VOLVO ENHANCED STABILITY TECHNOLOGY (VEST)

Volvo Enhanced Stability Technology (featuring Bendix® ABS-6 Advanced with ESP) provides core antilock braking, Bendix® Smart ATC, and an enhanced stability system (covering under-steer, over-steer, and rollover situations), making this the most effective ABS-based traction control and enhanced stability system on the market today.

Safety is the bottom line.

Consider all the costs of accidents: vehicle damage, down-time, clean-up, lost loads, and much more. When you do, you'll see just how much safety can contribute to your bottom line. For companies looking to reduce the risk of accidents and improve profitability, VEST provides proven value.

A competitive advantage for your business.

- *Protect Profitability*. Every dollar you save by reducing accidents goes directly to the bottom line. *Consider this… just to stay profit (bottom-line) neutral, a fleet operating at a 5% margin would need to increase revenue by 20 times the cost of accident related losses.* That means you'd have to increase revenue 2 million dollars to offset $100,000 in accident costs.
- *Promote Customer Satisfaction.* An accident can delay delivery or damage customer's property, which can build ill-will and loss of confidence. VEST helps you protect your customer's product – and demonstrate the added value that your fleet provides.
- *Enhance Driver Training.* Drivers often don't know that the vehicle is tipping because they can't feel what's happening until it is too late. VEST can help to mitigate those events; in addition, driving data can be monitored and used in safety coaching to help good drivers become even better.
- *Strengthen Operational Efficiency.* The reliability and serviceability of a proven ABS-based system, along with easy-to-use diagnostic tools, means less training and more vehicle up-time.
- *Boost Driver Retention.* A commitment to safety improves driver morale and can reduce the potential of drivers leaving the profession or going to a competitor.

VEST – what is it and how does it work?

This advanced stability control system continuously monitors many vehicle parameters and sensors to determine if the vehicle is reaching a critical stability threshold. When such a situation develops, VEST quickly and automatically intervenes to assist the driver.

Unlike other systems, VEST can selectively apply all vehicle brakes, as well as de-throttle the engine – typically much faster than a human. See the information on the next page to see how it works.

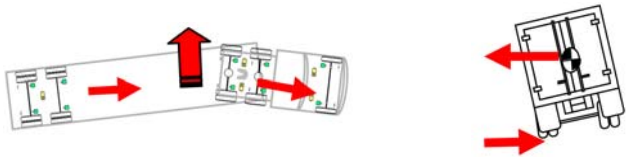
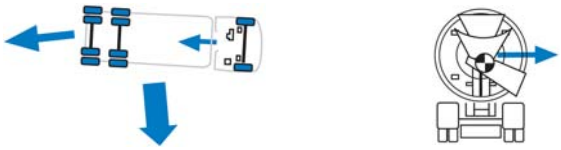
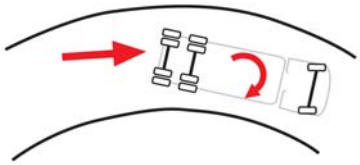
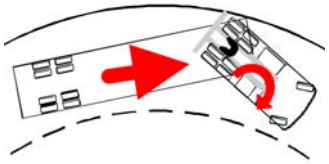
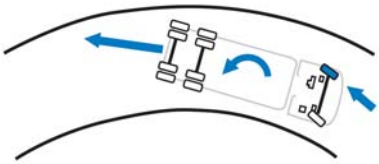
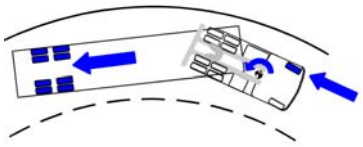
The Complete Stability Solution.

- VEST and Bendix provide the leading ABS-based truck stability system capable of recognizing and assisting with both rollover (RSP) and vehicle under and over-steer (ESP) driving situations and a variety of road conditions. Features include:
- Electronic Stability Program (ESP) – Helps mitigate jackknifes and loss of control through advanced monitoring of many different vehicle parameters, plus automatic and selective application of all vehicle brakes.
- Roll Stability Program (RSP) – This subset of ESP helps mitigate rollovers through advanced sensing and automatic application of vehicle brakes.
- Smart ATC – Unlike other traction control products, the Bendix Smart ATC system makes constant adjustments based on vehicle orientation (straight vs. curve) and the drivers throttle input.
- Core ABS – Prevents wheel lock-up to help drivers maintain steering control while braking. Fully complies with FMVSS 121 for air brake systems.
- Diagnostics – VEST offers a range of diagnostic tools to keep your trucks on the road. From traditional blink codes and "Chuff" at vehicle start, to a remote diagnostic unit (RDU), Pro-link compatibility, and ACOM, a comprehensive computer-based diagnostic software.
- Serviceability – VEST is based on Bendix® ABS-6 Advanced, an ABS-based system which means that most of the components are the same familiar parts used on your current ABS and ATC system. The additional components are based on proven technology and require only simple direct part replacement.
- Customization – A proprietary customization feature allows fleets to add custom functions such as, lift axle actuation and trailer pressure monitoring.

