



LT Academy

UPTIME

Information accurate at time of release



IT'S UPTIME™

Agenda

- UPTIME
 - What is Uptime?
 - Uptime Improvements
 - General
 - Exterior
 - Lighting
 - HVAC
 - Serviceability Improvements
 - Serviceability Index
 - Exterior
 - Interior, HVAC
 - Powertrain

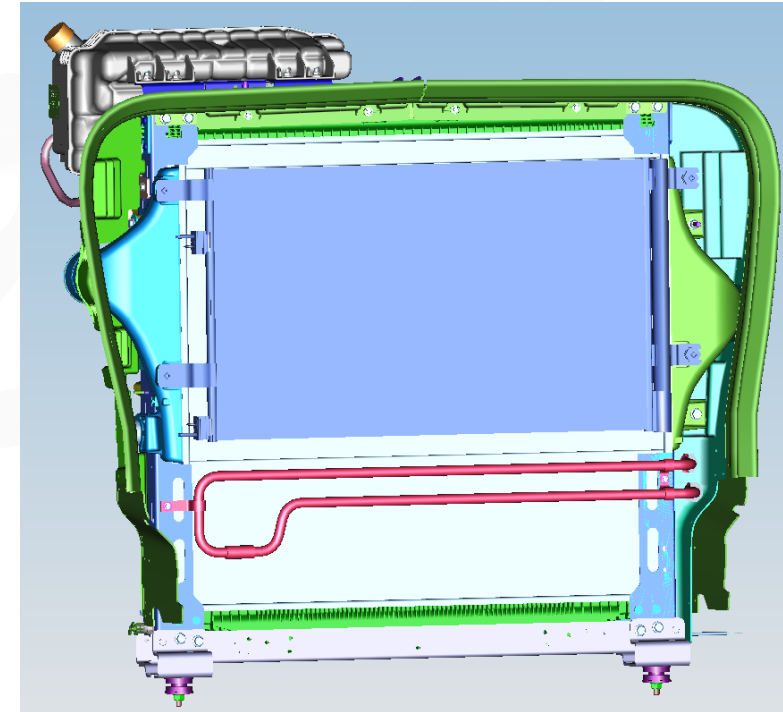
What is Uptime?

- Uptime contributors
 - Highest uptime and reliability
 - Lower R/1000
 - Improved serviceability
 - Quicker repairs



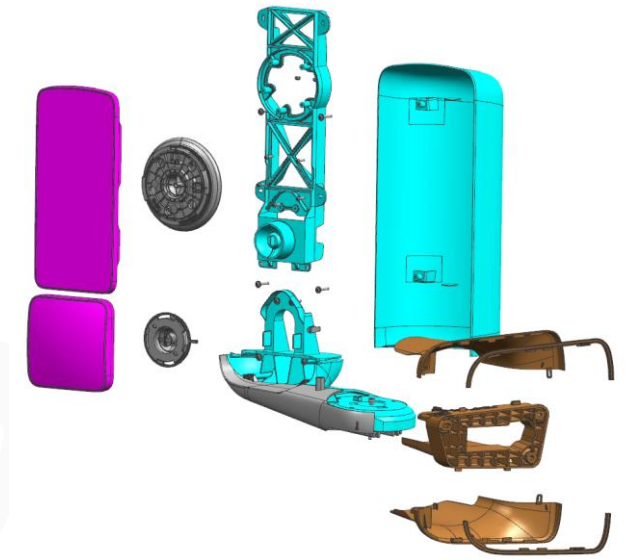
Uptime

- After treatment device
 - New single can system, large improvement over EGR, incremental improvement over dual can SCR
- Cab wiring
 - All new harnessing, with new in-cab PDM
 - Improved termination and modular termination blocks
- Cooling module
 - New ground up design
 - Low temperature radiator eliminated for International's A26 engine
- Cowl tray
 - Improved sealing and drain tubes, keeps hot under hood air from entering the HVAC, extending HVAC life



Uptime

- Indirect vision
 - New more reliable mirror
 - Extensive supplier and in house testing to assure quality
- Operator controls & instrumentation
 - New J1939 based electrical architecture with new switches and HMI Components
 - J1939 Allows diagnostic capabilities (improved fault detection and device definition), reducing repair time
 - New Switches have better Visibility, improved scratch resistance
- Skirt strips
 - Very flexible skirt strips reduce abrasion when in contact with pavement, extending life



