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Heavy-Duty Wheeled Vehicles: Design, Theory, Calculations

By Boris N. Belousov and Sergei D. Popov
Dedication

In memory of
Professors P.V. Aksyonov, N.F. Bocharov, G.A. Smirnov, and Yu.V. Pirkovsky
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Preface

This book narrates the history of heavy-duty wheeled vehicles (HDVs) and presents the basics of the design, theory, and calculation of their individual units and systems; as well as the peculiarities of common design solutions used.

HDVs are all-wheel-drive vehicles that have a load capacity of 25 tons or more and three or more axles. Such vehicles are used for transporting heavy, indivisible, bulky cargos and as transport platforms for various technical equipment.

HDV designs have their own development requirements, which are associated with high loads, huge dimensions, and specific operation conditions. Naturally, the approaches to designing such vehicles differ from those used in designing other multipurpose all-wheel-drive automobiles. Designers and manufacturers of HDVs use a custom approach, such as designing a chassis for a particular purpose requested by the customer. The main elements of the chassis, namely, the undercarriage, the carrying system, the transmission type and composition, the engine, and resilient elements of the wheel suspension are flexible and vary. Other design variables include the number of axles and which are the driving and driven ones, and what size and type of tire are needed. Due to the individual character of the design process, design solutions are often different than those used to design passenger cars. Therefore, every positive and negative aspect of designing an HDV deserves a thorough study for future use in designing new vehicles.

An enormous contribution into the theory and practice of designing HDVs was made by Professors N.F. Bocharov and G.A. Smirnov of the N.E. Bauman MSTU and Professors P.V. Aksyonov and Yu.V. Pirkovsky, who closely cooperated with MSTU. This book presents certain elements of updated theory, calculations, and related general design solutions. The concept of general design solutions, introduced by Professor Aksyonov, comprises of the number and location of axles, steering and transmission system layout, and general vehicle layout principles.

The authors hope that this book will be helpful for the engineers, technicians, and scientists involved in the motor industry; for those engaged in designing and building wheeled transportation vehicles; and for students and trainees at universities where specialists of respective branches of industry are trained.

The authors will be grateful for any critical remarks and wishes expressed by the readers.
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