

Experimental study on the configuration of auxiliary drive systems that maintain equivalent performance

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Key words: Auxiliary/Accessory Drive system, Component optimization, Cost efficiency, Performance equivalence, System redesign, Generator, OWC(One way clutch), Airconditioning compressor, Symmetric, Asymmetric.

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This paper presents an experimental investigation into cost-efficient optimization of front-end accessory drive (FEAD) systems through systematic modification of key components. The objective was to identify alternative design configurations that reduce manufacturing costs while maintaining the required functional and performance standards. Component-level variations included tensioner damping type (symmetric vs. asymmetric), alternator pulley design (one-way clutch vs. solid type), and belt specifications involving both cord material (polyethylene vs. aramid) and rib surface treatments (standard vs. jacketed). These variations were evaluated using standardized General Motors vehicle-level test procedures, assessing system efficiency, noise, and vibration performance. Results demonstrate that certain low-cost component combinations achieve equivalent performance to the baseline system, thereby validating their feasibility for industrial applications. The study further emphasizes the role of material selection and production process efficiency in enabling cost-effective yet reliable system configurations.

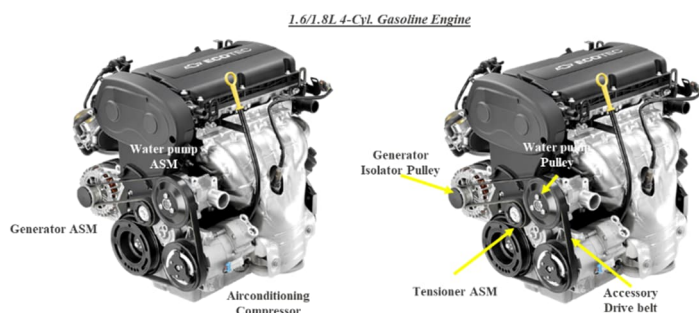


Photo. 1 Engine – Accessory Drive System with Auxiliary components

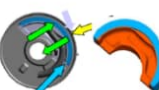
Content	ALT. Pulley	Drive Belt	Tensioner ASM
Current	One Way Clutch 	Standard (ARM) 	Symmetric (HDT1) 
Change Concept	Solid 	Jacket (ARM) 	Asymmetric (HDT2) 

Photo. 2 Accessory Drive System Components Comparison