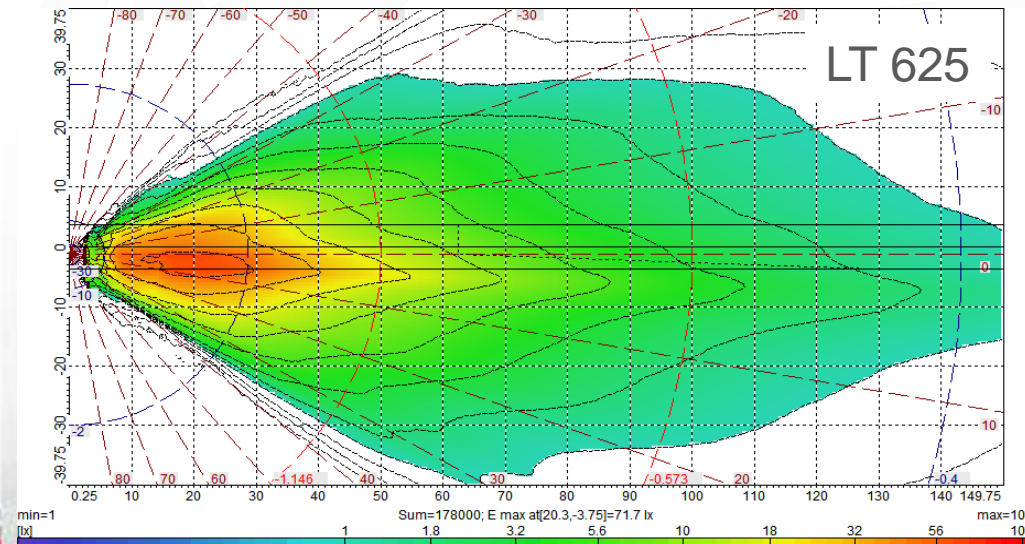
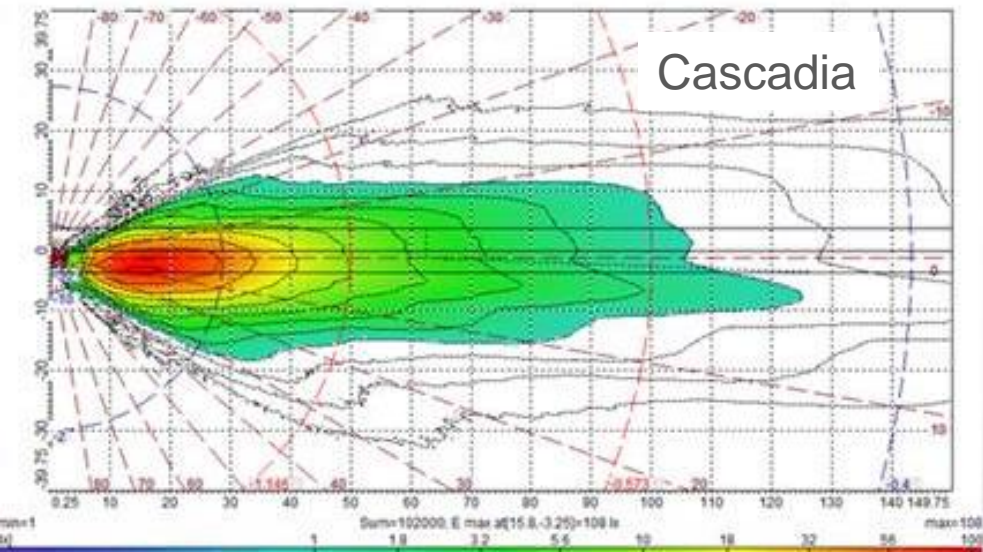
Uptime

- Hood
 - Air passages in the hood deliver air to the engine air filter
 - These passages separate liquid water before reaching the air filter
 - Engine is protected against water ingestion even during power washing and truck wash
- Inner fender
 - Stiffer mounting adds robustness against snow, ice, and road debris
- Forward lighting
 - Head lights and fog lights use polycarbonate lenses for superior impact resistance
 - Improved fog light sealing for long life



