THREE THIRTY SC

It's taken 15 years, but Extra's latest design, the 330SC, is finally here. This extreme machine is now in the hands of aerobatic guru Mark Jefferies

Interview by Dan Tye Photos Keith Wilson

MARK Jefferies and other world class aerobatic pilots have given aeroplane maker Walter Extra unique feedback from years of flying aerobatics to come up with this new 330SC. The result is an aeroplane so capable it makes you wonder whether it's humanly possible to push it to the limit of its aerobatic envelope.

The SC stands for single-seat competition, for this aeroplane is designed purely to win Unlimited International aerobatics contests, in particular, the forthcoming World Championships at Silverstone this August.

Here's the story from Mark on how the 330SC has come to fruition…

Dan: You've always built and developed aircraft yourself haven't you?

Mark: "Yes, I first learnt to fly in 1980 on a farm labourer's wage. The first time I started working on aircraft was when my father went ill into hospital. He had a Bücker Jungmann project and as it was winter there was no work on the farm so I picked up a piece and cleaned it up. It carried on and 8 months later I had a flying aeroplane. Then I built a second Jungmann and a few Jodels. I then started importing Pitts Specials and Stearmans from America. I couldn't buy them fast enough.

"I then had a partner who I shared a Laser with and very quickly he spun


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Tailplane has had some drastic weight saving

himself down into the ground in it and died. Suddenly I hadn't got an aeroplane. So I bought the plans for a Laser and built one from scratch. I fine tuned it and within three years I won the British Unlimited Championship in 1994 in it."

Dan: When did you start flying Extras?
Mark: "Well I'd flown the Laser for a long time and the Unlimited level had outgrown its capabilities. So in 2002 it was a case of either 'poo or get off the pot' and it was time to buy a better aeroplane so I bought the single-seat 300S. I've had great success flying that since."

Dan: Moving on to the 330SC. When were the seeds planted for that?
Mark: "The 330SC came about because Walter [Extra] decided in 2007 that the time was now right to upgrade the existing fleet because, basically all of his designs were fifteen years old."

Dan: Were you thinking ahead about flying the 330 in the World Championship then?
Mark: "Well, yes. Already in 2007 I thought I should upgrade the aircraft to something more capable because the 300S, has its limitations at World level. A lot of people were saying I did very well to get as high placed as I did but it was just through very diligent training. So I decided to buy the SC which should have been ready for February 2008."

Dan: And I remember talking to you about that…
Mark: "But it was late, late, late... delivery of it was in December 2008 (he smiles). The plan was to fly it in airshows and get familiar with it during 2008 and to go for the World Champs in '09 and be part of a British team which achieves a team medal."

Dan: You mentioned the limitations of the 300S at World level; what exactly are they?
Mark: "The limitations on the S are the power-to-weight ratio and the roll rate for classic Aresti comp flying. The further limitation on the S is for the freestyle flying and the control surfaces aren't big enough to maintain very high angles of attack and to get positive control down to zero airspeed."

Dan: Is this the key thing: to maintain control when you're at low airspeeds in complex figures?
Mark: "Yes, bigger control surfaces in the slipstream of the engine will give you that control."

Dan: That's where the wow factor comes in for someone watching, isn't it?
Mark: "Yes, well I'm doing stuff now in the 330SC which has astounded people on the airfield. They didn't realise an aeroplane could do some of the things I'm showing them."

Dan: Really? Have you seen it for yourself on video?
Mark: "Ummm, not yet because I haven't fully worked out the routine yet. I'm doing individual bits, but I haven't got them into

> **"I'm doing stuff in the 330 which has astounded people"**

The 330SC can roll round once in just 0.85 seconds...

one yet. I've got a feeling I'm going to open my show with a flat spin from a couple of thousand feet; spinning to a relatively low level and then just flying out of the spin in a fully stalled situation going into a hover. So it's spin, spin, stop, hover facing the crowd and then I'm just building in some rolls and finishing inverted."

