D D motor Application and Principle at 5 Axes head

Roberto Colombo
President & Technical Director
Technai Team s.r.l.

關鍵詞

- 直驅馬達　DD Motors
- 旋轉模組　Rotary Components
- 多軸化工具機　Multi-axis Machine Tools

摘要

本文主要說明直驅馬達於多軸化工具機的應用優越性，不管是從機械的運動精度、動態特性、成本性能、磨耗、維修、或是產品壽命等之考量條件，均顯示直驅馬達相較於傳統伺服馬達搭配減速裝置，有更廣泛之應用市場與機會。另外，本文同時概述義大利專業模組廠 Technai 之發展背景，及其在台灣的市場策略。

“Direct Drive” Technology for linear and rotary axis and the Opportunity

In 1993, Linear Motors were introduced in the field of the machine tool manufacturing as a groundbreaking solution. In those years, Linear motors were the main subject of debate, very much considered technologically innovative and a solution that would revolutionize the field. Linear Motors were applied to linear axis; but what about rotary axis? Surprisingly, no one was offering a suitable equivalent solution. Technai seized this unique opportunity.

“Torque Motor” is a technology known to people in the field for some time. It can be imagined as an offshoot

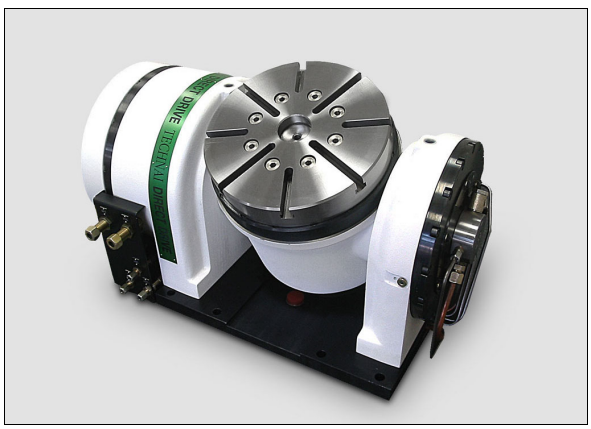
originated directly from a Linear Motor "curved" on to a circumference. In the past, these motors were already exploited for very specific solutions, particularly in the field of very small drive-systems (for instance in certain servo-valves) as well as for big high torque/power demanding applications used for military and scientific purposes such as radars, telescopes, satellite antennas. But they were never used for machine tool drive-systems.

Technai's approach

Technai was founded in 1993 by a highly skilled team of five associates with an extensive experience in Machine Tool engineering and manufacturing process.

The Company started off as an engineering consultancy service provider for the Machine Tool Manufacturers, yet consciously aware of a potential bigger role to play in the future, thanks to the opportunities offered by emerging new technologies and their unique "techne" approach to customized applications

Already in 1994, the Company, led by President and chief design engineer Roberto Colombo, began to focus on Torque motors technology by extensively researching its characteristics, construction and range of adaptability. This in-depth analysis led to a well defined strategy: - thoroughly understanding the advantages of "Direct Drive" motion vs. conventional transmission - selecting applications which could benefit from the new technology - committing resources for the development of Direct Drive technology to design and manufacture customized systems for specific applications. From here on, Direct Drive technology for rotary axes became Technai Team's mission.



The fundamental concept and the state-of-the-art of Direct Drive motor for rotary axis

"Torque Motor" imposes a different approach compared to what was once considered standard procedure when dealing with an ordinary electric motor.

Since it is the motor that "enters the machine", its dimensioning must be compatible with the structure of the machine. Also, its characteristics need to be customized to fit the purpose of the machine, very much so because, "the characteristics of the "Direct Drive motor" (Torque and Speed) will become the proper characteristics of the machine".

The Torque motor's characteristics are fundamentally delegated to the electronic control, which must be implemented with higher degree of precision and skillfulness.

This aspect should not be underestimated because, the mechanical functions of rigidity and stability need to be "built within" the electronic control. Ultimately, what matters most is the benefit gained from the improved performance of the machine in terms of precision and productivity.

When the system is properly designed and properly controlled, the results are tangible; the rotary axes execution will achieve an exceptional performance quality, most importantly in terms of dynamics and precision, and considered the fundamental absence of wear, it will lead to a stable performance throughout the machine's operative life.

Nowadays, Torque motors are considered a mature

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