



Volvo Trucks. Driving Progress

I-SHIFT

COMPETITIVE COMPARISON

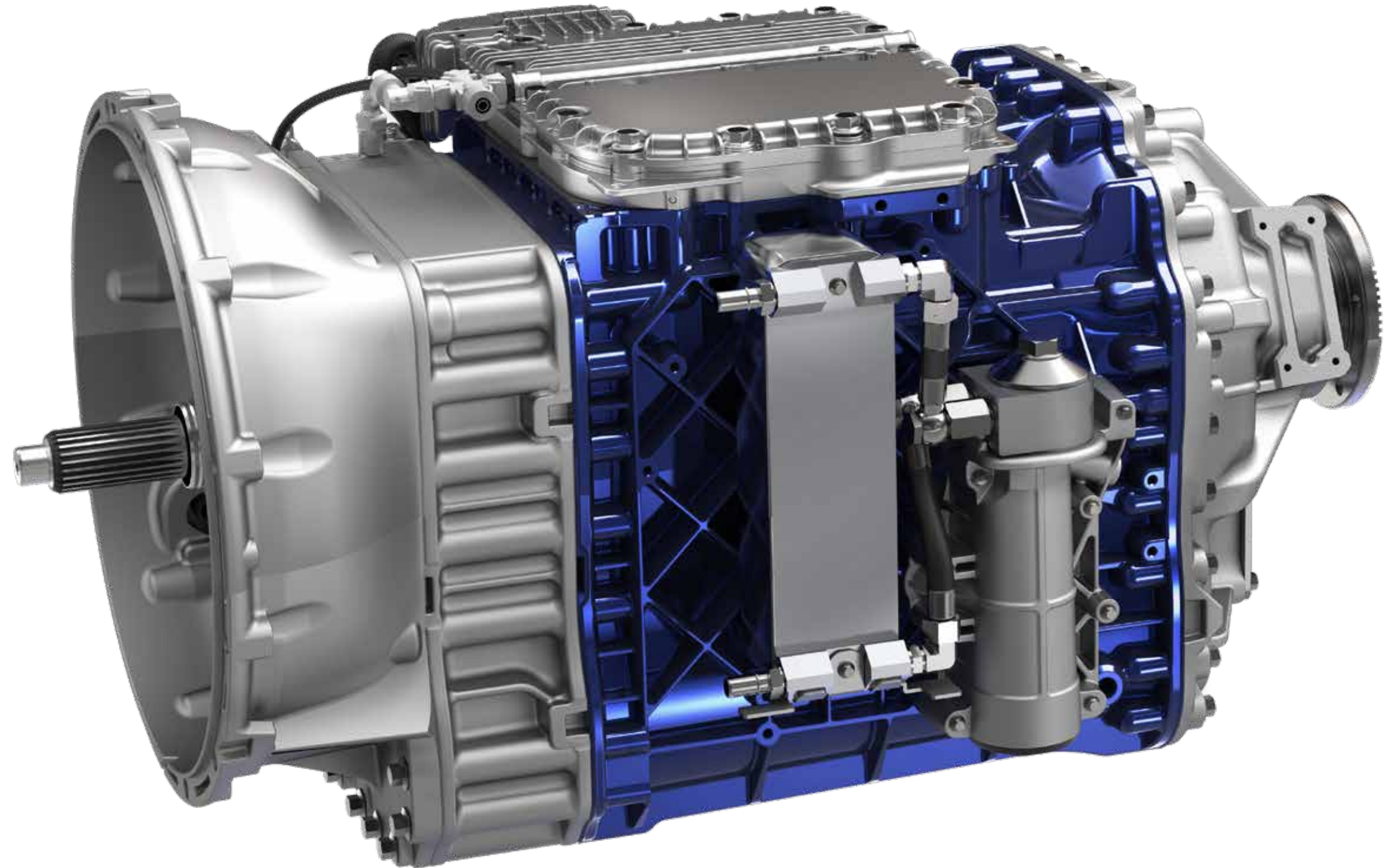


I-Shift, a superior choice

I-Shift continues to set the standard for automated manual transmissions. Worldwide, Volvo Trucks has sold nearly a million vehicles with I-Shift since 2001, and we proudly offer it standard in Volvo trucks with Volvo power.