Learn how you can help make safe drivers safer with Volvo Enhanced Stability Technology, featuring Bendix® ABS-6 Advanced with ESP. Talk to your Volvo Dealer or Bendix Account Manager today.

VOLVO TRUCKS | Bendix

VOLVO ENHANCED STABILITY TECHNOLOGY (VEST) IN ACTION

VOCATIONAL / STRAIGHT TRUCKS	HIGHWAY / TRACTORS
DRY SURFACE – HIGH FRICTION → ROLLOVER!	
	
A vehicle enters a curve too fast, on high friction pavement, resulting in high lateral (side) forces acting at the vehicles center of gravity (CG). The high friction between the wheels and the pavement create a "hinge" effect allowing the forces at the CG to push the vehicle over. In the case of some vehicles (e.g., cement mixers), an assymetrical load can alter the vehicle's CG without driver knowledge, leading to increased potential for rollover.	
	
VEST applies pressure to all vehicle brakes (tractor and trailer brakes) as it reduces engine throttle to quickly reduce vehicle speed and mitigate the tendency of the vehicle to roll over.	
WET/SNOWY/ICY SURFACE – LOW FRICTION → JACKKNIFE!	
	
Under-steer	Over-steer
The vehicle speed around a curve exceeds the ability for the tires to hold the vehicle orientation, causing a straight truck to slide and begin to under steer. In the same scenario, a tractor may slide and begin to over steer; the momentum of the trailer further pushes the tractor, exacerbating the situation (potentially leading to a jackknife or loss of control).	
	
VEST senses the driver's intended path (using the steering angle sensor, for example) and measures what's actually happening to the vehicle to identify an under-steer situation. In an attempt to correct the vehicle orientation and reduce speed if required, the system quickly applies braking pressure to **only** the appropriate wheels. (For example, a semi might require braking to the front outside tractor wheel and to the trailer.)	

All Stability Systems Are Not Created Equal

Evaluating competitive stability offerings can be confusing. Considering cost alone may not result in the best solution to meet your goals for return on investment, safety, and driver acceptance. To determine the effectiveness of a stability system, consider the following key factors: 1) the system's ability to detect potential stability situations quickly and completely; 2) the speed and accuracy of the intervention; and 3) the ability to apply adequate and appropriate braking.

The following table shows the key features and components of VEST and current stability systems to provide a clearer picture of the VEST advantage.

	Feature	What it does and why it matters	Roll Stability Only	VEST (Full Stability)
Sensor Technology	Wheel Speed Sensor	Monitors wheel rotation at individual wheels to determine vehicle speed and monitor wheel lock-up to optimize braking.	✓	✓
	Lateral Acceleration Sensor	Senses the side or lateral forces acting on the vehicle – to detect a roll situation.	✓	✓
	Steering Angle Sensor	Senses the driver's steering demand and direction – this is an early indicator of a critical maneuver, and helps VEST respond faster and more accurately.		✓
	Brake Pressure Sensors	Measures the driver's braking demand, and allows VEST to assist the driver throughout the maneuver.		✓
	Load Sensor	Senses the vehicle's load situation – this allows VEST match braking power to weight distribution.		✓
	Yaw Rate Sensor	Senses the vehicle rotation to compare the actual orientation of the vehicle to the driver's intention.		✓
Performance Enhancements	Multi-level Sensing	Cross checks multiple system sensors for improved reaction time and accuracy of the intervention.		✓
	Performance Tuning	Different trucks or towing vehicles have different stability characteristics. This improves the ability of the stability system to match the intervention to the situation.		✓
	All Axle Braking	The ability to apply brakes at all axles provides the best opportunity to reduce vehicle speed in the shortest time.		✓
	Individual wheel end braking	The ability to apply individual tractor brakes and trailer brakes provides the capability to control under- and over-steer situations.		✓