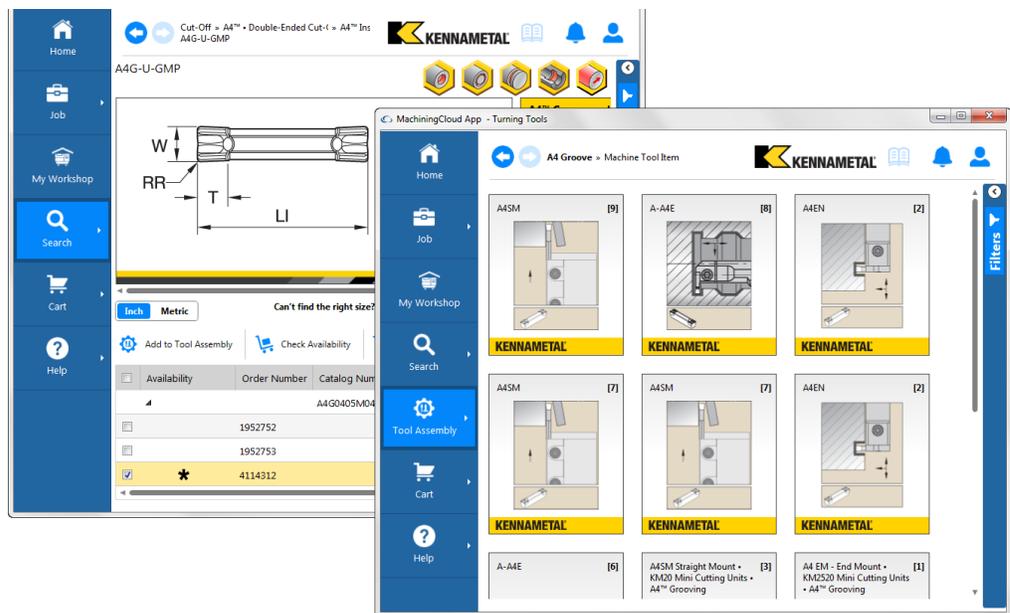# White Paper

Transforming Digital Tooling Data into Program-Ready Data

Connecting your CAM system directly to digital tool data is a smart step towards making your programming environment faster and more reliable.

Transforming Digital Tooling Data into Program-Ready Data

Connecting your CAM system directly to digital tool data is a smart step towards making your programming environment faster and more reliable.

As the concept of providing digital tooling data on web portals becomes mainstream, the opportunities to integrate that data into other digital systems is transforming the manufacturing industry. While digital tool catalogs make it substantially easier and faster to search for the right tools for a job, a more significant and growing trend is to make available geometric data of cutting tools as well as 3D models for CAM programming, simulation and verification.

The trend toward providing complete tool data is more important than ever as the manufacturing industry moves to a "digital twin" model of synchronizing the digital world and physical world. A digital twin is an exact digital replica of your shop in your computer. This pairing of the virtual and physical worlds brings benefits across a diverse range of applications such as simulation and analysis, visualization and collaboration, design and NC programming, to head off problems before they occur.

In recent years, the Internet of Things (IoT) has made the digital twin model increasingly cost effective to implement. The technology is no longer the sole domain of large corporations with big budgets. A shop of any size can now benefit from realistic simulation of every aspect of the machining process to improve cycle time, part quality and equipment utilization.

Data that goes beyond the digital catalog

There is a growing movement among tool manufacturers to populate digital tool catalogs on their websites, replacing the onerous and time-consuming task of searching through thick paper catalogs. While a digital catalog makes it fast and easy to find the tools you need from a particular vendor, it still requires visits to multiple websites if you use different vendors and tends to isolate data in "silos" of information.

Unlocking that vast store of data offers immense potential for seamless integration into other shop applications. Direct access to tool data and graphics supports accurate and reliable tool selection in applications such as CAM programming, toolpath verification and analysis.

What if tool manufacturers agreed to standardize their data and centralize that information so that application developers can either have a direct connection to or an online interface to the same information? This provides an efficient exchange of reliable and accurate data.

Two standards provide a communications bridge between cutting tool manufacturers and shop software. ISO 13399 is a set of international standards governing the exchange of digital tool data. The ISO 13399 standard is managed by an ISO Technical Committee. The GTC (Generic Tool Catalog) Format is a complement to ISO 13399 that enables straightforward and uncomplicated communication of cutting tool data.