After almost two decades of outstanding dependability with the I-Shift, Volvo continues to push the boundaries of powertrain performance. Today's I-Shift is the only automated manual transmission in the industry to feature innovative solutions like over-the-air software updates, application specific software packages, power launch and rock free modes. And I-Shift continues to offer the highest torque capacity for standard on-highway configurations.

This competitive analysis breaks down our advantages in key areas like fuel efficiency, driver productivity, integration and uptime. As a complete solution, no transmission comes close to the Volvo I-Shift.



The original, smart solution

Volvo was the first to recognize that an automated manual transmission could provide benefits to fuel efficiency. In 2007 we introduced the innovative I-Shift to the US, long before any of our competitors made their way into the North American market.

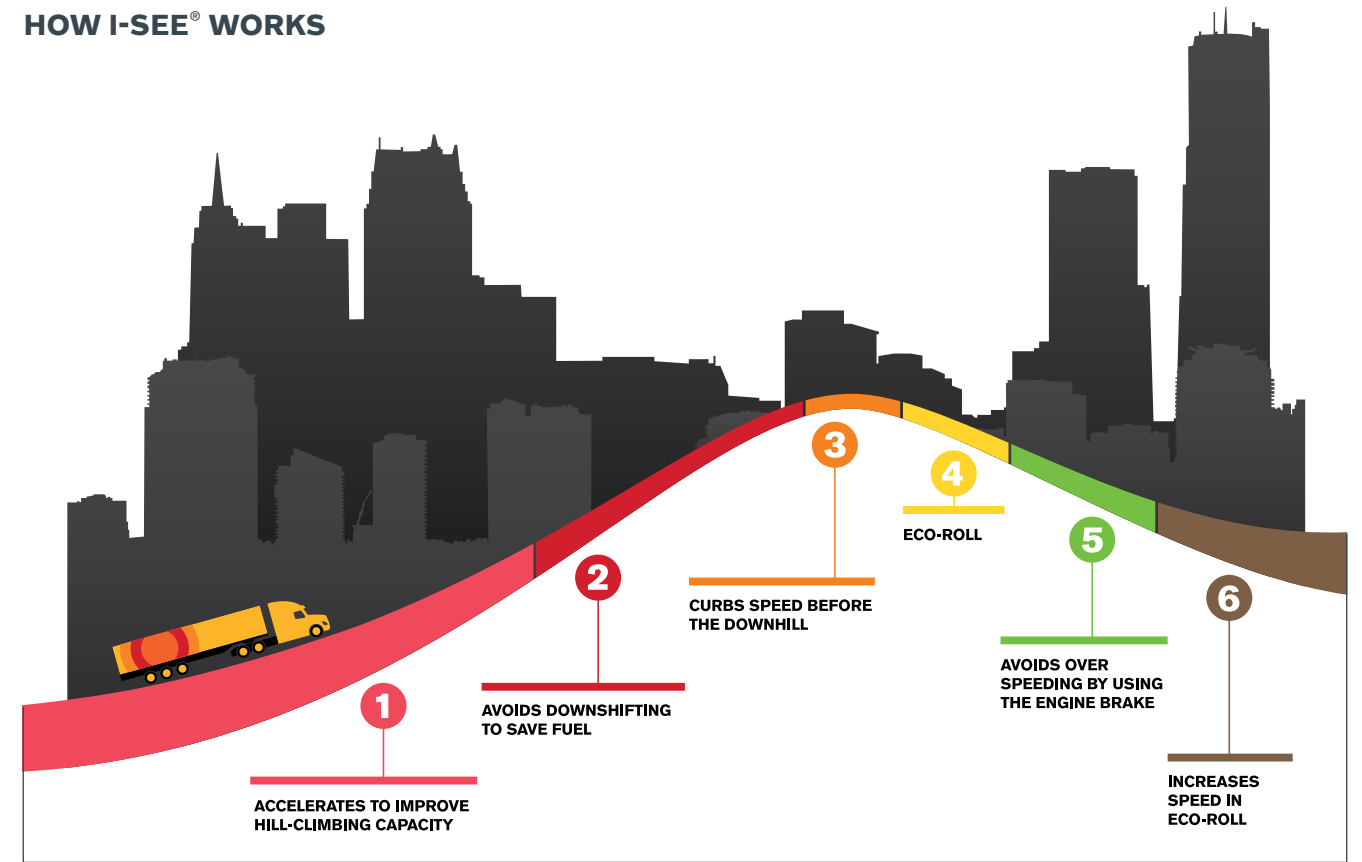
I-Shift identifies truck load, torque demand, vehicle speed, and road grade, allowing the transmission to always keep the truck in optimum gear. I-Shift's advanced integration

