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Number, siting and orientation of runways

1. Siting and orientation of runways

Many factors should be taken into account in the determination of the siting and orientation of runways. Without attempting to provide an exhaustive list of these factors nor an analysis of their effects, it appears useful to indicate those which most frequently require study. These factors may be classified under four headings:

1.1 Type of operation. Attention should be paid in particular to whether the aerodrome is to be used in all meteorological conditions or only in visual meteorological conditions, and whether it is intended for use by day and night, or only by day.

1.2 Climatological conditions. A study of the wind distribution should be made to determine the usability factor. In this regard, the following comments should be taken into account:

(a) Wind statistics used for the calculation of the usability factor are normally available in ranges of speed and direction, and the accuracy of the results obtained depends, to a large extent, on the assumed distribution of observations within these ranges. In the absence of any sure information as to the true distribution, it is usual to assume a uniform distribution since, in relation to the most favourable runway orientations, this generally results in a slightly conservative usability factor.

(b) The maximum mean cross-wind components given in Subpart F, 139.309(a)(3) refer to normal circumstances. There are some factors which may require that a reduction of those maximum values be taken into account at a particular aerodrome. These include:

(1) The wide variations which may exist, in handling characteristics and maximum permissible cross-wind components, among diverse types of aeroplanes (including future types) within each of the three groups given in 139.309(a)(3);

(2) Prevalence and nature of gusts;

(3) Prevalence and nature of turbulence;

(4) The availability of a secondary runway;

(5) The width of runways;

(6) The runway surface conditions - water and ice on the runway materially reduce the allowable crosswind component; and

(7) The strength of the wind associated with the limiting cross-wind component.

A study should also be made of the occurrence of poor visibility and/or low cloud base. Account should be taken of their frequency as well as the accompanying wind direction and speed.

1.3 Topography of the aerodrome site, its approaches, and surroundings, particularly:

(a) Compliance with the obstacle limitation surfaces;

(b) Current and future land use. The orientation and layout should be selected so as to protect as far as possible the particularly sensitive areas such as residential, school and hospital zones from the discomfort caused by aircraft noise;
Detailed information on this topic is provided in the EAC 139-16 and in
Guidance on the Balanced Approach to Aircraft Noise Management (Doc 9829);

(c) Current and future runway lengths to be provided;

(d) Construction costs; and

(e) Possibility of installing suitable non-visual and visual aids for approach-to-land.

1.4 Air traffic in the vicinity of the aerodrome, particularly:

(a) Proximity of other aerodromes or ATS routes;

(b) Traffic density; and

(c) Air traffic control and missed approach procedures.

2. Number of runways in each direction

The number of runways to be provided in each direction depends on the number of aircraft movements to be catered to.