These two standards are helping advance growing applications for digital tool data. One of the sponsors of the GTC site (http://gtc-tools.com) is MachiningCloud Inc, a one-stop, industry-wide resource of digital tool data. MachiningCloud helps cutting tool manufacturers publish ISO catalogs and then connect that data directly into shop software. MachiningCloud operates as a subscription service that allows manufacturers to get the tool data they need from the cloud.

Integrating to other systems is a key function of a centralized tool database.

Putting digital tool data to work

Industry-leading developers of shop software partner with MachiningCloud to help manufacturers obtain the digital tool information they need to create accurate proxies of cutting tools in their CAM, simulation, and tool management software.

MachiningCloud leverages complete tool data to do much more than provide an easy way to search through digital catalogs. Users have access to geometry data, 3D models of tools and assemblies, feeds and speeds and even product availability from tool manufacturers.

Data about fit and function is also leveraged to build virtual 3D tool assemblies in optimum combinations of inserts, holders, bodies, adaptors, etc. When tools are assembled on the cloud, there is no need to download individual items and assemble them in a CAD software. MachiningCloud uses manufacturer-supplied product data to show only those items that can fit together and are available for order. For any given insert, only holders that fit with that insert are displayed and vice versa for tool holders and boring bars. This saves hours of searching for the right components and the uncertainty that those components will work together and are available when needed.
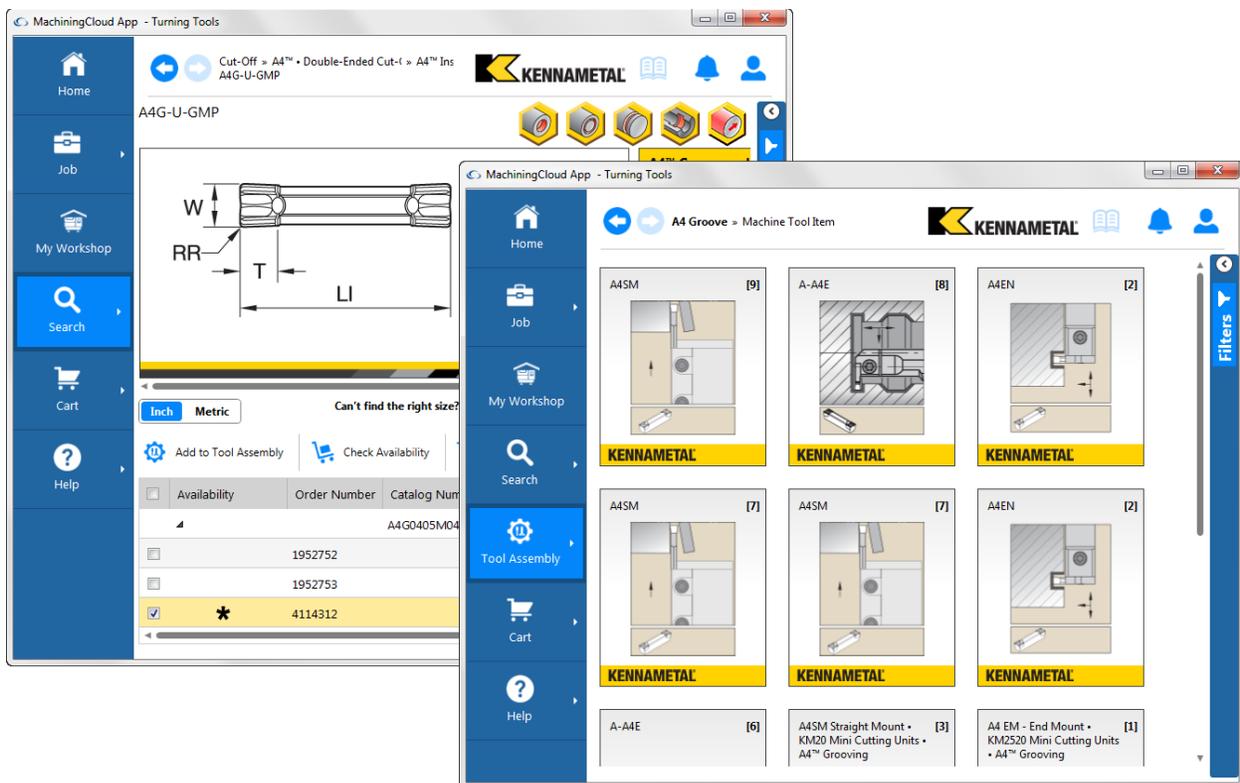
Only holders that fit a selected insert are displayed when assembling a turning tool in the MachiningCloud App.

