



ESDU TECHNICAL MEMORANDUM

Effect of wing-mounted engine nacelles of propeller-driven aircraft on lateral stability derivatives in sideslip

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ESDU TECHNICAL MEMORANDA

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EFFECT OF WING-MOUNTED ENGINE NACELLES OF PROPELLER-DRIVEN AIRCRAFT ON LATERAL STABILITY DERIVATIVES IN SIDESLIP

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EFFECT OF WING-MOUNTED ENGINE NACELLES OF PROPELLER-DRIVEN AIRCRAFT ON LATERAL STABILITY DERIVATIVES IN SIDESLIP

1. NOTATION AND UNITS

		<i>SI</i>	<i>British</i>
A	wing aspect ratio, b^2/S		
b	wing span	m	ft
$f(A)$	function of aspect ratio in Figure 2		
h_{nk}	maximum cross-section height for k 'th pair of nacelles, see Sketch 1.1	m	ft
K	nacelle fineness ratio correction factor in Equation (3.1) and Figure 1		
L_v	rolling moment derivative due to sideslip		
$[(L_v)_{nk}]_T$	theoretical contribution to $(L_v)_{nk}$ due to antisymmetric incidence induced across wing span by k 'th pair of nacelles		
l_{nk}	for k 'th pair of nacelles, nacelle length forward of wing leading edge for propeller-driven aircraft, see Sketch 1.1	m	ft
m_{0k}	longitudinal distance of cowl leading edge forward of moment reference point for k 'th pair of nacelles, see Sketch 1.1	m	ft
N_n	integer denoting number of nacelles on each half wing		
N_v	yawing moment derivative due to sideslip		
S	gross wing planform area	m ²	ft ²
s	wing semi-span	m	ft
s_{nk}	spanwise distance from plane of symmetry of centre-line for k 'th pair of nacelles, see Sketch 1.1	m	ft
Y_v	sideforce derivative due to sideslip		
z_{nk}	for k 'th pair of nacelles, vertical distance of nacelle centre-line below local wing chord for nacelle on propeller-driven aircraft, see Sketch 1.1	m	ft

z_{0k} for k 'th pair of nacelles, vertical distance of nacelle centre-line below moment reference point, negative in Sketch 1.1

m

ft

Subscripts

$()_n$ denotes contribution due to all nacelles

$()_{nk}$ denotes contribution due to k 'th pair of nacelles

k integer identifying nacelle, $1 \leq k \leq N_n$