

On the cutting edge of aerospace and club racing, F500 Racer Chris Huskamp comes from two worlds: racing and aerospace. In a recent interview, he highlighted their similarities, and even more surprising—the way that integral members of his support team bridge those two worlds.



FLYING *One Inch off the Ground!*

By David E. Kent

Photos courtesy Huskamp Motorsports Engineering and Wicks Aircraft and Motorsports, respectively.

Inside a narrow, high-speed turn affectionately known among racers as “The Kink” during the SCCA Runoffs at Road America 2009, Chris Huskamp had to make a split-second decision. Moving at 120 mph toward a spun-out racer on the track, he knew there was no way to avoid hitting *something*, so he decided on the wall. These are not the types of days racers like to talk about; however, after a rebuild, he was again racing strong...due largely to his two teams: the one at the track and the ones that help with parts, fuel and racing gear.

Speed...A Part of Both Worlds

Chris Huskamp has two careers. One is as an Associate Technical Fellow with Boeing Research and Technology near St. Louis, MO. Huskamp holds numerous patents and has worked on projects supporting Boeing’s 787 *Dreamliner* and F/A-18E/F/G *Hornet*—and on something closer to the ground but still fast and aerodynamically configured—his own F500 racecar.

At Boeing, Chris Huskamp introduced a key technology that allows the manufacture of prototypical parts directly from Computer-Aided Design (CAD) models. This marriage

of layer manufacturing processes with precisely crafted digital models is known as Rapid Prototyping (RP).

In 2003, he was introduced to the world of professional motorsports through a joint venture between Boeing and Renault Formula One, focused on RP. There, at Church Enstone in southern England, he began discovering many similarities between racing and the world of aviation. Speaking of racecars, he explains, “If you were to flip their designs right-side up so they'd fly, we're essentially very similar in concept—all carbon fiber, high-tech materials—an extremely developed piece of equipment in the Formula One category. Renault is a technologically-advanced team that employed up to 650 people at Enstone to do the electronics, gearbox and driveline. We also had a significant connection with their engine team which was located in Chantilly, France.”

After five successful years of working with Renault’s Formula One racing team, including two world championships, Huskamp arrived back home to the United States with a strong desire to race. Soon afterward, he joined the Sports Car Club of America (SCCA) and purchased his own F500 racecar.

Crew Chief Leon Mitchell Discusses Strategy with Driver Chris Huskamp at Road America 2009

Shortly after the purchase, Bob Washington, a good friend and Boeing liaison—who not only performs hard-core repairs on Harriers, F-15s and F/A-18s but also



builds and flies his own experimental aircraft—mentioned to Huskamp that he ought to stop by a place called Wicks Aircraft in Highland, for his car parts.

Racing suits, tires, fuels, oils and other specialized support products applicable to the racing industry are vital to racers. No less so are the component parts and structural elements that make up the cars they design, build, drive, repair and upgrade. Washington, intimately acquainted with the hostile, high-stress, high-temperature environments inherent in both aviation and racing—and a regular Wicks customer—knew that with Chris ripping around a track at aircraft speeds, his car would need the same high degree of resilience, ruggedness and mil spec quality inherent in aviation parts. Nothing less would do. Because demand exists in both of Huskamp’s careers for quick access to a variety of lightweight, impact-resistant materials able to operate optimally and reliably under extreme stresses and conditions, he was eager to work with a supplier “right down the street,” rather than halfway across the country.

Wicks Aircraft, now Wicks Aircraft and Motorsports, has long been known as the premier Midwest aircraft parts supplier with knowledgeable personnel. Going on Bob Washington’s advice, Chris visited them and was shortly ordering regularly from them, convinced that the combination of parts availability and specialized knowledge was a winner. He’d already seen similarities between aviation and motorsports, and understands that the same high-quality aircraft parts are the ticket for his racing as well.

And even though he's not involved with aviation outside of Boeing, his car "*flies* one inch off the ground" at speeds in excess of 130 mph. In a recent interview, Huskamp explained, "We're traveling around the track at speeds similar to those of most propeller-driven General Aviation aircraft. The main difference is in which way the lift works—but the electrical connectors, mil spec switches, and fasteners are all transferable technology—everything has to work perfectly in harsh environments while being subjected to nasty vibrations. It's something you see in aviation all the time."