Tool assemblies are added to a user's tool list and stored on the cloud for safe retrieval any time. Manufacturer-recommended feeds and speeds are also made available for each tool assembly. This is important because the entire tool assembly influences the quality of the

toolpath, not just the insert or cutter. The machine tool is another important factor when calculating feeds and speeds. MachiningCloud considers whether the machine's torque, power and maximum spindle speed limits are reached when feeds and speeds are set up.

Recommendations for feeds and speeds in MachiningCloud take into consideration the tool assembly, the machine, and the workpiece. Feeds and speeds data is saved with the tool.

Program-ready tool data for CAM programming

ESPRIT is a leading CAM software developer and an early MachiningCloud partner. The partnership allows ESPRIT users to easily transfer tool assemblies from MachiningCloud to ESPRIT via the Export function. An entire tooling job can be exported from the cloud and that tool data brought directly into their CAM software to create an accurate virtual replica of a complete tool list.
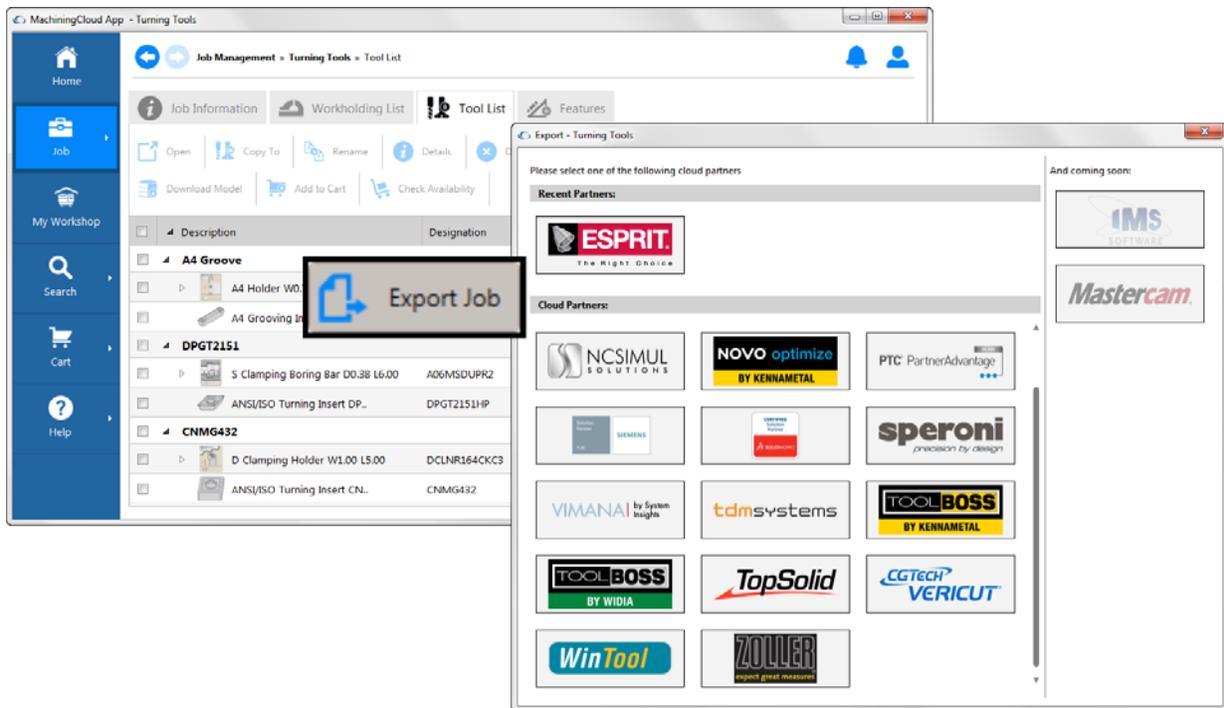
An entire tool list can be exported from a MachiningCloud job to your choice of cloud partners.