allows it to work in harmony with intelligent cruise control for the I-See® feature (chart page 5).

Fuel efficiency improvements of 1.5% for every 100 rpm of downspeeding are common, and customers with the XE package can see improvements up to 3% just from transmission performance. Couple the I-Shift with our innovative D13TC engine and fuel savings can jump to 7.5% and higher.



HOW I-SEE® WORKS



Combine I-Shift with an intelligent cruise control and you get I-See®. The unique system learns the topography of the road and manages shifting on known routes with hilly terrain to maximize fuel efficiency.

FUEL ECONOMY

Transmission	Dry Weight w/Clutch & Oil Cooler (lbs.)	Torque Capacity (ft-lb)	Transmission Housing Body	Maximum Highway Weight (lbs.)	Downhill Economy Mode	Topography Optimization Capability	Driver Controlled Economy & Performance Modes
Volvo I-Shift Direct (12-speed)	719	1900	Aluminum	110,000**	Eco-Roll	I-See®	✓
Volvo I-Shift Overdrive (12-speed)	719	1900	Aluminum	110,000**	Eco-Roll	I-See®	✓
Volvo I-Shift Direct (13-speed)	805	1900	Aluminum	110,000**	Eco-Roll	I-See®	✓
Volvo I-Shift Overdrive (13-speed)	805	1900	Aluminum	110,000**	Eco-Roll	I-See®	✓
Eaton Cummins Endurant Direct Drive	657*	1850	Aluminum	80,000	Neutral Coast Mode	Predictive Cruise and Look Ahead	✗
Eaton Cummins Endurant Overdrive	657*	1850	Aluminum	110,000	Neutral Coast Mode	Predictive Cruise and Look Ahead	✗
Detroit DT12 Direct	639	1750	Aluminum	80,000	E-Coast	Intelligent Powertrain Management	✓
Detroit DT12 Overdrive	639	1750	Aluminum	110,000	E-Coast	Intelligent Powertrain Management	✓

* Wet weight

** Capable of up to 220,000 GCW that includes Heavy Duty or Severe Duty Transmission Warranty



Greater torque, greater value

With a maximum torque capacity of 1,900 lb-ft, I-Shift offers the highest ratings in the industry for standard on-highway configurations. Paired with a Premium Shifter and the Performance Plus software package, I-Shift provides your driver with more tools to get the job done.

I-Shift offers the industry's highest gear ratio in the first five gears, providing greater torque at

the start, when you need it most. It offers the industry's only Power Launch and Rock free features as well.

Volvo provides the option to upgrade torque output for the engine with a software update that doesn't require physically changing your transmission. And only Volvo offers application specific software packages for the transmission.