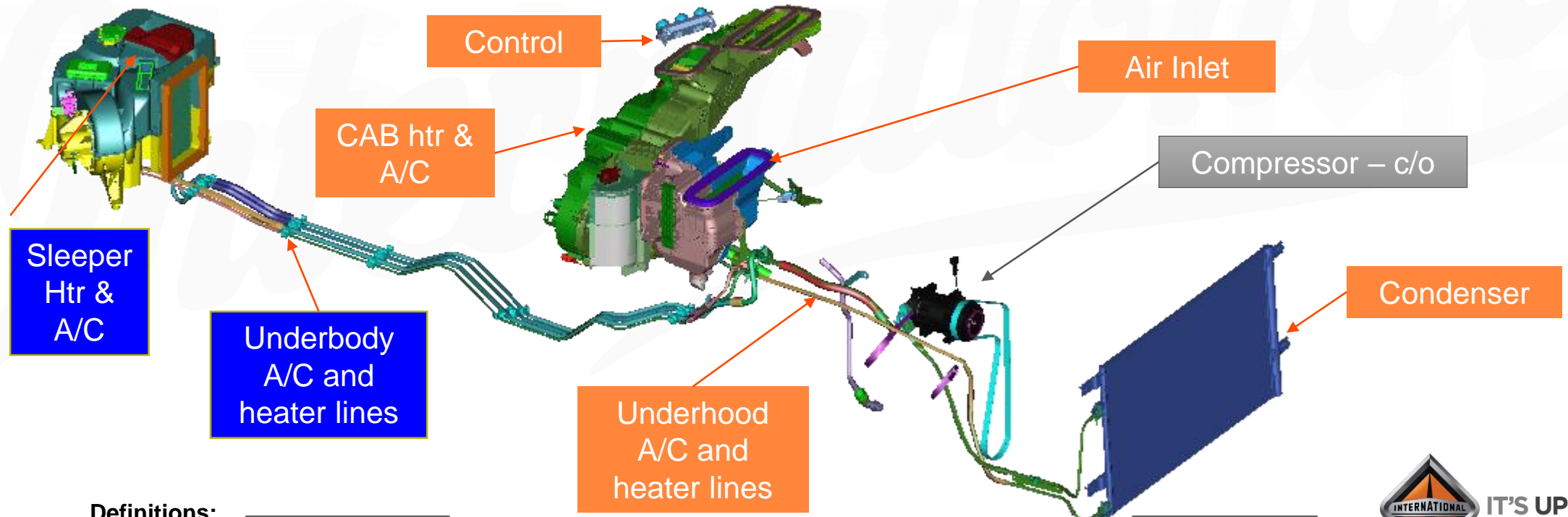
Forward Lighting

- Headlights and fog lights
 - Standard LED headlights with improved optics deliver best in class light pattern and intensity up to 900 Lumens
 - Headlights tightly mounted in the hood to stabilize light pattern on the road
 - Halogen available as low cost option
 - New LED and new halogen fog lights



Uptime

- HVAC system
 - Ground up design of entire system, except for the compressor
 - Improved performance and Uptime, in both durability and serviceability



Definitions:

TXV Change to Face Seal

Carry-Over

Imported -
Relocated

Modified

New

Deleted



IT'S UPTIME™

Uptime

- HVAC blower

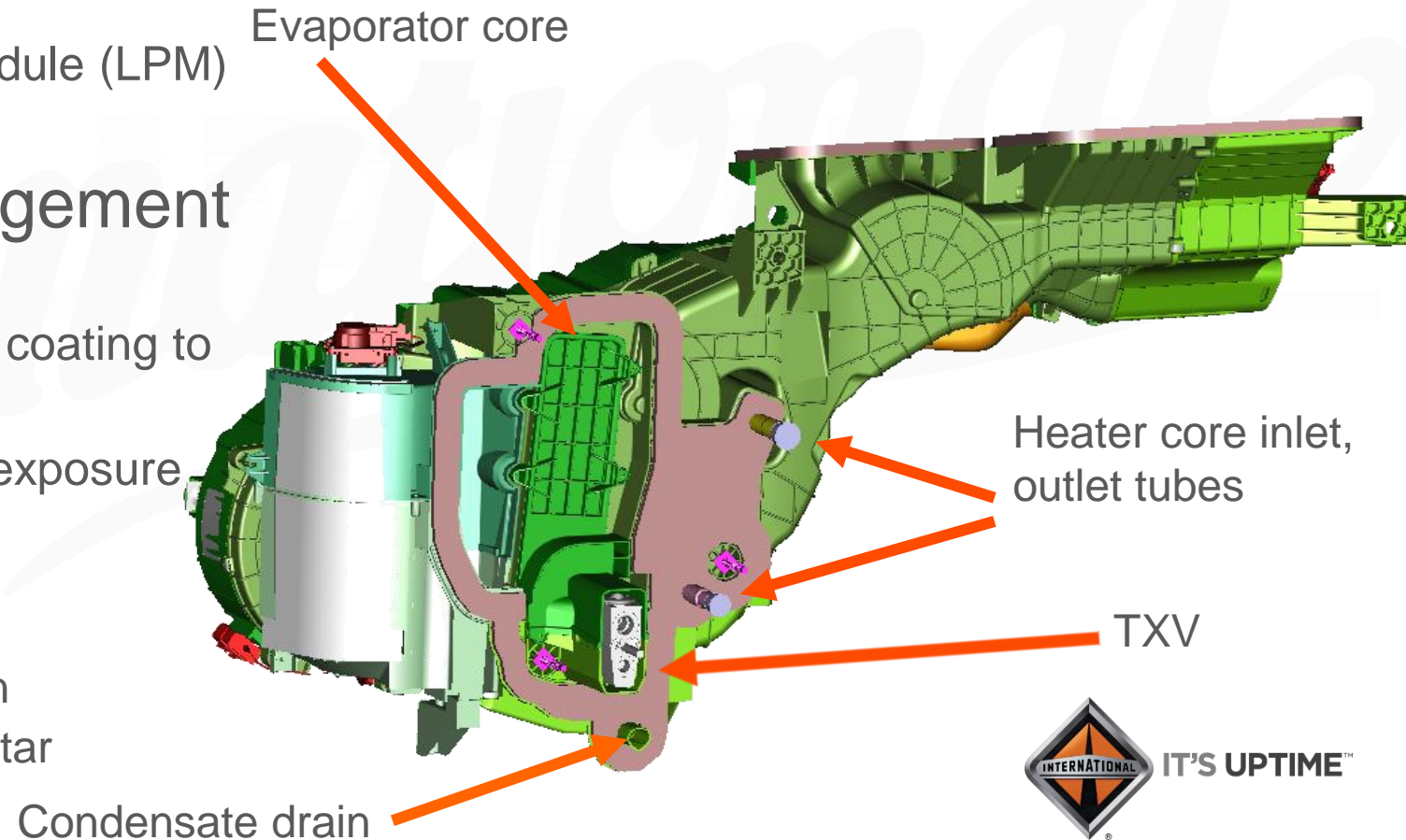
- Brushless blower motor upstream
 - 3x longer life than ProStar, with diagnostics
- Upstream of the evaporator
- Blower controller Linear Power Module (LPM) eliminated