His racing career got moving fairly quickly and Chris formed a company around his work, explaining, "There are 3 components of the team I run with: One is the company that I run, Huskamp Motorsports Engineering, which, at this point, focuses on design work for parts on cars for the small formula car market. And that's with emphasis on weight-shedding. Obviously my experience with that in aerospace ties right in. Utilizing high-tech materials and techniques on a level that's acceptable and affordable to the racer is what we aim for. And that's one of the places where *Wicks* ties right in—they're my single stop for our design components and parts in that respect. They maintain stock of specialty aluminum, chromoly tubing, CherryMax™ flush rivets, flush washers for smooth aero surfaces, Cleco™ fasteners to hold the body in place for riveting, plus Camloc™ and other AN/MS fasteners for structural joints. You name it, they carry it."



Lightweight and Strong

"As a simple example," he continues, "most people have more excess weight in fasteners on their cars than they could ever imagine. And if you look at the lifting capacity of an AN10-32 bolt, you can darn near lift a Mini-Cooper off of one. Obviously there are fatigue and impact issues, but in static load, that's the type of load you carry through a small, 3/16th, mil spec, aircraft-grade bolt.

"Wicks carries all the optimal hardware: the right-sized bolts, and AN "Kay" (Jet) nuts, which solve the weight problem. We also use significant amounts of carbon fiber and Kevlar™ in the body. I can buy the cloth, the epoxy system, and vacuum bagging materials from them as well. We also buy the specialized tools there for jobs that use these specific-use materials. We're using parts and techniques that the aviation guys have been using for *years*. There's very little that we can't make use of in racing, so the parts list is long."

Very Few Differences between Aerospace and Motorsports

"You look at small aircraft...our cars...and the planes we work on at Boeing—the F-15, F/A-18 or any military aircraft...they're all the same. It's just the degree you stop at. There are only three basic differences with racing: One, obviously you're bound to the ground.



Chris Huskamp leading the pack around a turn at Road America, September 2009

Two, you don't have the minus 65°F operational requirement that exists with aviation at 30,000 feet. Three, races usually last less than 2 hours, and you can pull over if something breaks."

After Chris hit that wall at Road America, Wicks had parts shipped overnight to the team, and they rebuilt the next day. He explains, "According to our Crew Chief, Leon Mitchell, the stock of fasteners, hardware, resin and composite materials from Wicks that we carry made all the difference in the rebuild." That's the value of the

extended team in motor racing: You need those guys close by even when you don't think you might, because surprises can be right around the corner, and you need parts quickly.

The Vehicle

Prior to the 2009 racing season, the Huskamp team decided to redesign the body of the car Chris had purchased in 2008. The new body configuration was developed specifically for Road America 2009 and fabricated by Preform Resources of Michigan. "It had just been painted and looked fantastic," Huskamp reported. "I was encouraged immediately when during the third lap of the Monday test session I had improved my personal best time at Road America, and the times were dropping." The only downside was on Lap 8 when he entered 'The Kink' and went into the wall, and experienced that "sudden stoppage" mentioned earlier. After that, the car was rebuilt in record time to finish their time at Elkhart Lake.

The teams' car uses a combination of construction techniques. Chris explained in detail that in the first iterations of the body where you know that you're *A*, going to change it at some point, and *B*, just testing the shape—you want to go with a molded lay-up technique using E-Glass with a polyester resin, which is what they've done here. Their current body was built up by Dave Craddock's Performance Resources. (Chris, I can't verify his co. name - could you check it out?). The design was done with some of Chris's contacts at Renault in France, including Renault's former chief aerodynamicist, the late Dino Toso, who had a significant part in its design. Chris elaborated, "Over several pints of English beers, we were able to sketch out a new concept of the body and it made huge improvements on that car. There were four people involved in that: Jack Walbran, myself, Kenny Price out of Dewey, Illinois, the builder of those Scorpion cars—and Jason Knuteson, who recently scored his second F500 championship in a Scorpion S1 Rotax at the (46th Annual SCCA National Championship Runoffs at Road America last

September). All were involved in coming up with this new concept and getting it executed in time for the Runoffs at Elkhart Lake in 2009."

"We don't use a lot of Finite Element models in the level of racing we're at today. They don't necessarily coincide, except for fracture-critical components like uprights, spindles, things like that. But for bodywork, where you're trying to maintain a shape, we're using a lot of engineering judgment that just allows it to flow. Most of the time, it's practical limits of the process that keep you from thickness. For instance, you want to lay up a couple of layers of carbon to give you stiffness for a closeout panel. We don't have an intrusion requirement where we've got a part breaking off and going through it. What we've got to do is just keep the hot gases out.

