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INTERMODAL INTEGRATION OF LARGE VOLUME AIR CARGO

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Abstract

Proposed is a novel air freight concept for intermodal container transport. The aim is to utilise the standardised (ISO) 20 and 40 foot containers currently in operation. Instead of a completely new, purpose built aircraft which would be too expensive, the baseline airframe considered is the planned Airbus freight configuration, A380-800F. Preliminary calculations show that an aircraft with the capacity and dimensions of A380 can carry up to six 40' or up to fourteen 20' containers as well as combinations of these, depending on load density. Considered are the necessary aircraft modifications, the cost and weigh implications, and also the efficiency of the concept. The conclusion is that such a modification may reduce the payload of the aircraft by about 6%, but the time savings can be very significant. Furthermore, the seamless integration of ISO 20' and 40' containers has the potential to radically change the air cargo business as it could become an integral part of the global manufacturing supply chain. This would extend the traditional air cargo market from perishables, clothing, high value and fragile items to components and even intermediate materials, given economies of scale.

1 Introduction

Cargo handling, including the associated paperwork is widely recognised as a bottleneck which limits the productivity of air shipping. For example, the current mean delivery time of 6.3 days has not changed much for quarter of a century as far as international freight is concerned. Over 25 years ago a NASA study [8] identified that the performance at the node of connection between two or more transportation modes is an important determinant of the degree of possible network optimisation. The same study predicted that "achievement of a viable large-volume air cargo will depend on the following:

a) Use of large containers that can be filled by shippers, surface carriers, or forwarders at off-airport sites.
b) Complete compatibility with surface freight systems to allow efficient ground interface and connecting surface for onward freight movements.
c) Cargo aircraft designed specifically for freight service and uncompromised by passenger considerations."

It appears now that these conclusions were ahead of its time. The focus of air freight has remained predominantly on low volume, high value items which could be combined with the passenger traffic.

The motivation behind this paper is to show that the business and technology drivers have changed and have become sufficiently strong to justify the return to issues a)-c) above. The objective is to introduce an enabling integration concept which utilises ISO 20' and 40' containers. The concept, named ICON, is shown in Fig. 1 and is based on a large wide body aircraft such as the forthcoming freight configuration of Airbus A380F.



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