A Multi-jet Polishing Technology that Boost Polishing Efficiency and Provide Good Surface Quality 多射流托拋光技術

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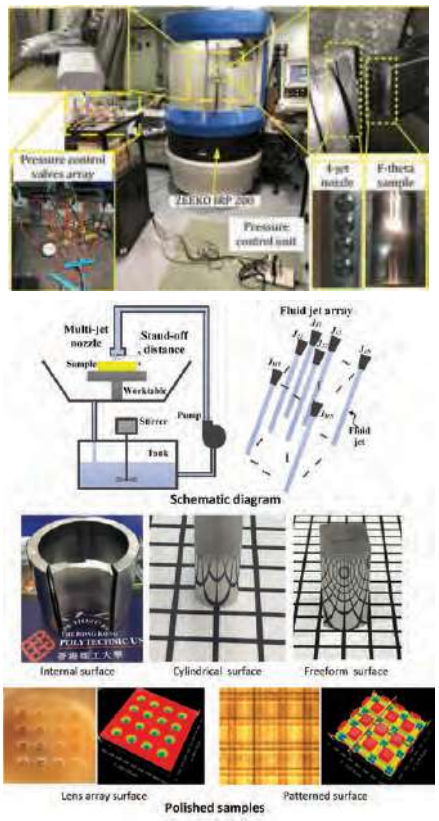
Special features 技術特點

- *Useful for patterning various kinds of structures such as lens arrays*
  已被成功應用於結構表面的加工，例如透鏡陣列
- *More cost-effective* 成本效益較高



Ultra-precision freeform surfaces have been widely applied in many fields such as aerospace, photonics, optics, biomedical, etc. However, the low polishing efficiency of fluid jet polishing (FJP) adversely affects its application in polishing large-sized components or components made of difficult-to-machine materials.

An array of orifices are designed and integrated into one multi-jet polishing (MJP) nozzle, which generates an array of pressurized abrasive water jets for removing material after impinging to the target surfaces. It works under two modes including integrated polishing mode and discrete polishing mode. In integrated polishing mode, all jets have the same fluid pressure, and the jet array is considered to be a large polishing pad to boost the polishing efficiency. In discrete polishing mode, the pressure of each jet is controlled independently through the connected pressure control valve, which can implement curvature-adaptive polishing of multi-regions of the surface simultaneously.

This MJP technology can be used for the polishing of freeform and structured surfaces used in biomedical (e.g. artificial implants), optics (e.g. freeform lenses), aerospace (e.g. turbine blades), etc. Further applications can be extended to polish 3D printed freeform surfaces.

理大團隊開發了多射流拋光(MJP)技術，其多射流噴嘴上設有一陣列噴孔，以 成本效益較高產生成一組具磨性的高壓水噴射系統，通過衝擊目標表面把多餘物料去除。

此技術可以在集中拋光和離散拋光模式下工作。集中拋光是於所有射流設定相同壓力，與單一射流相比，可作為一個相對大尺寸的拋光頭，從而大幅度提高拋光效率。離散拋光是每一束射流的壓力可以通過聯通壓力閥獨立控制，從而應用於多區域同時曲面自適應拋光。此技術與傳統單一射流拋光方式相比，可以大幅度提高拋光效率，對於變曲率自由曲面有高度的自適應性。技術可應用於自由曲面和結構表面的拋光，如於生物醫學領域（人工植入物）、光學領域（自由曲面光學元件）、航空領域（航空發動機葉片）等，並可進一步應用於三維打印自由曲面的拋光。當加工複雜結構表面時， 相比於激光加工的成本更低。

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