Dan: And the 330SC lets you do that?
Mark: "Yes, the performance advantages relate to power-to-weight. It's considerably lighter and has the new powerful Lycoming IO-580 engine which is certificated at 320hp. MT has also developed a special propeller to absorb that power. The blades (wide-cored) give more thrust at lower airspeed. There's also a more streamlined spinner to reduce drag."

Dan: How did you hear about the new IO-580 engine?
Mark: "Extra has been asking Lycoming to develop something with more power for the past ten years and I think the requirement from the Red Bull Air Races and pressure from Extra has helped. Also it was a pre-requisite for the aircraft to be released to the French Air Force. The French Air Force no longer wanted to use their indigenous CAP 232s and so they wrote a basic specification for the 330's roll rate, stick forces, all that sort of stuff and demanded that it must be civilian certified."

Dan: So really it's down to the French Air Force that we have the 330SC then?
Mark: "Well they've been the instigators. Walter Extra put it into action."

Dan: A lot has obviously been down to Walter and the design team at Extra but you've played a significant role in the 330SC's development haven't you?
Mark: "Well I had a whole list of ideas, what I called 'nice to have' ideas…"

"It's certificated to plus 10G and, yes, I have seen the wings bend"

Dan: A wish list?
Mark: "Yes, a list of things for Walter that would improve the existing 300S. He then invited me to test fly a prototype SC which I did and at the end of that flight I gave my opinion and he said, "Well that's sealed it then, I definitely need to design a new wing. It was plainly obvious what Walter wanted to achieve. He wanted to achieve lighter and faster roll rates and more controllability."

Dan: So how many hours have you flown in the aircraft now?
Mark: "Only thirteen."

Dan: And what was your first experience of jumping in and flying it?
Mark: "The first thing I noticed after establishing a climb speed was how much steeper the angle of climb was at that climb speed. I also noticed the lightness of the controls compared to the previous aircraft."

Dan: Really? Lighter than an Extra 300?
Mark: "I suppose it's more the reactiveness of the controls. In other words,

Normal cockpit. Headset inputs have been moved behind the pilot to stop the leads from tangling round the control stick... gulp!

yes they're light but the aeroplane reacts a lot quicker. If you look at the ailerons you'll see a huge horn balance on the end. These horns are quite clever because when the leading edge of the horn is centred it wants to stay in that neutral position. There's a lot of force needed to break out that long aileron but once it is deflected, the top surface of the horn balance is shaped like an aerofoil so helps to lift it out."

Dan: What else is different on the 330?
Mark: "The canopy area is all different. It is very light by comparison to the 300L, it's a fifth of the weight."

Dan: Wow.
Mark: "It is very light indeed."

Dan: And the cockpit instrumentation?
Mark: "Basic for what you need."

Dan: Has that been achieved using exotic materials?
Mark: "Yes, more exotic materials and lightening of places where weight can be saved. The total weight of the 330SC is just 585kg, the old 300S was 650kg so we've saved 65kg."

Dan: The ailerons extend nearly the whole way along the wing. How has this been achieved?
Mark: "Basically it's the wing of a 300L with half a metre taken out on the inboard end, which brings the wingtips inwards therefore lengthening the ailerons. That's where the increased roll rate comes from. Of course now you have less physical depth in the main spar but the strength is still there and it's certificated at plus and minus 10G and the wings do bend at 10G."

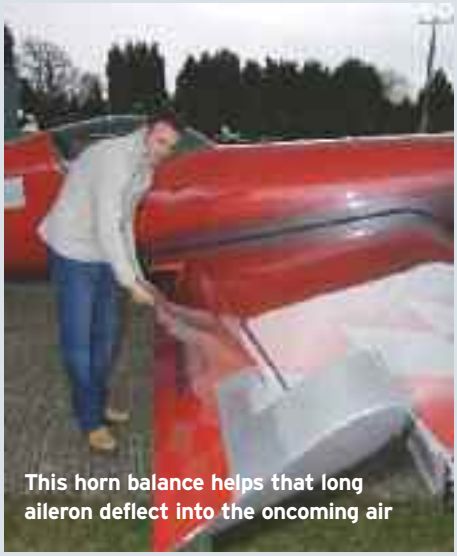
Dan: You've seen them do that?
Mark: "Errm, yeah. (he grins)".

