resins that replicate the performance of engineering plastics without the high costs of hard tooling associated with injection moulding.

The process starts with making a mould by encapsulating a master model in two-part liquid silicone rubber. A vacuum is then applied to remove any trapped air, then it is cured in an oven. Master models can come from a number of 3D printing technologies including stereolithography.

Once the silicone is cured, the mould is cut open to form a split line, the master model is removed which leaves a mould cavity perfectly replicating the master model.

To make a part, the mould segments are put back together, secured, pre-heated and placed in the vacuum casting system chamber. Two or three part resin is weighed, pigment added if required and the resin parts are placed in the automatic mixer of the vacuum casting system.

At this point, the vacuum casting system takes over the process to mix the resin components and vacuum cast the model. Once this is complete the casting is cured at 70 °C. After curing, the mould segments can be separated and the part removed. All that remains is for the part to be trimmed and finished as required.



Vacuum casting highlights



Benefits of vacuum casting

Vacuum casting can save you time and money in product development cycles

Renishaw vacuum casting resins and silicone rubbers

| Material | Part No. | Viscosity (cP) | Color | Shore A | Shore D | Modulus (MPa) | Elongation (%) | Temperature (°C) | Notes |
|----------|----------|----------------|-------|---------|---------|---------------|----------------|------------------|-------|
| ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |

Vacuum casting applications

Produce everything from industrial components to consumer products



Vacuum casting systems

From manual to high capacity automated systems, Renishaw can provide a solution to your needs



System configuration options

Optional modules allow the production of parts in a wide range of materials



Vacuum casting materials

A comprehensive range of casting resins and mould making silicones for your applications



Vacuum casting ancillaries

Ancillary equipment and consumables to make the vacuum casting process as simple as possible

Benefits of vacuum casting



When vacuum casting was first introduced to the market in 1987, the concept of '24 hours from pattern to part' was nothing short of a revolution, transforming plastic prototype production.

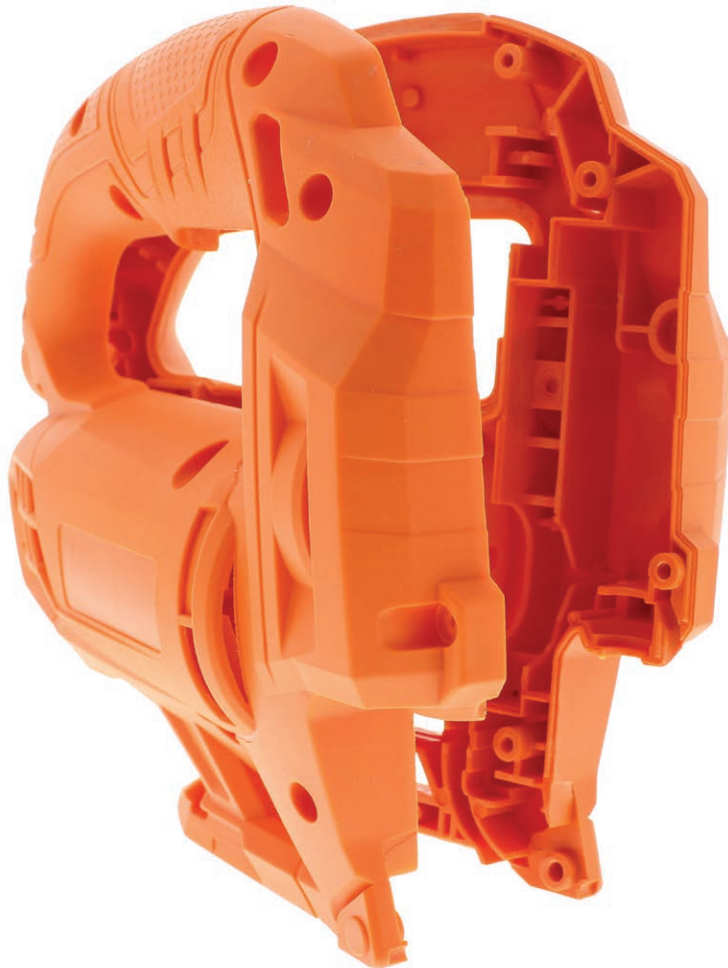
As mass-customisation takes hold, vacuum casting enters a new phase. Significant developments in polyurethane resin and materials, and the addition of thermoplastic nylon casting capability using Renishaw's externally mounted nylon module, enables vacuum casting to become a viable 'small batch' manufacturing technology.

Benefits at a glance:

- From master model to multiple components within 24 hours – reduces development time and saves cost
- Vacuum casting can be used for small batches of high quality prototypes or low volume end use parts
- Wide range of resins available to suit your application – food grade, clear, flame retardant and coloured



Benefits of vacuum casting



Benefits continued:

- Good mould life – moulds are capable of producing up to 50 parts before retooling is required, making vacuum casting the perfect choice for small batch production
- Versatile – resin types can be changed very quickly reducing system downtime
- Master models can come from a range of sources, the most common being stereolithography models, but increasingly the accessibility of 3D printers has become a useful source
- Highly complex shapes can be accommodated through multi-segment moulds
- The confidence we have in the reliability of our own systems and the quality of products is such, that we manufacture short run production parts for other Renishaw high quality engineering products, for example Dynascan®, Quarryman® and our metal additive manufacturing systems

Vacuum casting applications



Everything from industrial components, to consumer products, lenses and small batches can be produced using the vacuum casting process.

