CONCRETE CONSTRUCTIONS

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ABSTRACT

The use of concrete for runways increased hugely during World War Two to meet the requirements of heavy aircraft. Designs using other forms of construction proved less durable. Since then aircraft loads have increased and concrete remains the material of choice for designers and operators. But it is not without its drawbacks. This paper considers concrete construction from the perspective of the designer and the operator.

For design calculations concrete behaves more or less as an elastic material which make numerical analysis and calculation possible. Additionally it has characteristics that operators find attractive. Properly constructed it has high strength, is durable, cheap, resistant to chemicals, the weather, has good FOD characteristics and is capable of supporting very heavy aeroplane wheel loads on the apron and on the runway. Present designs are either fully empirical or include a mixture of analysis and empirical data. Constructions for heavy traffic require either extrapolation of design methods or increased use of analytical design methods. Because of its properties concrete lends itself to analytical methods.

However maintenance can be difficult. Curing time precludes early trafficking, joints are a perennial problem and economies of scale are not available for small works. Present design methods do not really deal adequately with existing pavements for overlay and this gives a clue as to the way forward for concrete constructions.

Concrete is sometimes viewed as an environmentally unfriendly material. However it has excellent recycling potential and offers opportunity for sustainability. Research into the development of very high flexural strength concretes, by the use of additives and cement replacement, is well advanced. Concrete pavements capable of supporting the demands of modern aeroplanes can now be achieved in considerably thinner layers than was previously possible. Laying techniques too have developed in such a way that contractors are able to achieve very high quality material. Concrete will undoubtedly remain the material of choice.

Aeroplanes are truly international. Identical vehicles operate to identical standards throughout the world. Apart from local material and weather conditions similar design requirements exist throughout the world. It should therefore be possible to develop an international framework to establish common design standards in much the same way that commonality has been reached through ICAO etc.