

Richard Childress Racing

One of the predominant names in NASCAR Sprint
CUP racing

Success Story



NCSIMUL
MACHINE





Information	
Industry :	Automotive
Solution :	NCSIMUL Machine



Company Overview

Richard Childress Racing (RCR), one of the predominant names in NASCAR Sprint CUP racing, knows a little bit about the value of getting on track and up to speed quickly. It is part of the organization's culture. So when its machine shop, where custom parts are manufactured for RCR race cars, was losing four to eight hours of machine cycle on critical «first piece» parts, it was a detriment to that culture of speed.

Rick Grimes, Manufacturing Manager for RCR, said, « We have to turn parts quickly in this business. We are a week-to-week operation. Our shop is frequently asked to program a part from scratch and get it out to the machine, then get the parts made and out to the track before the next race. Naturally, we are eager to do whatever it takes to reduce the time between creating the model and having the completed first piece in our hands. »

Ironically, to speed things up the shop was in the habit of slowing processes down to avoid potential crashes that could scrap a part and miss a deadline. Tedious hours were spent at the CNC machine controllers, meticulously stepping through first piece part programs, one line at a time, to avoid a potential cutting tool crash.

Of course, the obvious solution was to use some sort of process simulation package. RCR's PTC Pro/Engineer software came with a basic simulation utility that allowed the programmer to view movement of the tool around the part. However, it did not simulate the path of the tool and holder in relation to the machine itself or the vices and fixtures set up on the machine's table. During product research, the programming team found highly sophisticated software available to do this, but also discovered that those complex packages can cost far more than

the CNC machine itself. In addition, learning to use this high-end, complicated simulation software was a time-consuming proposition. This was not an option for an organization that must turn new part design and production around in less than a week.

Giant step

First piece manufacturing took a giant step forward at RCR in 2010 when its CAD software reseller, 3HTI, suggested that they take a look at a new simulation software package called NCSIMUL Machine, developed by SPRING Technologies, a French company that had just established a North American subsidiary organization headquartered in Cambridge, Massachusetts.

NCSIMUL Machine is an affordable yet comprehensive software solution for simulating, verifying, optimizing, and reviewing CNC machining programs. It can be used in conjunction with CAD/CAM software. In the case of RCR, it was PTC Pro/Engineer.

Clifton Kiziah, Manufacturing Engineer at RCR, was assigned the task of learning and implementing the software. Training sessions were divided into small, digestible modules that he was able to fit into his hectic schedule. Total time spent in training took less than two days and these hours were spread out over several weeks.

He was then ready to apply the software, which is designed to improve CAM generated CNC manufacturing programs in three ways: First, the software analyzes the CAM program itself, so that coding errors in the program can be corrected before the postprocessor generates G-Code that is sent to the machine. Second, the software analyzes the G-Code itself to see how the program performs in relation to the part, the machine setup, and the machine itself. Errors are flagged so that the user can correct the code and eliminate any potential crashes. Third, the software verifies the part geometry against the model, based on the toolpaths themselves and a kinematic model of the specific machine tool that the part is to be cut on.

Grimes said machine model and machine-specific license for NCSIMUL Machine was part of the purchase price. He said that ensuring that the NCSIMUL's machine-specific features operated flawlessly was a team effort between RCR, machine tool builder Okuma, and SPRING Technologies.

Lost time recaptured



Kiziah said that performing a complete simulation with NCSIMUL Machine takes about 15 minutes. All of this happens at the PC computer desktop, so that no machining time is lost while the next CNC manufacturing program is being analyzed. Grimes said that his shop might be called upon to manufacture unique first piece parts several times a week. Before the company installed NCSIMUL Machine, many hours of machining time were lost while painstakingly slogging through the code. This lost time has now been recaptured.

For example, RCR was called upon to machine a heavily revised Oil Cooler Valve Body for the Inline Oil Filter Assembly, a critical part of a race engine's oiling system. RCR had machined the original Revision A part several years earlier, but, Revision B had extensive changes to it. The Valve Body part runs on the 4-axis Okuma MA-500HB Horizontal Machining center because of its complexity. There are two operations with multiple B-axis rotations.

RCR faced some challenges with this new revision. Due to the extreme complexity of the part, some surfaces had to be partially machined in the first operation and then completed in the second operation. « *Before NCSIMUL Machine, we had no way to program and simulate the second operation using the stock that remained from the first op* » said Kiziah.

NCSIMUL Machine allowed RCR to accurately know how much stock remained for removal in the second operation. RCR was even able to export the Op 1 remaining stock from NCSIMUL Machine for use in Pro/Engineer. Once the second operation was programmed and posted, both operations were simulated together in NCSIMUL Machine. This was done to verify that all surfaces of the part had been properly finished without any program errors or collisions between tooling and fixturing. In the past, without NCSIMUL Machine, RCR would have had to blindly proof the program out on the machine. If some surfaces didn't clean up, the operator and machine would have had to wait around until the programmer re-worked the program. This would in turn waste several hours of machine time. Without NCSIMUL Machine, the original Rev. A 1st piece part took 8 hours to proof out. This time around, with the power of NCSIMUL Machine, the Rev. B 1st piece part was proofed in only 4 hours.

Similar savings are accumulating throughout the week, saving time, reducing costs, and making RCR even more competitive at the track.

Affordable NCSIMUL Machine cuts hours from first piece production cycle.