Typically, between 30 and 50 colour matched parts can be produced from a single mould with first parts available within 24 hours.

Typical applications at a glance:

- High quality prototypes for product design verification
- Small batch production for bespoke products
- Functional nylon components in a range of grades – particularly good for living hinges and high strength requirements
- Automotive 'hot test' and specialist manufacture
- High quality wax masters for investment casting
- Flexible components using Vario Vac technology



Vacuum casting systems

Renishaw is a leading manufacturer of vacuum casting systems. We provide a full solution for vacuum casting with a range of systems, from manual to high capacity computer automated, for the economic production of short run, end use parts and prototypes.

Vacuum casting system features at a glance:

- Mixing capacities up to 10 L (610 cu/in)
- Controls – PLC touch screen with manual options available
- Mixing and pouring – automatic and semi-automatic options available
- Systems are designed and built in-house, by Renishaw expert engineers with over 25 years of experience in the vacuum casting industry

Vacuum casting systems at a glance:

- 5/01 Vario – the smallest PLC controlled Renishaw vacuum casting system with many of the features of larger systems and a small footprint
- 5/04 Vario – high quality parts in a range of resins including ABS replicas, soft-feel rubber-like materials and filled nylon
- 5/01 Vario and 5/04 Vario – CE marked and TÜV approved

