'THE JET'
Simple, spacious design to offer logical progression for piston flyers
By Mike Vines

When the Cirrus Design Corporation threw its hat into the Personal Jet (PJ) arena with its 'V' tailed, Williams International FJ33 turbofan powered aircraft, people sat up and took notice. After all, the company has delivered over 3,000 innovative aircraft in eight years, so the release of details about 'The Jet' in June was pretty exciting.

Rumors had been circulating that Cirrus wanted to get into this market for the last few years, and Mike Van Staagen, Cirrus's vice president, Advanced Development, admitted that the company had been looking at the concept since 1998/1999. The Jet program, however, complete with mock-up, was launched formally on 27th June this year to some 150 position holders who have each paid a $100,000 deposit towards their $1 million aircraft. The gala event was held in Cirrus's home town of Duluth, Minnesota.

First deliveries are slated for 2010, with a possible first flight of the prototype known as 'V1'(for Validation and Verification # One) in mid 2008. But the date isn't set in concrete as V 1 won't fly until the aircraft is absolutely ready, according to Van Staagen.

The moulds have been built for some time he told *World Aircraft Sales Magazine*, and Cirrus has already received some parts for the aircraft. The Jet is designed to cruise at around 300kts, have a range of around 1,000 nm with NBAA reserves, operate to a maximum altitude of 25,000 with pressurization set at 8,000 feet cabin altitude, and it will have Cirrus's trademarked Airframe Parachute System fitted as standard.

Designed to operate from small airfields, The Jet should have the equivalent of piston aircraft take-off run, and have a low stall speed similar to piston prop landing speeds. According to Van Staagen the whole aircraft structure will most likely consist of a combination of glass and carbon fiber.

Logical progression
Cirrus sees the Jet as a logical progression, and step-up airplane from its very successful and nippy SR-22 and SR-20 range of single-engined piston and turbocharged aircraft. "We also believe that there is a correlation between what someone spends on an airplane and the amount of versatility and functionality that it should encompass – which is exactly why we did not go for a four place personal jet," explained Van Staagen.

"Our philosophy is that, if you are going to roughly double the price of the plane [the SR-22GTS costs $469,990] then you should offer a lot more than just higher cruise speed."

The Jet cabin was designed around five, 200lb, 6ft 4ins people and has two pilot positions in the un-segregated 'wide-body' cabin - but it can be single pilot operated thereby freeing up another seat. The cabin is almost spherical and the cross-section more-or-less circular. The rear/mid-split middle seat slides back and forth to give a choice of personal space, and the addition of large wrap-around windows gives a light and airy feel.

"We're making the cockpit orientated to friendly single pilot operation. It's not a matter of making it more automated –that is the wrong way to go," added Van Staagen. "We're planning to make the aircraft obvious and straightforward to operate. If we're successful, then we think that it will be a more utilized single than any other owner operated aircraft out there."

Customer feedback about the spacious cabin reveals people will want to utilize the aircraft more because of the comfort, which makes it like a large flying SUV.

The thought behind the design

“Getting the airflow around this big bulbous cabin was our first priority and dictated the need to have the engine outside the airplane rather than buried in the fuselage and projecting noise into the cabin,” explained Van Staagen. “We wanted to keep every cubic inch of cabin for people.

“We didn’t want the nose of the aircraft used for luggage as this would severely affect the CofG so this is the space dedicated for the parachute recovery system. All the fuel is in the wings and all variable loads are over the wings so we have a very narrow CofG range requirement.

“We’re having a long and lengthy avionics supplier’s selection process and they are having to prove to us that they can incorporate some of our ideas. We believe that what is currently available is too complicated so we’re doing something slightly different which we will announce soon.”

So where to put the single fan engine, bottom, middle or top? “We tried them all, even one with an engine mounted on the side, but un-surprisingly, it looked too un-conventional and who wants an asymmetric airplane anyway,” said Van Staagen.

