The orbital drilling revolution
Join the holemaking revolution

The orbital drilling revolution

Novator’s orbital drilling technology enables enterprises to significantly improve quality and productivity. Use of orbital drilling cuts production lead times and total costs. Orbital drilling enables users to work with new, advanced materials and technologies and thus introduce new products.

Novator’s orbital drilling equipment is now revolutionizing manufacturing processes in the aerospace industry. The technology is also suitable for applications in other industries in which hole-drilling precision in sophisticated, intricate materials is a critical success factor.

Orbital drilling – the new holemaking concept

Novator’s patented orbital drilling technology is based on simultaneously rotating a cutting tool around its own axis and a center axis that is offset from the cutting tool’s axis. Dynamic adjustments of the offset allow a cutting tool of a specific diameter to be used for drilling holes of various diameters and shapes. Only the imagination limits the range that’s possible with the orbital drill’s offset.

Mechanically forced orbital movement

The orbital movement of the cutting tool is mechanically forced and should not be mixed up with circular interpolation. The mechanically forced orbital movement gives a dramatically increased orbital speed, which in turn gives a significantly higher material removal rate. The drilling diameter is defined by the offset created by the orbital movement. The diameter can therefore be dynamically adjusted during drilling and enables holemaking of different diameters and shapes with a single tool. By using orbital technology, the total cycle times are often drastically reduced.
Orbital drilling adds a new dimension to high precision drilling in industrial applications. It opens up for totally new rationalized drilling processes that increase the hole precision and strength and significantly reduce production costs.

**Business benefits**
- Shorter lead times
- Lower production costs
- Higher hole quality
- Greater degree of automation
- No need for coolants
- Easier use of new materials

**Burrless holes**
Lower force in combination with orbital movement of the cutter produces burrless holes in metal.

**Delamination-free holes in composites**
Lower thrust enables drilling of delamination-free holes in composite materials, and risk of part deflection is reduced when drilling in stacks.

**One tool — many hole sizes and shapes**
The adjustable offset in orbital drilling enables use of one tool for drilling holes of various sizes and shapes. Cutting tool inventories can be substantially reduced, and fewer machines are needed.

**Dry drilling**
The orbital drilling cutter has only partial and intermittent contact with the material. That, together with efficient air cooling of the cutting tool and the hole surface, enables dry drilling or quasi-dry drilling, which requires MQL. Not needing coolant during drilling makes coolant cleaning and management obsolete, allows for drilling in clean environments, and reduces the need for cleaning structures.

Efficient heat extraction also reduces risk of matrix melting in composites and heat-affected zones in metal.

**Smaller, easier-to-remove chips**
Orbital drilling reduces chip-induced damage. Novator’s tools have a smaller diameter than the hole and produce smaller chips that are efficiently removed in an advanced airflow system. Efficient chip extraction also enables drilling in closed sections.

**Holes drilled in composite, titanium and aluminium with traditional technique compared to holes drilled with orbital drilling.**

**Improve quality and productivity while cutting lead times and costs**
A flexible platform for various applications and requirements

Customized standard products for many applications

Orbital drilling technology is versatile and easily adapted to various applications. Each customer solution is unique in terms of operation, process, procedure, and drilling requirements. Orbital is Novator’s product portfolio for orbital drilling products, which are developed in close cooperation with its customers. The Orbital portfolio contains these product groups: Orbital Portable, Orbital End Effector, and Orbital Machining Spindle.

**Portable drilling applications**
The Orbital portable lightweight units are suitable for advanced drilling in situations where increased productivity and quality is required but automation is not an option.
- Drills holes in different sizes with one single tool.
- Programmable drilling process
- Automatic hole identification using RFID for correct drilling parameters
- Dry drilling or MQL

**Example of an Orbital Portable drilling unit in an assembly application.**

**End Effector applications**
The Orbital End Effectors are easily integrated into host machines, either gantries, robots or other machine tool equipments.
- Drills holes in different sizes with one single tool.
- Low cutting forces enables robotic automation
- Programmable drilling process
- Dry drilling or MQL
- Automatic tool change

**Example of an Orbital End Effector unit on a robot.**

**Machining spindle applications**
The machine in the machine. An orbital spindle is integrated into a machining centre. A highly flexible solution for multi purpose machining with one single machine:
- High speed Orbital Drilling
- Conventional drilling
- Milling
- Reaming

**Conceptual example of an Orbital Machining spindle integrated into a machining centre.**
Join the orbital drilling revolution

Novator is a high-tech engineering company that helps customers to optimize their hole-drilling processes, improve productivity, and cut production costs by using its expertise in sophisticated drilling technologies that deliver state-of-the-art drilling solutions.

Novator serves the aerospace industry and other industries in which hole-drilling precision in advanced, complex materials is a critical success factor. Companies that now use orbital drilling products include Airbus, Boeing, and Lockheed Martin.

R&D for orbital drilling technology and the Twinspin products are done in Stockholm, Sweden.

Novator was launched in 1992. It owns 29 patents and has 16 additional patents pending in the EU, Japan, and the US. These patents are directly related to orbital drilling and hole production. The patents cover methodology, equipment, and accessories.

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