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## **LARGE MODEL AIRCRAFT**

**Tony Hooper MBE. Chief Examiner of the UK Large Model Association**

The UK Large Model Association (LMA) is the CAA-approved organisation responsible for ensuring that all unmanned and remotely-controlled flying vehicles operated in the UK, and with a dry mass in excess of 20kgs, are developed and operated under conditions agreed by the Association, and the CAA. The conditions require that all aircraft in this category comply with the requirements of the Air Navigation Order (ANO), thus requiring that their operators respect all necessary safety and airspace-related restrictions. Whether purchased (complete or partial kit) or designed and built from scratch, any new vehicle must be registered with the LMA, and they must proceed to develop the model and its operational plans only on terms overseen and approved by a nationwide team of 30 or so examiners.

The speaker, as the association's chief examiner, provided a personal view of his own involvement, from being an enthusiast as a young man, an aviator (in respect of flying actual and model aircraft) over several decades, and now as the custodian of the technical rules that govern all large model aircraft operations in the UK. He inter-twined his enthusiasm-driven presentation with many examples of large aircraft model projects which he had examined, and some from his own experience.

He provided a detailed insight with a walk-through a personal project: of a large-scale model of a Vickers Wellington bomber. He stressed that any 'design' has to be thought through, stressing that examiners have to be involved at the early-stages, and that they have a keen eye for the detailed content of drawings submitted. Issues he described included the need for a clear understanding of the construction process. An examiner's scrutiny will cover critical aspects, such as joints (often very different to those on a full-scale aircraft, as the model is likely to be made transportable by arranging its quick assembly/disassembly into major items), the alignments of aerodynamic elements (he stressed wing incidence), the assessment and disposition of mass, the components of flight and radio-control systems to be used and their capabilities, etc. His clear message was that aircraft are often larger than 20kg dry mass, and they are potentially hazardous if inappropriately designed, and that there must be assurance that they will be flown too in circumstances compatible with acceptable safety and operating procedures.

In his Wellington project walk-through he showed that the builder needs a large enough area to accommodate layout drawings (and in later comments hinted that the drawings are often drawn on plain wallpaper rolls). He acknowledged that some projects might use a bought-in kit, but that the same process would need to be applied. Those who know of the Wellington's unusual geodetic construction were assured that his 'conventional' frame and rib-based fuselage and wing designs were compatible with safety requirements, and the construction, by using wood layering and tedious application of a grid based wing-covering, ensured the final model was faithful to the actual aircraft in terms of appearance. He walked through the 'experience' techniques of choosing engines, knowing the size and power of control devices that would provide adequate control authority and fidelity, and hinted at much more – including radio channel, power/range and best-to-use frequencies, etc.

This technical component of the session was complemented by a review of other designs, and some of the most impressive projects that have contributed to films, especially historical. To list them does little justice, but noted models were of: bombers - Lancaster, Vulcan, B-17, B-52, Me110, an equivalent diversity of fighters - ranging from BF109 to F100, and other types included a BN Islander plus a relatively large UK-developed and commercial seaborne UAV, This has been recently tested for autonomous operations and he was enlisted as a LMA-trusted specialist to fly the aircraft manually through flight phase in which the developers tested autonomous control laws, and had his manual-control capability as back-up. This was a relatively long-endurance design, useable without need for a fixed location, and with potential commercial and humanitarian operations. It was an insight into how essential expertise, often regarded as dormant or lost, is still available and can be utilised by businesses investing in high-technology air vehicle developments (The UK-developed Gull 36 UAV is described on the manufacturer's web-site on the internet).

He brought along two models. One was vintage: a Chance Vought Corsair, WW2 US carrier-borne aircraft which had a 125cc five-cylinder radial piston engine, and wings that folded when on deck, and one was modern: a French Dassault Rafale twin-engines jet fighter. When flying such models he commented on owners buying regular JetA1 fuel from airport stocks to run the small-scale gas-turbine engine. He presented videos of the Corsair and his North American F-100 Super Sabre model being displayed. The attention to realism was impressive, to say the least: with the F-100 having simulated afterburners and detail such as miniature landing lights that retracted and extended appropriately with control inputs. The realism of films and pictures almost defy belief that the subject is not full-scale.

Question and answers reveal a wealth of additional information, from the use of wallpaper for drawing to the need to have access to sizeable facilities to store 30 large scale models: the estimation he gave of his own inventory, and before packing away his sizeable cargo he provided on-the-spot demonstrations for the most intrigued attendees of the Corsair's systems, including the wing-folding mechanism. This was a delightful, enthusiasm-fuelled presentation, attended by about 120 suitably-impressed people and set a really good start to the new season's annual timetable.

Lecture notes by Mike Hirst



Avro 504K



Boeing B17 Flying Fortress  
used for films



Boeing B52 Stratofortress  
(eight engines)



Bristol Bulldog



Chance-Vought Corsair – one of two models the speaker brought to the presentation



North American F-100 Super sabre – another of the speaker's personal models



Hawker Hunter FMk6 – so realistically modelled and detailed that it is hard to distinguish from the real article.



A line-up of LMA models at an event that celebrated the WW2 Avro Lancaster bomber at an RAF base in Lincolnshire.



Dassault Rafale (1/5<sup>th</sup> scale) – one of the two models the speaker brought to his presentation.



LMA modeller David Johnson with his Avro Vulcan B.Mk.2 in 1960s all-white strategic bomber colours.

A selection of slides from the lecture showing the speaker's Vickers Wellington bomber model in build & flying



To make the modelling task more manageable, on a large flat surface, the fuselage used a conventional structural configuration.



When it was skinned with thin wood strips the detail was indistinguishable from the unique finish of the fabric-covered 'geodetic' structure of the real aircraft.



The finished model 'returning to base' – so realistic that it is indistinguishable from what was a common sight at many RAF aerodromes over 70 years ago.