When a tool list is exported from MachiningCloud, complete data for every tool assembly (not only the tool but the entire tool assembly with all the necessary components) is downloaded to your computer. That information is then integrated with the CAM system to develop toolpaths.

Exporting tool assemblies from MachiningCloud eliminates the redundant manual entry of data in ESPRIT or any other MachiningCloud partner. Upon import into ESPRIT, the entire tool list and its data is instantly added to the software's tool manager. The only task for the CNC programmer is to assign tool stations and tool shifts on the machine tool. All other dimensional tool data is accurately loaded in the system.
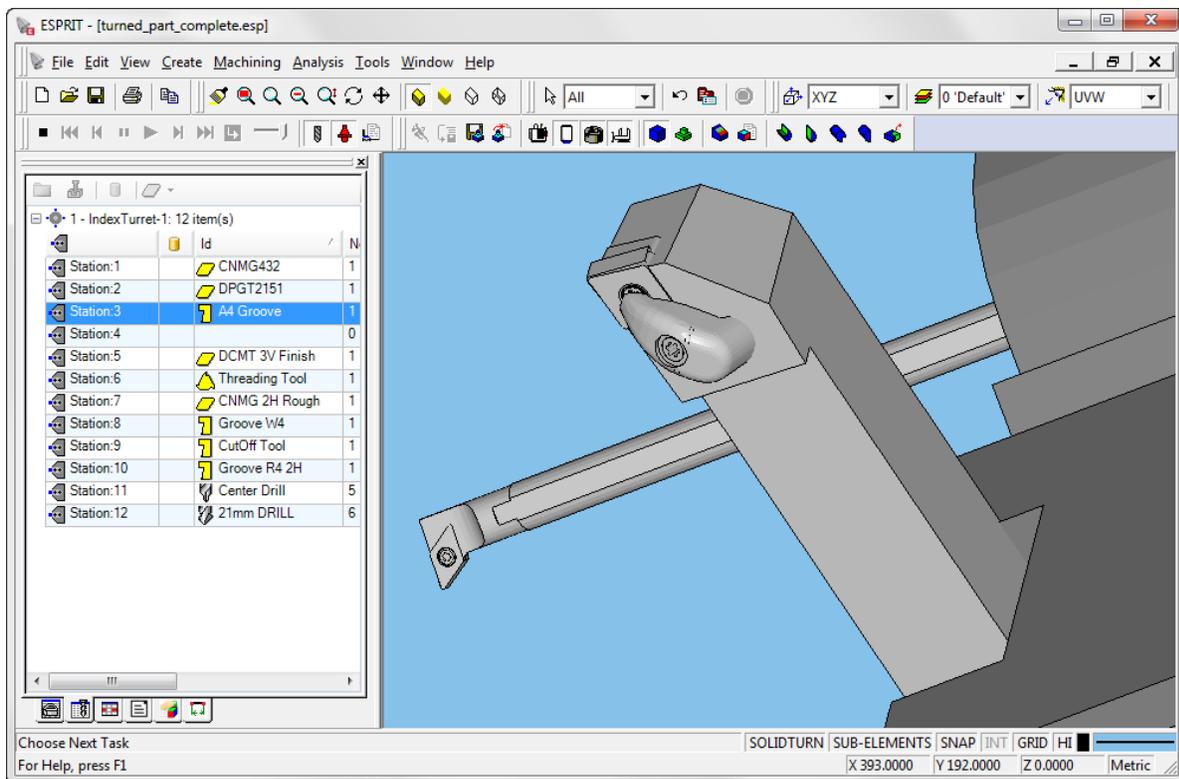
Complete tool data is brought into ESPRIT, including 3D models of all assembly components for more accurate simulations and collision detection.
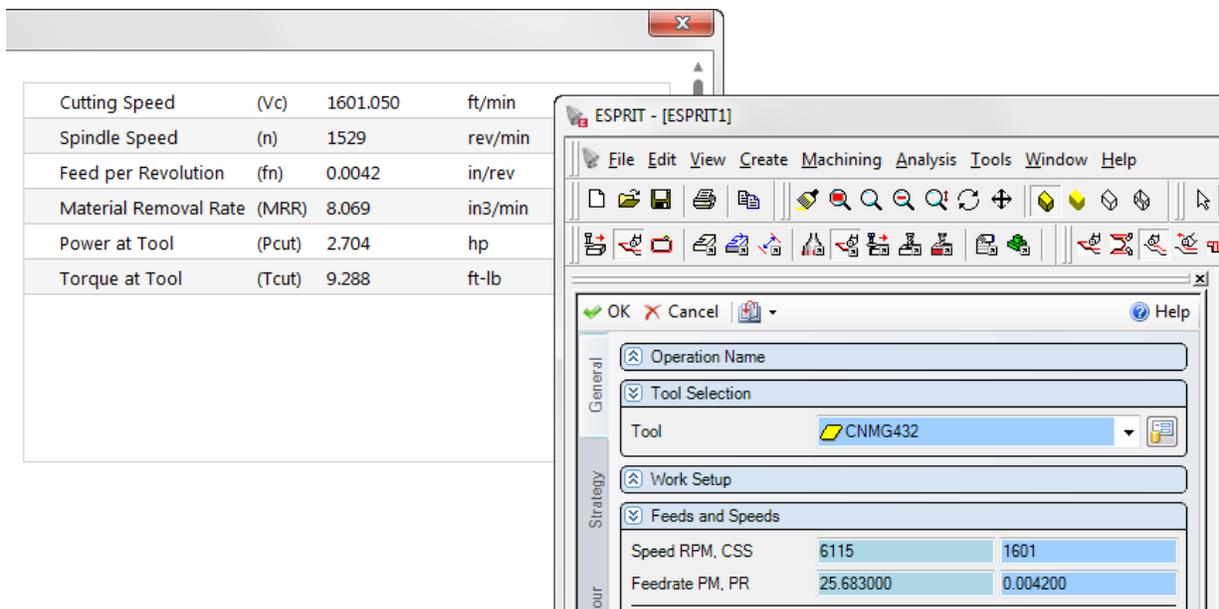
Feed and speed data is also imported for each tool assembly and automatically loaded in an ESPRIT operation when a tool is selected.

