Aircraft Design for Future Air Combat Training Offering High Specific Excess Power, Lowering the Energy Consumption and Operational Cost and Having the Lowest Environmental Impact

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Advanced air combat training is currently at a dead-lock. The costs of flying modern fighter jets have grown so high that in the future it will be unthinkable to use these jets for anything other than actual operations, major exercises, or maintaining operational qualification.

In addition, the multi-target capabilities of modern combat aircraft have revealed the need to train their pilots in the face of large numbers of opponents, who carry out what are called "Red air" missions within specialized units called “aggressors squadrons” (specialized military squadrons or private companies). These missions cannot be reasonably carried out by frontline combat aircraft, again for reasons of unacceptable cost.

There is therefore an obvious need for "downloading" on a less expensive type of aircraft for missions in the advanced phase of the training course, for basic training missions in operational unit, and for Red air missions.

But this only makes sense if this type of aircraft has performance equivalent in energy level to that of combat aircraft (high Specific Excess Power - SEP, with the consequence of being supersonic). If not, there is the risk of ending up in unrealistic cinematic positions during the engagement, with the obvious disadvantage of doing "negative training".

The situation is complicated by the fact that this same world of advanced training aircraft has for decades gone the way towards also making light combat aircraft (LCA) which would in fact be incapable of surviving in a modern conflict and therefore have no real operational future. Consequence: the planes are weighed down (system, load structure, engine, snowball effect) and either do not have the required performance or are too expensive for true "downloading”.

The effect of LCA requirements on cost and operational value must be further studied.

Another major aim is lowering the energy consumption and lowest environmental impact (climate and noise) in parallel to lower operational cost: the smallest air vehicle combined with the integrated training system ITS shall produce a great step forward.

This article will provide a good view over the situation in the European Lead-In-Fighter-Training LIFT also. There are as many training procedures as air forces. Every European nation possesses different training systems what is confusing. The following issues are evident and will be presented:

- Jet trainers (almost all) before going to the combat a/c;
- The characteristics of key functions of turbo-trainers will be discussed. Solution one: "no fighter-like turbo trainer à la PC-21" before the Hawk ("Prefect" is basic training, cockpit side-by-side) and then to the combat a/c (that's UK). Solution two: from the "fighter-like turbo trainer PC-21" directly to the combat a/c (Swiss Air Force, and experimental Armée de l'air). The general opinion however is that the jet cannot be excluded before going to the high performance combat a/c as the flight performance of all turbo-trainers is clearly not sufficient. Despite the Pilatus' "sales-pitch"...;
- Synthetic training gains more part in the overall training syllabus as could be expected, somewhere around 50/50% in hours. But real flying cannot be omitted. And it should be on high energy aircraft as mentioned in the context of the T-38 and the future;
- More and more training Centres are installed: besides ENJJPT (Sheppard): IFTS (Italy), NFTC (Canada), VLC (Prague), Deblin (Poland);
- Few is said about a new solution including new AT in 10 years from now. Air Forces face other problems right now;
- Times are not wrong to think about the future and analyze commonalities in a European approach.

All these ideas, issues and challenges for the future will be discussed in the presentation.