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جامعة عين شمس

شبكة المعلومات الجامعية

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ALEXANDRIA UNIVERSITY
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**A NEW DESIGN APPROACH FOR
STIFFENED PLATES TOWARDS
WEIGHT AND COST SAVINGS**

Dissertation

*Submitted in partial satisfaction of the requirements for
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NOMENCLATURE

A	:	total cross sectional area
A_w	:	cross sectional area of web stiffener
B	:	length of the panel
b	:	width of flange of a rectangular box unit
b_f	:	breadth of the flange
c	:	height of web of a rectangular box unit
C_d	:	deprecations cost of used equipment
$C_{f/hr}$	:	cost of fitter per hour
C_m	:	total cost per kg of welding metal consumables
C_o	:	overhead cost per kg of weld metal
C_p	:	electric power cost deposit one kg. of weld metal
$C_{pR/ton}$	:	cost of plate per ton.
$C_{pre/hr}$	:	cost of prefabrication man hour L.E./hr
$C_{S/R/ton}$	:	cost of stiffeners per ton.
D	:	flexural rigidity
d_w	:	depth of the web stiffener
E	:	modulus of elasticity
F_c	:	fitting cost
FEM	:	finite element method
FS_1	:	corresponding factor of safety against buckling
FS_2	:	corresponding factor of safety due to shear
FS_3	:	corresponding factor of safety due to yielding
H.T.S	:	high tensile steel
I	:	moment of inertia of the cross section about neutral axis
k	:	buckling stress factor
k_1, k_2	:	coefficients depending on boundary conditions
K_m	:	total welding cost of metal consumables

NOMENCLATURE (Cont.)

K_m	:	total welding cost per meter run
L	:	length of the stiffeners (breadth of the panel)
L_c	:	labour cost
L_{wp}	:	length of butt weld plates
L_{ws}	:	length of fillet weld stiffeners
M	:	bending moment
M_c	:	material cost
M_L, M_T	:	longitudinal and transverse bending moment
M_{LT}	:	twisting bending moment
M_{pc}	:	material plating cost
M_{sc}	:	material sections cost
M_{xy}	:	twisting moment and inplane force in shear in the x-y
N	:	number of stiffeners in length (B), ($N = B/S$)
N_{JP}	:	number of welding joints in (L) directions
N_{PJL}	:	number of plate welding joints in longitudinal direction (B)
N_{PJT}	:	number of plate welding joints in transverse direction (L)
N_{SJ}	:	number of corrugation stiffener joints
O_c	:	overhead cost
P	:	lateral pressure
P_L	:	longitudinal tension or compression plane
P_{prec}	:	prefabrication cost
P_T	:	transverse tension or compression
$R_{Fit/ton}$	:	fitting man-hours /ton
$R_{pre/ton}$	:	prefabrication man-hours per ton
S	:	pitch of a rectangular box unit
S	:	the spacing of stiffeners

NOMENCLATURE (Cont.)

SAP	:	Structural Analysis Program
S_y	:	web frame spacing in y- direction
t_{eq}	:	equivalent thickness
t_f	:	flange thickness
t_p	:	plate thickness
t_w	:	web plate thickness
V	:	maximum normal shear forces
W	:	weight of weld metal consumables in kg per meter run
w_a	:	maximum allowable elastic deflection
W_c	:	welding cost
w_e	:	elastic deflection at any point along the beam
w_{emax}	:	maximum elastic deflection
Z	:	modulus of section of stiffener with associated plating
σ_{cr}	:	the critical allowable stresses
ρ	:	density of used material
ν	:	Poisson's ratio
σ_{act}	:	actual maximum acting stress
σ_{eq}	:	equivalent stress
σ_L	:	lower yield stresses of material
σ_T	:	transverse bending stress due to lateral pressure