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WHEELED MILITARY VEHICLES, STRUCTURAL ANALYSIS AND TESTING (SA ARMY)

SCOPE

This document is a handbook on the subject of structural analysis of wheeled military vehicles during design and operation. A distinction is made between separate frame and body vehicles (mostly cargo vehicles) and monocoque hull vehicles of which the semi-integral frame vehicle is a special case. Monocoque hull vehicles are mostly wheeled armoured vehicles like Infantry Fighting Vehicles (IFV) and troop carriers.

It commences with a discussion on the activities necessary for the structural design of a new vehicle. These activities are not grouped in terms of development phases, as the assumption is made that a modern approach of simultaneous engineering is applicable.

A discussion on the constraints on the military vehicle development process, within the South African context, follows. This is provided so that the user of the handbook is aware of certain aspects which will influence the extent of technical activities on a specific project.

These introductory paragraphs form the basis for deriving development activities for military vehicles integrated from existing components and structures. These vehicles are mostly separate frame/body vehicles, built on a bought-out chassis frame.

An important part of any development process is the definition of the input loads to the system being designed. A paragraph is devoted to the definition of loads and load cases to be used during development.

Principles of the structural analysis of separate frame/body vehicles are presented. They include guidelines for selecting a suitable chassis for a specific application, performing modifications to the chassis for the fitment of a specific body and, lastly, the analysis of various vehicle body types.

A discussion follows on the structural analysis of monocoque hull vehicles.
This discussion centres around principles of fatigue as applicable on welded structures. It concludes with a short discussion on affecting structural modifications to existing monocoque hull vehicles.

The last section of the handbook is devoted to vehicle structural testing.
Guidelines are given on field, test track and laboratory testing. Guidelines are given for determining the optimum type of test to perform.