Cirrus opted for placing the FJ33 on top of the fuselage and has already tweaked the position from wind-tunnel research. “We have angled the engine to keep the air smooth and clean and aligned to the relative airflow. To achieve this we sunk the engine slightly down into the top of the fuselage to help lower the drag a little. We also vector back up 6.5 degrees so that we have a very low thrust line relative to the cross-section of the fuselage.

“We experimented with an ‘H’ tail (like the Aircoupe) as well as the ‘V’ tail design. We also did an in depth study of the Beech V tail Bonanza history. The reality is that Beech’s early tail issues were not caused by V tail geometry, it was structural and shed-vortex related issues,” observed Van Staagen.

He went on to explain the thinking behind the 25,000 ft. maximum altitude. “We feel that a 25,000 ft. aircraft is at a natural break in the certification regulations and offers an airplane with tremendous capability. In fact some people argue that 98% of all flights can be completed with this type airplane.”

Keeping it simple

Cirrus’ plan is to keep this, its first jet aircraft, as simple as possible. It feels that most pilots stepping up to a faster aircraft don’t want, or need, to fly at airliner altitudes and that it has the proper balance of technology to go after this market.

“We don’t think our first Jet out of the gate should ‘have it all’, we’d much rather baby-step our way to see how the market emerges. Personally I’d like to see the engine makers optimize their fan engines for greater fuel efficiency at lower altitudes, as many of our customers, given the choice, would prefer to operate at around 18,000 feet.”

Talking about the extensive testing the company has carried out Van Staagen revealed, “We’ve done about a year and a half of hard core aerodynamics, we’ve been in the wind tunnel five times and adjusted the airplane accordingly. We have, what we believe, is a fairly close rendition of the production configuration. It’s important that we don’t change the aircraft a whole lot from the time it’s seen publicly to the time it’s produced. There will doubtless be subtle aerodynamic changes, but basically what you see in the mock-up is what we are going to first fly.”

The company is about to start wind tunnel test on a 30% scale test article fitted with a scaled model turbine fuel burning engine.

The PJ realization is in response to the latest affordable and fuel efficient new technology engines and their FADEC controls, he commented. “We’ve only just crossed the line, but I expect things to get even better from Williams, Honda-GE and P&WC.”

Big market potential?
Surveys suggest that there is a production requirement for about 240 PJs per year. “We are watching our pennies to keep our R&D in a responsible area, but realistically believe that we could build 100 aircraft per year. We also feel that all the companies that are building PJs will be successful. We see a fantastic opportunity here, and if the personal jet really takes-off it might also inspire some of the big manufacturing giants to re-awaken.

“We currently sell 25% or our aircraft overseas and it’s a growing market. A Jet A powered vehicle is going to be much more useful than a 100LL powered machine. We expect tremendous international sales for the Jet.”

The company’s competitor, Diamond, is building the D-JET to fit into the under 4,480 pound category, but Cirrus’s Jet definitely won’t fit into this category according to Van Staagen. “Not unless we start impregnating our airplane with helium,” he joked. “We’re shooting for a really useful load target which we haven’t published yet. This will allow for all the new electronics and other system goodies that will be newly developed over the next 10 years.

He remarked his company was, “Interested in the likeness” of the Eclipse Concept Jet (ECJ) proof of concept four /five seater Personal Jet. “It is a nice affirmation than an independent source drew the same conclusions as we did. I am curious to check how close it is to one of our original models. That aside, it’s a really nice looking airplane, and has a similar layout to ours, but you must appreciate that it is also really small.

“We feel that their design actually helps us substantiate the single engine-on-top, ‘V’ tailed concept as an acceptable, very solid, and safe airplane,” he concluded.

Jet Dimensions:
Wingspan - 38ft 6ins (same as the SR-22)
Length - Just over 30 feet
Height - 10 feet

More information from www.cirrusdesign.com or www.the-jet.com