DRIVER PRODUCTIVITY

Transmission	Torque Capacity (ft-lb)	Software-based Torque Output Upgrades Available	Gear Ratio	Forward Gears	Reverse Gears	Power Launch Feature	Ability to Rock Free
Volvo I-Shift Direct (12-speed)	1900	✓	14.94:1	12	4	✓	✓
Volvo I-Shift Overdrive (12-speed)	1900	✓	15.04:1	12	4	✓	✓
Volvo I-Shift Direct (13-speed)	1900	✓	19.38:1	13	6	✓	✓
Volvo I-Shift Overdrive (13-speed)	1900	✓	22.35:1	13	6	✓	✓
Eaton Cummins Endurant Direct Drive	1850	×	14.43:1	11	2	×	×
Eaton Cummins Endurant Overdrive	1850	×	18.85:1	12	2	×	×
Detroit DT12 Direct	1750	×	14.93:1	12	4	×	×
Detroit DT12 Overdrive	1750	×	14.96:1	12	4	×	×

Everything at your fingertips

I-Shift transmission and Driver Information Display controls improve performance and reduce in-cab distractions. When drivers are experiencing heavy traffic, I-Shift improves safety by minimizing the need to touch the accelerator thanks to Idle Driving mode.

Volvo offers a basic or a premium shifter option. The premium shifter comes with multiple software packages to choose from and both shifters provide simplified

controls, enhancing driver safety and performance.

I-Shift is the only transmission that features Runaway Control to help the driver operate more safely on downhill routes.

In testing sponsored by Volvo Trucks, the 12-speed I-Shift is able to downshift and upshift in smaller, optimum steps, an average of 28 percent between gears.

PRODUCTIVITY AND SAFETY

Transmission	Shifter Position	Gear Selector Positions	Kick Down	Grade Sensor	Monitored by Remote Diagnostics	Runaway Control
Volvo I-Shift Direct (12-speed)	Seat Mounted or Dash Mounted	Reverse, Neutral, Drive, Manual	✓	✓	✓	✓
Volvo I-Shift Overdrive (12-speed)	Seat Mounted or Dash Mounted	Reverse, Neutral, Drive, Manual	✓	✓	✓	✓
Volvo I-Shift Direct (13-speed)	Seat Mounted or Dash Mounted	Reverse, Neutral, Drive, Manual	✓	✓	✓	✓
Volvo I-Shift Overdrive (13-speed)	Seat Mounted or Dash Mounted	Reverse, Neutral, Drive, Manual	✓	✓	✓	✓
Eaton Cummins Endurant Direct Drive	Seat Mounted or Dash Mounted	Reverse, Neutral, Drive, Manual	✓	✓	✓	×
Eaton Cummins Endurant Overdrive	Seat Mounted or Dash Mounted	Reverse, Neutral, Drive, Manual	✓	✓	✓	×
Detroit DT12 Direct	Column Mounted Only	Reverse, Neutral, Drive, Manual	✓	✓	✓	×
Detroit DT12 Overdrive	Column Mounted Only	Reverse, Neutral, Drive, Manual	✓	✓	✓	×

Uptime comes standard

Superior connectivity has made I-Shift the hands-down leader in Uptime. Volvo offers dozens of over-the-air software upgrades and parameter updates for the powertrain. Updates that previously required a dealer visit can now be done in minutes. It's the first true over-the-air solution from a truck OEM.

