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16. Abstract <p>A cost and weight analysis of automatic emergency braking (AEB) systems was performed on 4 medium duty (MD) trucks and 3 heavy duty (HD) trucks. MD refers to gross vehicle weight rating (GVWR) classes 3 – 6 and HD refers to classes 7 & 8. The MD systems were all integrated by the named truck manufacturer (OEM) from components made by T1 suppliers; the MD systems required a single sensor module as the only incremental hardware required for AEB. Two of the HD systems were made by a named AEB system supplier and made them adaptable to installation in a variety of trucks with their own processing capability and a stand-alone driver interface unit or display unit; the other HD system used components that were made by suppliers to the OEM for fitment into its own brands of trucks.</p> <p>The MD systems used a variety of sensor types: Ford used a radar, GM used a camera, Stellantis (RAM) used a combined radar and camera module, and Isuzu was the latest to release its own technology with a stereo vision camera module.</p> <p>The HD system from Bendix, the Wingman Fusion, is adaptable to any HD truck platform and contained 5 modules: separate radar and camera sensors, a driver interface unit, an image processing (video control) module, and a brake control module.</p> <p>The Detroit Assurance system was made for Freightliner and Western Star trucks under parent company Daimler. The Detroit system contained separate radar and camera sensors and a processor system; the driver interface was integrated into the trucks' design. Detroit claims to have a "proprietary high-definition camera system" which may explain its high cost, and its own processor giving the AEB system enhanced functionality with adaptive cruise and lane assist.</p> <p>The ZF Wabco system studied here, OnGuardACTIVE, was the simplest of the HD systems containing only a radar sensor and a distinct driver interface display unit making it adaptable to various truck</p>		

models. Nonetheless, the OnGuardACTIVE system has enhanced features such as adaptive cruise, and AEB for moving or stationary vehicles with collision avoidance. The most advanced system, OnGuardMAX with radar and camera, also has AEB capability on pedestrians, but was not available in time for this study.

The total manufacturing costs are followed by a build up to the end-user price increase for the AEB systems as shown in the table below. The MD AEB systems were less expensive than the HD systems due to utilization of a single module as well as emphasis on cost reduction. The HD AEB systems had a greater level of functionality within their systems, even controlling braking function in the case of the Bendix system.

Truck Class	AEB System	Trucks available for fitment	No. of modules	Total manufacturing cost	End-user price increase
MD	Radar	<i>Ford</i>	1	\$ 83.32	\$ 110.33
MD	Camera	<i>GM</i>	1	\$ 84.14	\$ 111.41
MD	Radar & Camera	<i>Dodge RAM</i>	1	\$ 113.99	\$ 150.94
MD	Stereo camera	<i>Isuzu</i>	1	\$ 123.16	\$ 163.02
HD	<i>Bendix Wingman Fusion - Radar & Camera</i>	<i>various</i>	5	\$ 273.62	\$ 362.43
HD	<i>Detroit Assurance 5.0 - Radar & Camera</i>	<i>Freightliner, Western Star</i>	3	\$ 355.25	\$ 470.63
HD	<i>ZF Wabco OnGuardACTIVE - Radar</i>	<i>various</i>	2	\$ 162.66	\$ 215.36

17. Key Words

Medium, duty, heavy, AEBS, Automatic, Emergency, Braking, Systems, AEB,

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