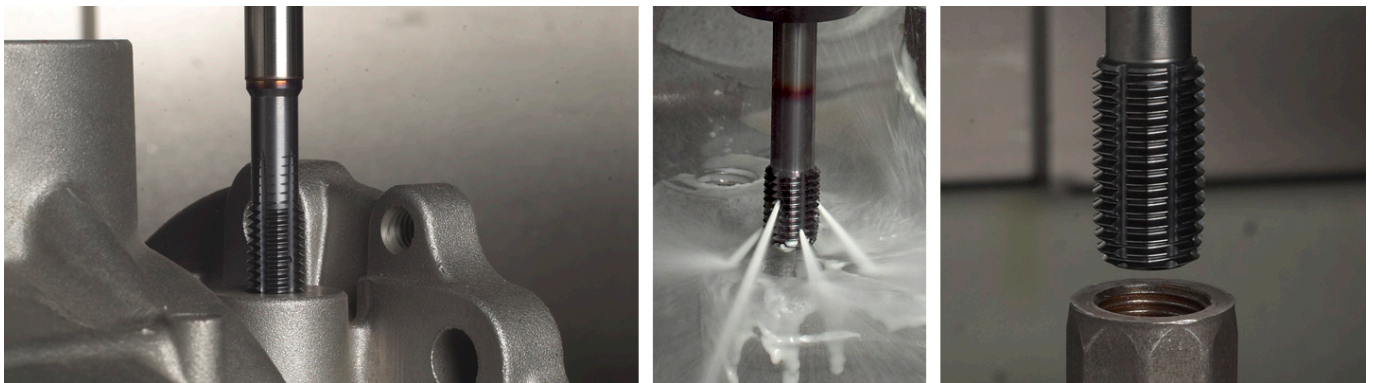


Innovate

# Continued Improvements to Form Tap Design Make Thread Forming a Great Alternative to Conventional Cut Threads

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Fluteless taps, or roll form taps, are used for the forming of internal threads without chip removal. In contrast to conventional tapping where material is cut from the workpiece, thread forming is a pressure deformation process without chip removal for the production of internal threads. During the process, the material is cold formed or pressed into thread geometry without interrupting the grain flow. As a result, the threads formed by this pressure deformation are stronger than those from a cut tap.



Pionex up close

## There are several advantages to thread forming:

- No chip is produced, therefore there are no chip evacuation or bird nesting problems, regardless of depth of threaded hole.
- One tool can be used for the production of threads in through and blind holes.
- Applications in wide range of materials are possible with the same tool.
- Pitch and angle of thread errors that can occur with thread cutting are eliminated.
- Internal threads produced by thread forming possess a higher tensile strength thanks to the uninterrupted grain flow and the cold forming process.
- The surface finish of the thread is superior.
- Fluteless taps can be applied at higher speeds because the formability of many materials increases with the forming speed. This does not have a negative effect on the tool life.
- Reduced danger of breakage due to the rigid design of the tap.

## Notes of caution before selecting a form tap:

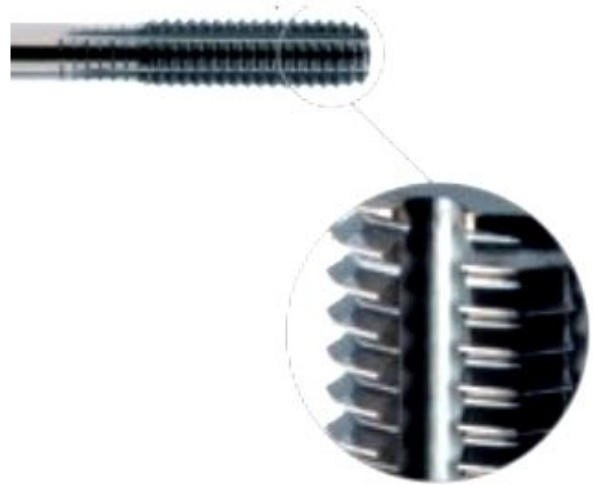
- Workpiece must be a ductile (formable) material.
- The part must have a wall thickness that will prevent the external dimensions from deforming while the internal thread is being formed.
- Tapping hole size optimization is key to managing minor thread diameter after forming, torque, tool life and process reliability.
- Lubrication is especially important in thread forming (preferably 10% water soluble or greater), to prevent build-up of material and excessive torque.

