

Young People in Flight Simulation

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1 Background

Aviation and aerospace appeal to young people. Aerospace is an exciting, vibrant and challenging industry and naturally it appeals to boys and girls looking to fly or design aeroplanes of the future. Although recruitment in the traditional subjects of engineering has flagged in universities, recruitment in aerospace courses is buoyant, confirming the enthusiasm for the subject, despite reduction in the UK aerospace industry over the last 20 years.

However, the situation for flight simulation is not so positive. Schools are unlikely to cover flight simulation in a tightly prescriptive syllabus and even at university, courses in aerospace continue to cover the traditional subjects of aerodynamics, aircraft structures and propulsion. This situation contrasts with the growth of the flight simulation industry and its increasing impact in the aviation industry. One reason for this lack of awareness is that the simulation industry fails to provide good public relations to make young people aware of its scope and activities.

2 The Problem

Flight simulation is a systems discipline; it covers aeronautics, mechanical engineering, electrical engineering, computer science, mathematics and psychology. Consequently, the subject does not fit comfortably in the science syllabi of schools or the engineering syllabi of colleges and universities. The awareness of systems engineering as a discipline has been very slow yet, for the majority of companies in the aerospace industry, the major shortage of engineers is the systems engineer.

There is a further problem in higher education. Most aeronautic departments have a wind tunnel, structural testing machines or propulsion rigs to support teaching. The facilities for flight simulation cannot compete. Up to a few years ago, the cost of a flight simulator exceeded \$5M and even where simulators have been donated to universities, the maintenance and upkeep was prohibitive and impractical. The situation has changed slightly, with the availability of simulators costing less than \$300,000.

Despite the introduction of over ten flight simulators in UK universities in the last few years, the level of innovation in teaching provided by these simulators is questionable. They are used for simple demonstrations and although the performance of the flight models can be customised to a limited extent, much of the software is proprietary and students have very restricted access to the underlying software or systems. Arguably, the main role for these simulators is in student recruitment.

This situation contrasts somewhat with the games industry, where a plethora of flight simulators provide young people with quite advanced flight simulators running on home PCs. Although access to the underlying technology is restricted to graphical modelling of aircraft and scenes, these simulators do expose students to aircraft operations, navigation procedures and, to a limited extent, aircraft handling. In short, we have produced a generation of simulation enthusiasts with no grasp of the subject.

3 The Solution

In order to make students more aware of flight simulation, there are four possible strategies to bring flight simulation to schools and universities:

- Visits to schools to provide teaching material and talks on flight simulation, to stress the excitement of engineering, the underpinning science (e.g. lift and drag) and to emphasise that simulation is used in engineering design and that these techniques will become pervasive in all industries, not just flight training.
- To introduce students to flight simulation facilities. However, this is far from straightforward; manufacturers and airlines have security issues, utilisation for commercial training is high and it is difficult to provide access to a simulator for more than a few students at a time.
- To develop teaching material; although this offers the best opportunity to encourage student participation, it is not clear how this material will be developed and integrated into a syllabus and, more importantly, who will fund this development.
- Summer placement for university students; BAE Systems have in the past provided summer schools which combine lectures and design exercises, trying to break down perceptions that engineering is difficult or dull. Some aerospace companies such as Roll Royce offer funded placements, enabling students to experience different aspects of their business units over a period of 12 weeks. Clearly, the cost of such a venture (10 students at £400/week for 12 weeks is £48,000) is a real constraint for many organisations.

There is one additional group; schools and universities support ATC cadet schemes and the RAF continues to sponsor local ATC units who are given airborne flight experience trips. The provision of low-cost flight training facilities in these groups could enhance flight training and provide a practical teaching tool.

4 Opportunities for the FSG

The FSG does support branch lectures and could develop lecture material appropriate to schools, with help from educational advisers. National Science Week (running every March) encourages organisations to provide talks or hands-on experiences for local schools.

With some financial support from industry, the FSG could look at the development of teaching material in schools and universities. This is not the provision of flight simulation facilities but the development of teaching material to provide some simulation packages. For example, a package could be developed to model the lift and drag of a paper aircraft, comparing the results from simulation with experimental data. Alternatively, students could interface a simple laptop EFIS display to a bicycle fitted with a solid-state compass and inertial sensors. In universities, a real-time model of an aircraft could be implemented on a dedicated PC (to protect a manufacturer's IPR) with a simple interface to a PC to enable flight control laws or visualisation tools to be developed and to provide a simple flight test facility.

The role of the FSG in these activities would be to coordinate a programme of development with the flight simulation industry and educational advisers and to seek sources of funding. In addition, there are educational foundations who provide

funding opportunities for initiatives in teaching and most universities have limited funding to develop new teaching facilities.

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