To prevent the problem of stale tool data, MachiningCloud is continuously refreshed with the newest product data from tool manufacturing partners, while obsolete tools are deleted. This

ensures the tool geometry is the most accurate available. Virtual tool libraries for CAM programming are easily kept up-to-date, another benefit of having tooling data on the cloud.

A typical shop can save 10 hours a month on tool searches and redundant data entry, while improving the accuracy and reliability of NC toolpaths.

Breaking the barriers to adoption

The timeline for full implementation of digital tool information from tool manufacturers is rapidly being compressed from years to months. Data technologies in the manufacturing industry, not just tool libraries, are advancing the connectivity between machine tools and the people who manage them.

However, to achieve greater connectivity requires a change in mindset for manufacturers to adopt this more open and fluid form of communication. It requires an openness to sharing information so that machines and tools and people can reach their full potential.

The process of selecting and setting up tools will be more transparent and efficient, from the tool crib to engineering to the purchasing manager. CNC programmers will be able to readily find tool assemblies that already exist or create new assemblies with available components. Production delays due to tool unavailability will become a memory.

About MachiningCloud

MachiningCloud is dedicated to leading a digital shift within the discrete manufacturing industry to deliver a new level of operational efficiency. Cloud-based applications, resources, services, knowledge, and digital product data from the world's leading manufacturers of cutting tools, machine tools, workholding and specialty products are providing efficiency improvements by facilitating the flow of data to and from today's data intensive shop-floor.

For cutting tool manufacturers and their customers, the MachiningCloud app is an Industry 4.0 solution delivering up-to-date cutting tool manufacturers' product knowledge and data, fast-tracking cutting tool selection, CNC programming, simulation and shop floor operations. By providing data from the world's leading suppliers, MachiningCloud eliminates the hassles of searching through printed catalogs, telephone calls and multiple websites to find optimal tooling, while also removing the burden of manually typing tooling data into CAD/CAM software.

For more information about MachiningCloud, Smart Manufacturing and Industry 4.0 solutions, please visit www.machiningcloud.com.