If you are able to manage the above mentioned factors, using pressure deformation to create threads can reward with great versatility, improved productivity and extended tool life in a vast range of

applications. The design of the form tap can have a big influence on your potential for success and your ability to avoid the pitfalls. There are several features of new Pionex® taps from Guhring that make it easier to choose thread forming for your application.

### **New polygon lobe geometry**

The polygon geometry of *Pionex form taps* optimizes the contact between the tool and the workpiece



to reduce torque and axial force by as much as 30%.

Fluteless taps with optimal pressure point quantities and geometry have been shown in multiple studies to achieve increased dimensional accuracy. This design also reduces the amount of heat generated, and tool life is greatly extended as a result of this advanced geometry.

### **Optimized lubricating grooves**

The lubricating grooves of Pionex form taps have a deeper and wider design, allowing more lubricant to be carried to the forming lead threads of the tap.

The obvious result is extended tool life due to the improvement in lubrication and reduction of heat

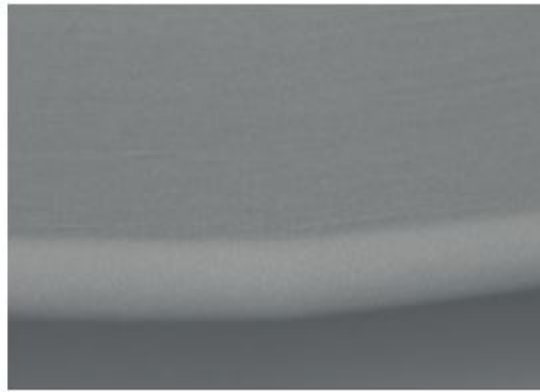
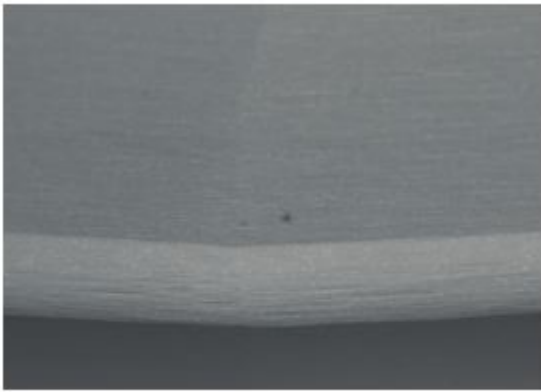


produced.

Four series of Pionex form taps are available from stock with coolant through the tool.

### **Improved surface finish**

All Pionex form taps go through an advanced pre-coating polishing process which removes any fine grinding marks from tap production. TiCN coating is then applied to increase wear resistance. Then a post-coating polishing technique is applied to ensure the smoothest surface finish possible. These extra polishing steps in production ensure increased wear resistance and provide greater tool life.



Finish of a conventional fluteless tap (left) versus finish of a Guhring Pionex fluteless tap.

A newly developed powdered metal substrate also adds toughness and wear resistance to the list of Pionex features.

Pionex fluteless taps are stocked in UNC, UNF, Metric and Metric Fine designations; and with both semi-bottoming (Form C) and full-bottoming (Form E) chamfer leads. This new tap family can be applied in all standard clamping chucks due to its h6 shank tolerance. Guhring recommends GuhroSync chucks for the best results in form (fluteless) tapping.

### Field test proves Pionex goes the distance

Frustrated with their carbide tap's tool life, a manufacturing plant in the Midwest tested a Series 4483 Pionex form tap in their long production run in Al-cast A380. Guhring's PM Cobalt tap **more than tripled** the tool life of the competitor's carbide tap – threading more than 203,000 holes vs. the competitor's 64,900 holes (see chart below). On top of that, the Pionex tap cut the cycle time by two thirds, and the overall savings for the plant was 55%.

