An Interview with Jan Zurakowski

By Steve Thornton, HTML'd by R. Kyle Schmidt

This is an abbreviated interview with Jan Zurakowski, the first man to fly an Arrow, performed by Steve Thornton at Zura's Kartusi Lodge July 11/90

The leader ST and the italics indicate Steve Thornton's questions. The leader JZ and the standard type indicate Jan Zurakowski's responses

ST: How fast could the Mark 2 Arrow have gone?

JZ: It's a problem of stress. With increased speed, temperature's increasing. Arrow was designed basically from a light alloy, aluminum. Aluminum is losing very quickly strength at around 400 Fahrenheit. Arrow is officially stressed to a mach number 2 or actually 220 or 240 degrees Fahrenheit. Temperature was to some extent governing factor. But from performance point of view I think it's likely to go around 2.4, 2.6. But as you increase temperature, strength is going down. So arrow was stressed at 7.6 G. 7.6 safety factor. If you increase this your whole safety factor or your strength was then going down. So more likely this speed will have only 4.5, maybe 5 g strength factor available.

I don't think it would go to mach number 3 or anything Because for this you need steel construction. Because that's, as I remember mach number 3 is something like 680 Fahrenheit. And aluminum starts losing strength at around 400. So you have to use harder material.

ST: Did you ever lower the weapons while flying?

JZ: No. Arrangement was such that in old, previous design, you were making one or two prototypes, hand-made. Arrow was made straight on production jigging and tooling. Even with different engines, were still made to be provided with the Iroquois engines. So idea was to accelerate everything, and there was quite a number of aircraft which been initially instrumented and converted for different problems. I remember I think it was number six or seven aircraft was supposed to have armament trials. And we couldn't even start properly doing something because the government was continuously-- (interrupted by guest). So then this aircraft will come back to service, and will be demodified, or deinstrumented really. But problem was that government was responsible for choosing weapons, and they couldn't make up their minds. They're changing a few times, so the best way was to wait

until they specify what they want, and that's why this armament this armament pack was a very good idea, because you can change the role of the aircraft, you can have it photoreconnaissance, anything you can put in your pack. It's simple to change, there are four attachment points, so you can have completely different aircraft in ten minutes. And that was a good point.

And there was a good point beside that, you were not losing performance. I was doing lots of testing, even subsonic speeds on other aircraft, with external stores. There's a horrible drag, even at subsonic speeds, at 400, 500 mph, you put anything under the wings, then you get not only trouble due to the drag, but trouble due to the excess flow, which is breaking the skin of the wing. We had a trouble on old meteor, we decided to put big, fat bomb under the wing, you see. There was such a vibration that within a half an hour, skin on the aileron was just flying away. So then what you have to do, you have to make longer pylon to make it farther from the wing, but of course that pylon is adding to the drag again. So I think that was a good idea.

Some of the bigger rockets were intended to be semi- submerged, which mean half only outside and half inside. But all other smaller --Sparrow-- was intended to be on some sort of arrangement which you lower, in fraction second fire, and retract.

ST: Handling at different altitudes and different speeds.

JZ: Aircraft was to some extent artificially flown. Not like in old days when you get just the cables to controls. Everything was changing to square of the speed. Now here you had artificial feel. You had no straight connection between your stick and the control. All going through the sort of they call black boxes, anyway some sort of computer which was transferring pilot intention to do something by applying force and movement on the stick, and that went into the controls. And to the edge of the speed this was controllable by another, call it, device. So problem of an old aircraft when controls were heavier and heavier and heavier because square of the speed was simply making it much heavier. Or extremely light at low speed. Had been artificially, to some extent, eliminated, or make it as a straight line progress, not as square. But there was some sort of stability augmentation, the same artificial. But all these factors, had been possible to adjust them to any value you like. So for example you could actually have aircraft individual adjusted to your liking. You could make it flying as a heavy bomber or flying as a very light fighter by just altering on the ground different parameters. Say for example you get input of inertia, dynamic forces, you can make it by adjusting more delightful from flying point of view.

That was only initial optimization of flying characteristic at the time, as they calculated and tried. But from my point of flying it was not more difficult or anything special than any other aircraft. Like I was flying Convair 1 or 2, or Javelin in England. Delta wing. There was nothing special there.

ST: Could you hear the engines when flying it?

JZ: Oh yes, I mean with cockpit pressurized is five or ten times more quiet than in old times. In fighters before the war or even in wartime, in Spitfires for example, was very noisy because they got a short length of pipe in front of you. That was very noisy, upsetting radio quite a lot. But you can still hear the noise, but not to such an extent that you can hear it on the ground.

ST: Did you wear a g suit?

JZ: Not much. They were designed and there was lots of testing done, but for normal flying they were not using it.

ST: Acceleration: at what speeds was it strongest?

JZ: Excessive power depend on engine speed. We never stabilized, we never measure maximum speed. Highest speed reached was only as a matter of testing. Sensing element transmitted to the ground, now increase speed say from point 1.3 to 1.4, do movement of control such and such. Now increase further, because we never measure stabilized speed. Stabilized speed was still very close to Mach number two. One nine eight. But mind you, aircraft been designed for Iroquois, and Pratt and Whitney much heavier, so we had to put, I remember, one and a half thousand pounds more lead to keep the center of gravity in the right position. We were not worrying about the performance. They already knew that would get performance right to the specification. But were worrying about the optimization of flying characteristic and stressing, there was lots of stress measurement in each part of the aircraft. There was quite a lot of continual problem for us. That was the main point. We made a jump from point eight five to Mach number two. All improvement between one and second prototype in few years time was ten percent, say between Spitfires or between the Gladiator and Spitfire. And here we jumped from point eight five to Mach number two, maybe plus, straight away, in one big jump.

ST: I imagine a modern fighter would outhandle an arrow.

JZ: Arrow was intended as interceptor. Now they're trying to design aircraft they can call air superiority, which mean more universal. So it's really difficult to compare. Of course you got the rockets, which could have five, ten, twenty, thirty miles. But even with improvement which we got in interception methods, still is a problem if concorde is flying at mach number two, and you're at 1.6, to make interception properly. If you miss, gone. maybe I am influenced by speed requirement, because I was at the beginning of the war in a Poland, I had old fighter, and there Was a formation of (Junkers)? 17s, German typical bomber, I couldn't chase them. They were slowing down, I could start approaching. And I

opened fire, they opened fire, and then they added power and ssst, straight away. So that makes me a bit biased. Superiority in speed for whatever opponent you got, it doesn't matter fighter or.... There were occasions, even later in the war, i'm always talking about the last war of course, '41, '42, spitfires were faster than those Junkers 88, reconnaissance aircraft, in level fight they were faster, but they (Junkers) were faster in shallow dives, and that's what they were using always. In level flight, rate of climb and level flight, spitfire was better, but that didn't mean that spitfire could catch, because in the shallow dive they had higher weight, so they were faster in the shallow dive. And they knew this. So there were occasions when you just about opened fire, and they got some information, they start going down down gently, about five, ten degrees, they going, pulling out. That's my experience from last War. That's why maybe I say that speed is still something which you must have. The rocket is improving situation, you can still fire at some distance.

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