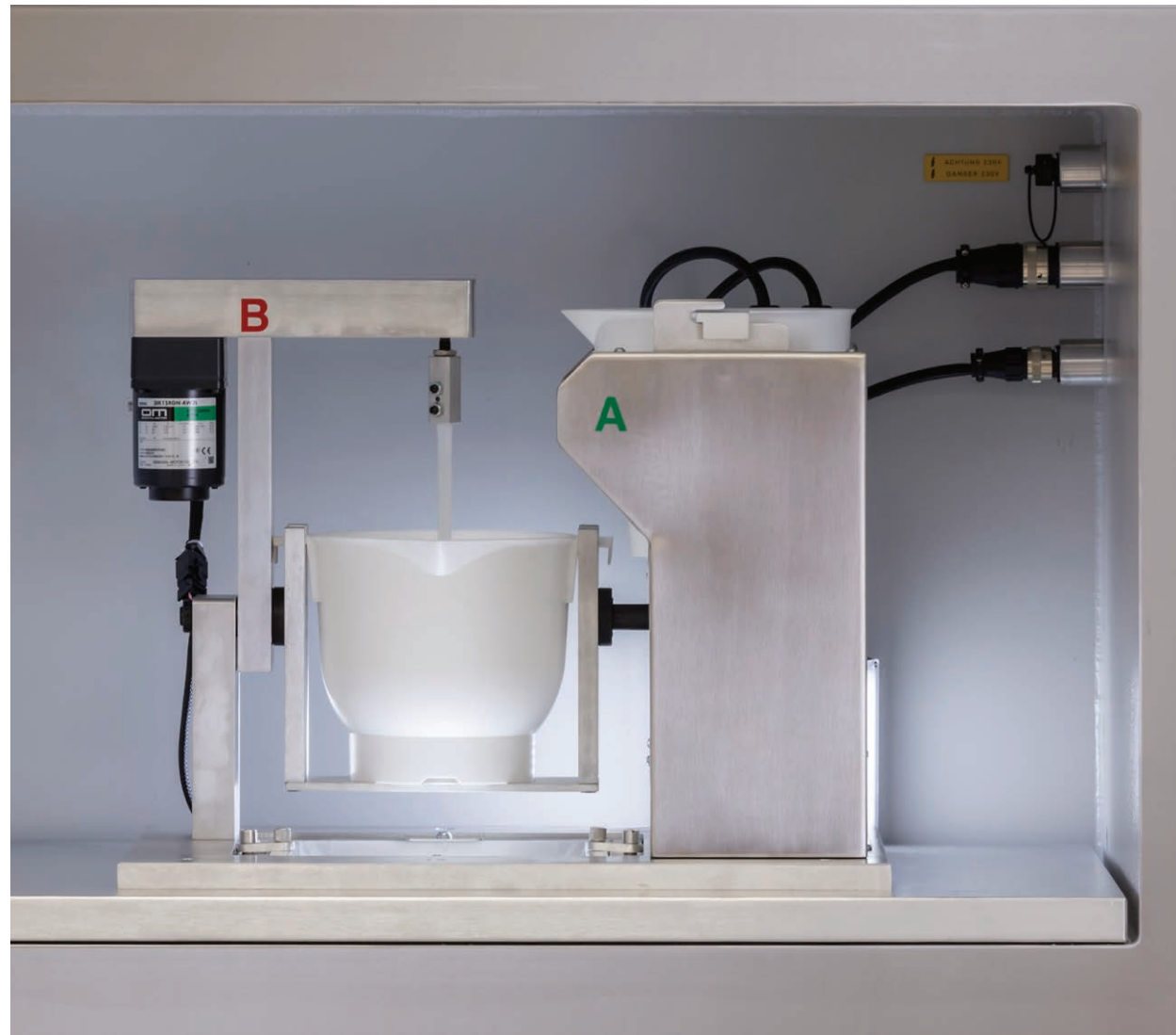


System configuration options

Renishaw vacuum casting systems can be easily configured to produce parts in polyurethane resins, investment casting wax, filled nylon or soft feel materials, including silicone rubber. This is done simply by exchanging modules on the system.

System configuration options at a glance:

- Vacuum casting module – for plastic prototypes and low volume production in vacuum casting polyurethane resins
- Nylon casting module – for prototypes and production parts in nylon and filled nylon
- Heated cup for wax masters – to create wax master models for investment casting and low melting point alloys for carbon fibre lay-up
- Vario Vac – for prototypes in silicone rubber and highly filled viscous materials



Vacuum casting materials

Renishaw supplies a comprehensive range of casting resins and mould-making silicones suitable for a wide range of applications. We are constantly developing new materials so it's always worth contacting us for the latest developments or if you have a specific need.

The more common materials are listed below.

Polyurethane vacuum casting:

- SG95 – ABS type – transparent
- 6235 – translucent – pigmentable
- 8020-2 – soft rubber type – translucent
- 8045 – variable hardness PP/PE type
- 8051 – PC/ABS type – white
- 8263 – UL94 V=0 5 V flame retardant ABS type
- 8891 – 20 A to 90 A variable hardness rubber type
- 9012 – FDA ABS type – white

Silicone mould making:

- Rensil – transparent – low viscosity – long mould life
- VTV750 – translucent – colourless
- VTX950 – transparent – colourless
- VTN6000 – transparent – colourless – for nylon casting

For the full range of vacuum casting resins and silicone rubbers visit www.renishaw.com/vaccast-datasheet





Renishaw 8263 resin

- Good impact strength
- Flame retardant – certified fire retardant to UL94V-0
- Pigmentable
- Suitable for electrical enclosures

Vacuum casting ancillaries



Renishaw supplies a complete range of vacuum casting systems and ancillaries, all available to order off the shelf.

Ancillaries at a glance:

- Nylon module – enables you to create functional components in PA6 nylon
- Curing ovens – a range of curing ovens for materials and moulds – analogue or digital control
- Extension chamber – for projects that fall outside the capacity of a standard system, available for the 5/04 vacuum casting system
- Twin robot – enables increased casting capacity, available for the 5/04 vacuum casting system
- Fume and dust benches – enable you to maintain a clean and safe atmosphere for the system operator and help to maintain part quality
- Training programmes – tailored to suit your requirements



Vacuum casting consumables



Consumables:

Renishaw supplies a complete range of vacuum casting consumables, all available to order off the shelf, including.

- Materials
- Cups
- Funnels
- Liners
- Mixing paddles
- Mould tape
- Mould separators
- Release agents
- Hoses
- Specialised cleaning products

Global support



Renishaw believes the quality of support you receive is just as important as the quality of the products you receive. Renishaw is committed to supporting customers throughout the world via an extensive network of Renishaw offices and distributors.

If you are investing in your first vacuum casting system, or are upgrading to the latest technology, Renishaw can support you. We've developed all elements of our own manufacturing processes, including vacuum casting, enabling us to provide excellent technical service and support.

Renishaw engineers are renowned for their pre and post sales support. Buying new equipment can be a major investment and keeping it running is often key to the profitability of a business. That is why Renishaw gives fast responsive support and a "repair by exchange" (RBE) service on hardware.

For more information or to tailor a support package to your exact requirements, please contact your local Renishaw office for detailed information about the options available.

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Renishaw is an established world leader in engineering technologies, with a strong history of innovation in product development and manufacturing. Since its formation in 1973, the company has supplied leading-edge products that increase process productivity, improve product quality and deliver cost-effective automation solutions.

A worldwide network of subsidiary companies and distributors provides exceptional service and support for its customers.

Products include:

- Additive manufacturing and vacuum casting technologies for design, prototyping, and production applications
- Dental CAD/CAM scanning systems and supply of dental structures
- Encoder systems for high-accuracy linear, angle and rotary position feedback
- Fixturing for CMMs (co-ordinate measuring machines) and gauging systems
- Gauging systems for comparative measurement of machined parts
- High-speed laser measurement and surveying systems for use in extreme environments
- Laser and ballbar systems for performance measurement and calibration of machines
- Medical devices for neurosurgical applications
- Probe systems and software for job set-up, tool setting and inspection on CNC machine tools
- Raman spectroscopy systems for non-destructive material analysis
- Sensor systems and software for measurement on CMMs
- Styli for CMM and machine tool probe applications



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