

CONTENTS

Chapter 1: The power unit

- 1 Performance prediction
- 5 Thermodynamics and design
- 7 Mechanical design
- 8 Historical design lessons
- 10 Engine efficiency factors
- 15 Engine fuel/air-intake systems
- 18 Engine valve control advances
- 21 Engine fuelling systems
- 24 Diesel fuelling systems
- 26 Contemporary supercharger application
- 31 Inlet tract tuning
- 32 Exhaust system analysis
- 35 Lean-burn and combustion control
- 42 Advanced engine design: Rover K-series

Chapter 2: The power unit environment

- 47 Gasoline engine emission control
- 52 Diesel particulate control
- 55 Diesel emission control
- 57 Emissions during transient operation
- 62 Back to basics on engine efficiency
- 63 Optimizing catalyser performance
- 64 Meeting ULEV emission levels
- 48 Total systems approach to ULEV
- 71 Emissions outlook for diesels
- 74 Improving catalyst fast light-off
- 76 Natural gas engines
- 82 The Bruntel engine
- 86 Heat exchanger calculation
- 90 Engine cooling/vehicle heating
- 94 IC engine noise control
- 98 Engine mounting
- 103 Engine balancing
- 106 Future power-unit technology developments

Chapter 3: Electric propulsion

- 108 Future traction: gas or electric
- 114 DC electric traction basics
- 118 Developing electric drives
- 122 Electric storage systems
- 127 Electric car technology
- 130 Hybrid-drive vehicles
- 133 Hybrid-drive buses
- 137 Hybrid-drive, a staged approach
- 139 Electric trucks
- 142 Solar vehicles
- 145 Production electric vehicles
- 147 Practical hybrid systems
- 149 Hybrid-drive for taxis
- 151 Hybrid-drive advances
- 156 Electric buses in service

Chapter 4: Vehicle suspension and ride

- 159 Dynamics fundamentals
- 160 Ride parameters and comfort criteria
- 165 Dynamics theory applied to a 2-axled vehicle model
- 167 Suspension geometry/roll: ride and handling conflict
- 168 Gyroscopic effects
- 170 Suspension spring design
- 174 Suspension coil-springs
- 179 Auxiliary suspension springs
- 182 Integrated approach to suspension/engine-mounts
- 184 Damper performance evaluation
- 186 Rubber suspension
- 190 Hydro-pneumatic suspension
- 196 Active suspension systems
- 200 Semi-active suspension evaluated
- 202 Full active suspension
- 205 Active suspension with preview
- 209 Air suspension for road-friendliness
- 215 Road-friendly CV suspension

Chapter 5:

Vehicle steering/handling

- 220 Steering geometry and vehicle handling
- 224 Dynamic tyre stiffness
- 226 Steering and suspension linkages
- 230 Directional control
- 234 Steering system developments
- 238 Electric steering
- 240 Vehicle dynamics in design
- 244 Vehicle dynamics analysis applied
- 251 Handling analysis in racing cars

Chapter 6:

Wheel, brake and trailer-design

- 256 Statics fundamentals
- 257 Traction vs stability
- 260 Road-wheels and hubs
- 266 CV wheel-nut standards
- 268 Braking systems
- 271 Brake performance/noise analysis
- 276 Anti-lock braking
- 279 Anti-lock and anti-spin in combination
- 281 CV disc-braking
- 281 CV electronic brake actuation
- 283 Car electronic brake actuation
- 286 Automatic brakes
- 287 Brake pipework
- 289 Truck/trailer braking compatibility
- 289 Drawbar/semi-trailer coupling
- 291 Drawbar vs artic trailers

Chapter 7:

Drive axles and the drive-line

- 296 The mechanics of rotation
- 297 Driveline calculation
- 300 Drive shafting and universal joints
- 302 Drive axles
- 306 Drive axle optimization
- 308 Driveline vibration
- 312 Light-weight drivelines
- 315 Light-weight UJs
- 319 All-wheel-drive
- 322 Traction control differentials
- 328 Viscous couplings
- 331 Viscous coupling calculation

Chapter 8:

Transmission gearbox design

- 335 Change-speed gearing
- 336 Manual gearbox design
- 341 Transmission gearbox bearings
- 345 Automatic transmissions
- 348 Epicyclic gears
- 352 Automatic clutches
- 355 Auto-clutch management
- 360 Staged automation of manual gearboxes
- 362 Friction-drive stepless transmission
- 364 Continuously variable transmission
- 367 CVT pusher belt development
- 370 Hydrostatic drives
- 373 Ultra-compact automatic
- 374 Transmission trends and refinement

Chapter 9:

Off-road propulsion

- 378 Off-road vehicle technology
- 382 Farm tractor technology
- 386 Light-weight ATVs
- 389 Farm support vehicles
- 392 All-terrain trucks
- 395 Earthworking vehicles
- 400 Military vehicle design