"But there *are* areas where we do a lot of Finite Element Analysis: we've come up with some different things on the wheels. Materials and design are hand-in-hand topics. If you've seen what we've done with brake ducting, and where we've selected materials based on some of the temperature requirements for certain areas of the car, it's very similar to aerospace. Just applying those good practices to similar areas has yielded good results for us. And in 2009 the car came alive—we've lost weight on the car, we've gotten more competitive, and certainly Leon Mitchell brings to the table his driveline and tuning experience, which has helped to bring us in much closer. We're really bringing it to a head."

The Engine

Another common tie to the aviation industry is the Rotax name. Many of today's Sport aircraft are powered by Rotax engines, mainly from the 277-series up through the certificated (for aviation) 912- series. The powerplant for the Huskamp car is the Rotax 500Z—a 500cc, 2-cycle snowmobile engine that produces about 103 hp. Chris told us, "We have to be extremely efficient, so you can see why all the focus on the aero work. Normally these engines make less horsepower in stock trim, but we've tuned them out, dyno-ed them and had a lot of custom pipes built and raced. And as a result, over the years we've made them extremely efficient. Also, this (racing) configuration uses a constant-velocity transmission system consisting basically of two integral parts, and they work well in the snowmobiles. But what's nice is if you spend time and development on that, as we have, we've really focused on optimizing that package to the point where two years ago, at the Runoffs, the top Formula Ford would've qualified only third on our grid, and the Formula Ford is an open-wheel, 1.6L-engine car. These are not toys by any stretch of the imagination. They're flat out in excess of 130 mph at Road America, and you're seeing side loads up over 2 Gs—significant loads on the car." Again: lightweight, resilient, strong.

The Team

There are 3 components to this team that come together—Chris Huskamp, Jack Walbran and Leon Mitchell. Walbran is former Vice President of Legal for Boeing and its predecessor, McDonnell-Douglas. He's the one responsible for getting Huskamp back into racing. Chris mentions, "When I was rolling off the Renault project, I met up with Jack and he was such a friendly, go-to guy to talk with—he encouraged me to get in a car and get my school done, and I ended up buying one of his cars.

The Crew Chief for Team Huskamp is Leon Mitchell of Mitchell Racing Services, out of Gasoline Alley of Indianapolis, whose business deals exclusively in car preparation. Mitchell also maintains Jack Walbran's racing package.

The Bottom Line

Chris summarized with a list of significant factors that he believes give their team a winning edge, "I have to say too, that for other racers, they may be wondering how all this ties together and how they can work their program like we are. The bottom line—one of the greatest benefits of working with Wicks is that they're so knowledgeable. I get exceptional help, as in, 'Hey, I got this problem, and what do I do about it?' And they always have the best solution. They're technically savvy from the standpoint of their products and the way they work in the harsh environment and aerodynamic applications. They can and do help us work through issues and come up with solid solutions. These stock classes we operate under don't necessarily have stock ways of doing things, so you have to be innovative in coming up with ways to be better, faster, stronger. And we have that latitude, but their people work on solving the issues we come in or call with."

Like other support companies who work with the race teams on an ongoing basis, Wicks works alongside these and other racing teams to provide innovative answers to each one's unique needs. Both the Huskamp and Walbran teams raced at Road America in Elkhart Lake at the 2009 SCCA National Runoffs. Because so much of what has been engineered into Chris's car applies to Jack's as well, Wicks continues to play a critical, baseline role as supplier and sponsor.

"Team Huskamp has pushed really hard the last couple of years, Chris shares. "Jack's come up and we had a one-two finish for Midwest Division in points. Jack has a tremendous amount of points and in 2008 I came in with wins as well, a couple in second place..."

In 2008, Chris Huskamp and Jack Walbran accomplished a 1-2 finish for in the Midwest Division, with no squawks or DNFs for either one of the guys in SCCA Nationals during the entire race season. Both drivers attribute this to their primary and support teams, and the integral roles that aircraft-grade, maximum-performance parts play in their respective cars.

The benefits of quick access to parts like these cannot be understated. "Wicks does a fantastic job with quality, knowledge and stock of parts on hand. What a benefit they are," Huskamp concluded. "Those guys always have the best solutions."