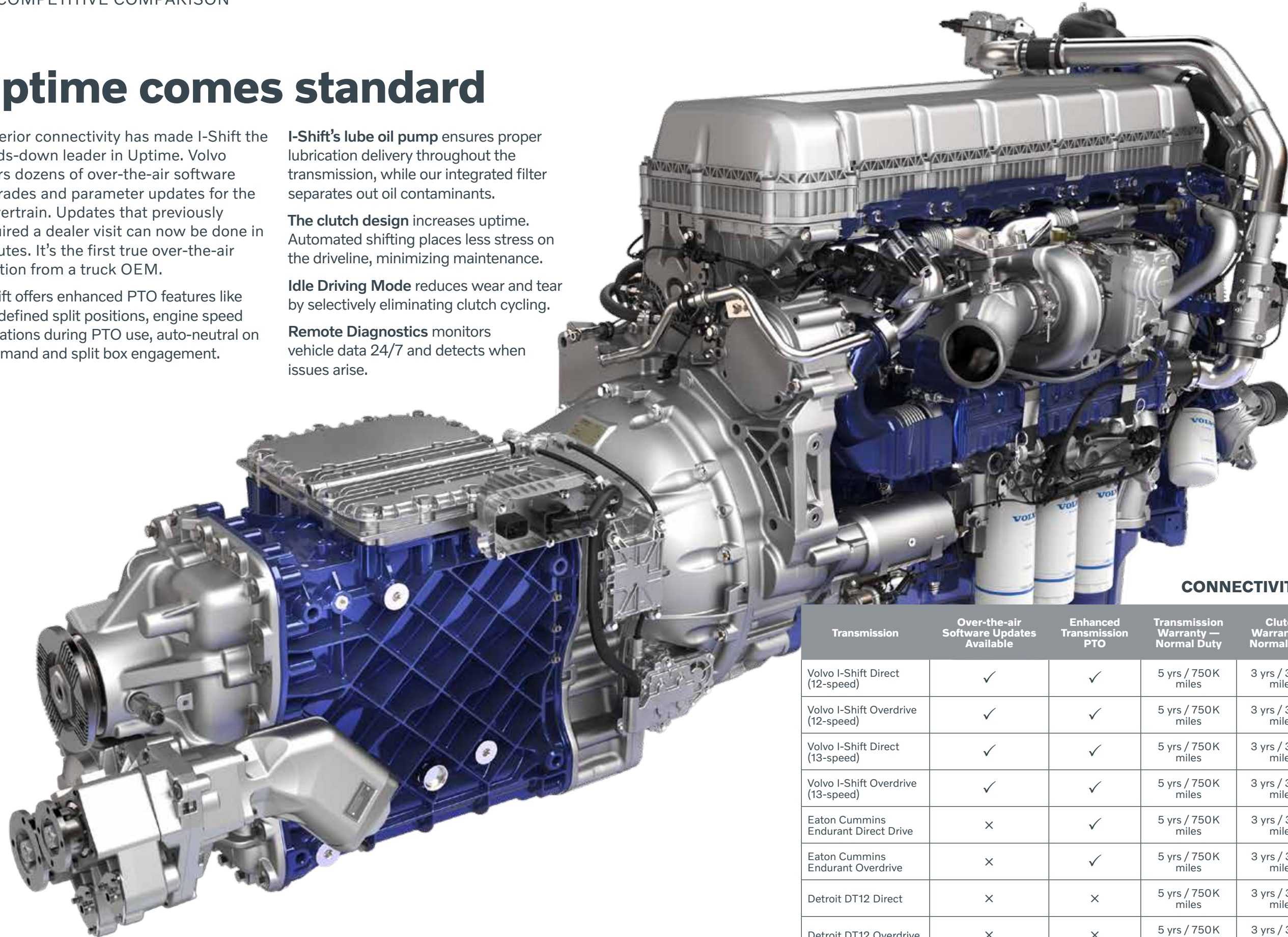
I-Shift offers enhanced PTO features like pre-defined split positions, engine speed limitations during PTO use, auto-neutral on command and split box engagement.

I-Shift's lube oil pump ensures proper lubrication delivery throughout the transmission, while our integrated filter separates out oil contaminants.

The clutch design increases uptime. Automated shifting places less stress on the driveline, minimizing maintenance.

Idle Driving Mode reduces wear and tear by selectively eliminating clutch cycling.

Remote Diagnostics monitors vehicle data 24/7 and detects when issues arise.



