

MxD 14-02-02	Category: PO to 1 st Article, Recurring Manufacturing, Engineering Change
Title:	Mind the Gap – Filling the Gap between CAD and CNC with Engineering Services
Completion Date:	2016-10-31
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Problem Statement and Summary:

Digital manufacturing requires models, but today’s manufacturing machines are controlled by codes that describe linear and circular motions. The details of these codes are unique to each machine and cannot be shared. They are hard to optimize because they do not describe the design requirements being met, or any but the most basic form of the solution. The “Mind the Gap” project has filled this gap with standards to describe tolerances and tooling. This new information allows new cloud services to be developed. Mind the Gap has shown that these services can operate in real time and make manufacturing 15% more efficient.

The key finding of “Mind the Gap” is that it is now possible to construct and maintain a 3D machining model in real time. Therefore, a new digital manufacturing framework can be constructed in which intelligent apps measure, monitor and optimize machining from real time models using smart phones and browsers. This was not possible before Mind the Gap because the necessary computing power was not available.

The three Mind the Gap services are the first examples of apps. US industry should deploy them and similar apps in an open digital thread for their supply chains. STEP Tools has developed a new product to host the digital thread. This product is called the DigitalTwinServer[®]. It has been evolved from the STEP-NC Machine product that existed at the start of the program. It uses standards to describe its inputs and outputs, and enables integrated machining and measurement by maintaining a real-time simulation of the machining results.

The standards are MTConnect for connecting manufacturing machines to cloud services. STEP for defining models of the tolerances and tooling, and QIF for reporting manufacturing quality results. Mind the Gap has shown that these three standards enable a digital thread that can deliver model based data across the supply chain. Mind the Gap has developed a server to host the thread. Mind the Gap has shown that real time modeling makes manufacturing at least 15% more efficient.

The following video explains each of the three services:

<https://www.youtube.com/watch?v=Mjzg5nku5Lg>