Dan: When you've actually been flying the aeroplane?
Mark: "Yeah. (smiles more and pauses). Carbon fibre is designed to bend. It'll break when it's supposed to break, no less."

Dan: Have you got any idea of the manoeuvres you'll have to fly at the World Champs at Silverstone in August?
Mark: "Yes, I know and I've started training for them now and the 330 is more than capable."

Dan: Is the 330SC going to make it easy for you to fly in competitions?
Mark: "It's potentially made it more difficult. Because now I have an abundance of power and I have to manage the airspeed. Previously I'd fly at full throttle but now I need to reduce the power throughout the sequence and then just use full power in the complex areas."

Dan: Norvic Engines sponsors you. What role has the company played?



This horn balance helps that long aileron deflect into the oncoming air

Instead of the rudder tapering to a point, the extra thickness shown by Dan and Mark here gives some drag and improves rudder response when flying knife edge

Mark: "It is very reassuring to know that I have the expertise of a sound, established and fully EASA-approved company behind me to repair and overhaul my engine quickly as and when the need arises. To remain at the top, I cannot afford for my engine to perform below its optimum and Norvic's knowledge, experience and reliability gives me that security."

Dan: In terms of sustaining such high G, have you been doing extra training?
Mark: "I've been doing stomach exercises for the G. I weigh 72kg, so say 50kg for my upper body, at 10G that's half a ton weighing down on my back. If your back isn't straight before going into a manoeuvre you're going to do some damage. I think one of the most important things for an aerobatic pilot to do is to sit properly."

Dan: Are you starting to feel you're now getting to grips with the 330?
Mark: "Yes I can fly the necessary sequences, admittedly not perfectly yet, but I'm up to a high standard. I've just started flying the Unknown manoeuvres but the rotation rates are so fast in this. The roll rate is actually 420° per second. A pilot needs to react to 1/72th of a second to avoid losing one point. So for example, in a competition if he over-rolls by 5° that's one point deducted, 10° that's two points deducted. To achieve one 360° rotation means you have to put that stick input in within 1/72th of a second. That's what you have to react to."

Dan: Have you managed to achieve that so far?
Mark: "No. (he laughs)"

> **"The 330's roll rate is so fast. It's so easy to over-rotate"**

Dan: So that's now a focus of your training?
Mark: "Yes, because it's rolling so fast and it's so easy to over-rotate."

Dan: What's most surprised you about the 330SC?
Mark: "The most surprising thing, to an untrained eye, is you could say it looks just like a 300S but they have totally different flying characteristics, control response and performance which has come about through three things; more power, less weight and bigger control surfaces. It really is an outstanding aircraft."

Dan: In terms of aircraft you've flown, is this the best?
Mark: "Yes, there is nothing to compare it against. I guess if pushed you could compare it to a CAP 232 because it is in the same bracket of power-to-weight ratio."

Dan: Have you scared yourself flying it?
Mark: "No, you get scared through loss of control and this aeroplane has control down to zero airspeed. Also you only scare yourself if you start flying recklessly."

Dan: What's it like to land?
Mark: "Delightful. Much the same as the other Extra series of aircraft; it's very easy to land. You can slideslip it and just kick it straight prior to touch down."

Dan: Finally, do you think the British Aerobatic team can win Gold in August?
Mark: "I would like to think so, we are a very experienced team with some high performing aircraft between us, but the problem is the competition we are up against are full-time State-sponsored aerobatic competition pilots/instructors. One such rival is Renaud Ecalle, a pilot in the French Air Force. The British Team are true sportsmen that work hard to fund their sport."
www.extraaircraft.co.uk

Find out more about the World Aerobatic Championships at Silverstone in August at www.wac2009.com

HOW DID HE TAKE THAT?
Pilot's photographer, Keith Wilson on a cherry picker showing the lengths he went to get these great shots!