CONNECTIVITY AND MAINTENANCE

Transmission	Over-the-air Software Updates Available	Enhanced Transmission PTO	Transmission Warranty — Normal Duty	Clutch Warranty — Normal Duty	Oil Drain Interval	Oil Volume (Quarts)
Volvo I-Shift Direct (12-speed)	✓	✓	5 yrs / 750K miles	3 yrs / 300K miles	5 yrs / 500K miles	16.2
Volvo I-Shift Overdrive (12-speed)	✓	✓	5 yrs / 750K miles	3 yrs / 300K miles	5 yrs / 500K miles	16.2
Volvo I-Shift Direct (13-speed)	✓	✓	5 yrs / 750K miles	3 yrs / 300K miles	5 yrs / 500K miles	16.2
Volvo I-Shift Overdrive (13-speed)	✓	✓	5 yrs / 750K miles	3 yrs / 300K miles	5 yrs / 500K miles	16.2
Eaton Cummins Endurant Direct Drive	✗	✓	5 yrs / 750K miles	3 yrs / 350K miles	5 yrs / 750K miles	8
Eaton Cummins Endurant Overdrive	✗	✓	5 yrs / 750K miles	3 yrs / 350K miles	5 yrs / 750K miles	8
Detroit DT12 Direct	✗	✗	5 yrs / 750K miles	3 yrs / 350K miles	2 yrs / 200K miles	15.4
Detroit DT12 Overdrive	✗	✗	5 yrs / 750K miles	3 yrs / 350K miles	2 yrs / 200K miles	15.4

I-SHIFT COMPETITIVE COMPARISON

SEVERE DUTY	Volvo I-Shift for Severe Duty	Volvo I-Shift for Severe Duty	Allison 4000 RDS Series	Allison 4500 RDS Series	Allison 4700 RDS Series	Eaton UltraShift Plus® VMS	Eaton UltraShift Plus® MHP	Eaton UltraShift Plus® MXP
	Direct	Overdrive	Automatic	Automatic	Automatic	Overdrive	Overdrive	Overdrive
Max Torque Capacity (lb-ft)	1900	1900	1850	1650	1850	1750	2250	2250
Overall Gear Ratio	14.94	15.04	13.27*	16.98*	28.84*	35.73	16.84	19.73
Forward Gears	12	12	6	6	7	11	13	18
Reverse Gears	4	4	1	1	2	2	2	4
Dry Weight with Clutch and Oil Cooler (lbs.)	720	720	831	831	831	978	978	978
Max Highway Weight (1k lbs.)	220**	220**	Unlimited***	Unlimited***	Unlimited***	110	140	Unlimited***
Transmission Body Housing	Aluminum	Aluminum	Aluminum	Aluminum	Aluminum	Cast Iron	Steel	Steel
Transmission Warranty — Heavy Duty	3 yrs / 250k Miles	3 yrs / 250k Miles	3 yrs	3 yrs	2 yrs	3 yrs	3 yrs	3 yrs
Clutch Warranty — Heavy Duty	3 yrs / 250k Miles	3 yrs / 250k Miles	No Clutch	No Clutch	No Clutch	3 yrs	3 yrs	3 yrs
Oil Volume (quarts)	16.2	16.2	48	48	51	14	14	14
Monitored by Remote Diagnostics	✓	✓	×	×	×	×	×	×
Remote Programming OTA	✓	✓	×	×	×	×	×	×
Hill Start Assist	✓	✓	×	×	×	✓	✓	✓
Ability to Upgrade Engine Torque	✓	✓	×	×	×	×	×	×
Ability to Rock Free	✓	✓	✓	✓	✓	×	×	×
Power Launch	✓	✓	✓	✓	✓	×	×	×
Kick Down	✓	✓	✓	✓	✓	×	×	×
Grade Sensor	✓	✓	✓	✓	✓	✓	✓	✓
Performance Software	✓	✓	✓	✓	✓	×	×	×
Manual Mode	✓	✓	✓ (limited)	✓ (limited)	✓ (limited)	✓	✓	✓
Ability to Lock in a Gear	✓	✓	Only 1st or Reverse	Only 1st or Reverse	Only 1st or Reverse	✓	✓	✓
Enhanced Transmission PTO	✓	✓	✓	✓	✓	✓	✓	✓

* Mechanical ratio multiplied by max stall ratio 2.42 to determine gear calculations
 ** Capable of up to 220k GCW that includes Heavy Duty and Severe Duty Transmission Warranty
 *** If certain conditions are met



I-Shift for Severe Duty

The new and improved I-Shift for Severe Duty transmission comes standard in all Volvo VHD and VNX models and is designed for on-and-off-road work in construction and other applications requiring frequent shifting. The latest generation of I-Shift Severe Duty includes upgraded hardware and software, improved engaging sleeves for greater durability and a new countershaft brake for improved performance and smoother shifting.

