A

Report on

EFFECT OF BUCKLING BEHAVIOUR OF COMPRESSION LOADED COMPOSITE CYLINDRICAL SHELLS WITH REINFORCED CUTOUTS

A Project report submitted for the partial fulfilment of the requirements for award of Degree of

BACHELOR OF TECHNOLOGY

IN

MECHANICAL ENGINEERING

Submitted by

V. Manikanta (19815A0395)

T.V.S.S. Ganesh (19815A0378)

T. Srinu (19815A0389)

V. Sunil (19815A0381)

Under the guidance of

Shri. V. HARI KIRAN M.TECH (Ph.D)

Associate Professor & H.O.D

DEPARTMENT OF MECHANICAL ENGINEERING

AVANTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

(PERMENANTLY AFFLIATED TO JNTU-KAKINADA, ACCREDITED BY NBA & NAAC, APPROVED BY AICTE, RECOGNISED BY UGC 12f & 2b)

(Affiliated to Jawaharlal Nehru technological university Kakinada, A.P)

TAMARAM, MAKAVARAPALEM, NARSIPATNAM-531113

2018-2022

DEPARTMENT OF MECHANICAL ENGINEERING

AVANTHI INSTITUTE OF ENGINEERING & TECHNOLOGY

CERTIFICATE

This is to certify that the project entitled "**Effect of Buckling Behaviour of Compression Loaded Composite Cylindrical Shells with Reinforced Cutouts**" is the record of the work carried out by **V. Manikanta (Regd No. 19815A0395), T.V.S. S.Ganesh (Regd No. 19815A0378), T. Srinu (Regd No. 19815A0389), V. Sunil (Regd No. 19815A0381)** students of final year B. Tech in the department of Mechanical engineering. This work is done for the partial fulfilment for the award of BACHELOR OF TECHNOLOGY during the year 2021-2022.

Project Guide
Shri. V. HARI KIRAN M.TECH (Ph.D)
Associate Prof. Dept of ME

Head of the Department
Shri. V.HARI KIRAN M.TECH (Ph.D)
Associate Prof. Dept of ME

External Examiner

ABSTRACT

Composite thin cylindrical shells are most widely used structural forms in Aerospace and Missile applications. In designing efficient and optimized shell structure, they become increasingly sensitive to buckling. It is well known that the experimental display is mainly attributed to geometrical imperfection like damage in the structure, or ovality or local thinning of material etc.

In Missile and Airframe, the composite cylindrical shell structure is generally provided with cutouts for accessing internal components during integration. The cutouts invariably reduce the strength of the composite cylindrical shell and more specifically the buckling load. It has been a design practice to improve strength by addition of Reinforcement around cutout. The cutout not only introduces stress concentration but also significantly reduce buckling load.

Results from a numerical study of the response of thin- walled compression-loaded quasi- isotropic laminated composite cylindrical shells with unreinforced and reinforced square cutouts are presented The effects of cutout reinforcement orthotropy and size, on the linear response of the shells are described. The results indicate that a local buckling and deformation occurs in the shell near the cutouts are described when subjected to compression load. Interlaminar and Intralaminar failure occurs on the near the free edge of the cutouts.

In general, reinforcement around a cutout in a compression- loaded shell is shown to retard or eliminate the local buckling response, Interlaminr, intralaminar and failure near the cutout and increase the buckling load and decrease the deformation of the shell. To eliminate the Interlaminar and Intralaminar failure by change in material properties of Graphite/Epoxy tape unidirectional property.