The electronic control unit can handle any load and any road, shifting perfectly every time.

I-Shift helps slow driveline wear, reduce noise, extend transmission life, and lower maintenance costs.

I-Shift Severe Duty includes a “rock free” feature that can get a vehicle moving when stuck in soft soil, mud or snow. When more torque is needed, Power Launch allows the engine to rev as high as 1300 rpm in the lowest gear.

Shift your expectations of low-speed control

When steep-grade startability and low-speed maneuverability are critical, I-Shift with Crawler Gears is the answer for maximum GCW loads. The crawler option adds either one or two gears to the I-Shift for Severe Duty, a low gear and ultra-low gear, for low-speed control.

For heavy-haul over the road applications, this I-Shift offers the highest weight capacity in an

automated manual transmission. Up to 220,000 pounds.

On a jobsite, I-Shift with Crawler Gears can enable controlled forward and reverse travel at extremely slow speeds, perfect for paving and curbing applications.



LOW SPEED

	Volvo I-Shift with Crawler Gears	Volvo I-Shift with Crawler Gears	Allison 4000 RDS Series	Allison 4500 RDS Series	Allison 4700 RDS Series	Eaton UltraShift Plus® VMS	Eaton UltraShift Plus® MHP	Eaton UltraShift Plus® MXP
	Overdrive	Overdrive	Automatic	Automatic	Automatic	Overdrive	Overdrive	Overdrive
Max Torque Capacity (lb-ft)	1900	1900	1850	1650	1850	1750	2250	2250
Overall Gear Ratio	22.35	41.08	13.27*	16.98*	28.84*	35.73	16.84	19.73
Forward Gears	13	14	6	6	7	11	13	18
Reverse Gears	6	6	1	1	2	2	2	4
Dry Weight with Clutch and Oil Cooler (lbs.)	805	809	831	831	831	978	978	978
Max Highway Weight (1k lbs.)	220**	220**	Unlimited***	Unlimited***	Unlimited***	110	140	Unlimited***
Transmission Body Housing	Aluminum	Aluminum	Aluminum	Aluminum	Aluminum	Cast Iron	Steel	Steel
Transmission Warranty — Heavy Duty	3 yrs / 250k Miles	3 yrs / 250k Miles	3 yrs	3 yrs	2 yrs	3 yrs	3 yrs	3 yrs
Clutch Warranty — Heavy Duty	3 yrs / 250k Miles	3 yrs / 250k Miles	No Clutch	No Clutch	No Clutch	3 yrs	3 yrs	3 yrs
Oil Volume (quarts)	17.9	17.9	48	48	51	14	14	14
Monitored by Remote Diagnostics	✓	✓	×	×	×	×	×	×
Remote Programming OTA	✓	✓	×	×	×	×	×	×
Hill Start Assist	✓	✓	×	×	×	✓	✓	✓
Ability to Upgrade Engine Torque	✓	✓	×	×	×	×	×	×
Ability to Rock Free	✓	✓	✓	✓	✓	×	×	×
Power Launch	✓	✓	✓	✓	✓	×	×	×
Kick Down	✓	✓	✓	✓	✓	×	×	×
Grade Sensor	✓	✓	✓	✓	✓	✓	✓	✓
Performance Software	✓	✓	✓	✓	✓	×	×	×
Manual Mode	✓	✓	✓ (limited)	✓ (limited)	✓ (limited)	✓	✓	✓
Ability to Lock in a Gear	✓	✓	Only 1st or Reverse	Only 1st or Reverse	Only 1st or Reverse	✓	✓	✓
Enhanced Transmission PTO	✓	✓	✓	✓	✓	✓	✓	✓

* Mechanical ratio multiplied by max stall ratio 2.42 to determine gear calculations
 ** capable of up to 220k GCW that includes Heavy Duty and Severe Duty Transmission Warranty
 *** If certain conditions are met

VOLVO

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Some vehicles shown with optional equipment.

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