- HVAC condensation management

- Actuators have drip loops
- All circuit boards have a protective coating to shed water
- Brushless motor capable of water exposure

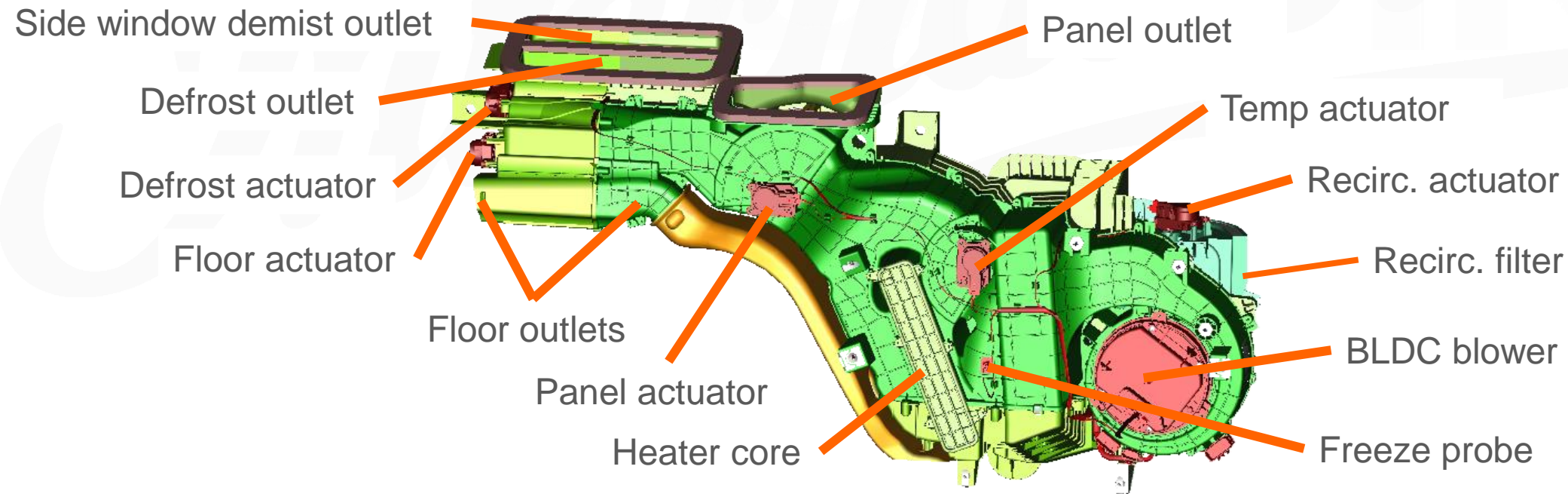
- HVAC doors

- Direct drive doors
 - Simplest and most robust design
 - 3x longer actuator life than ProStar



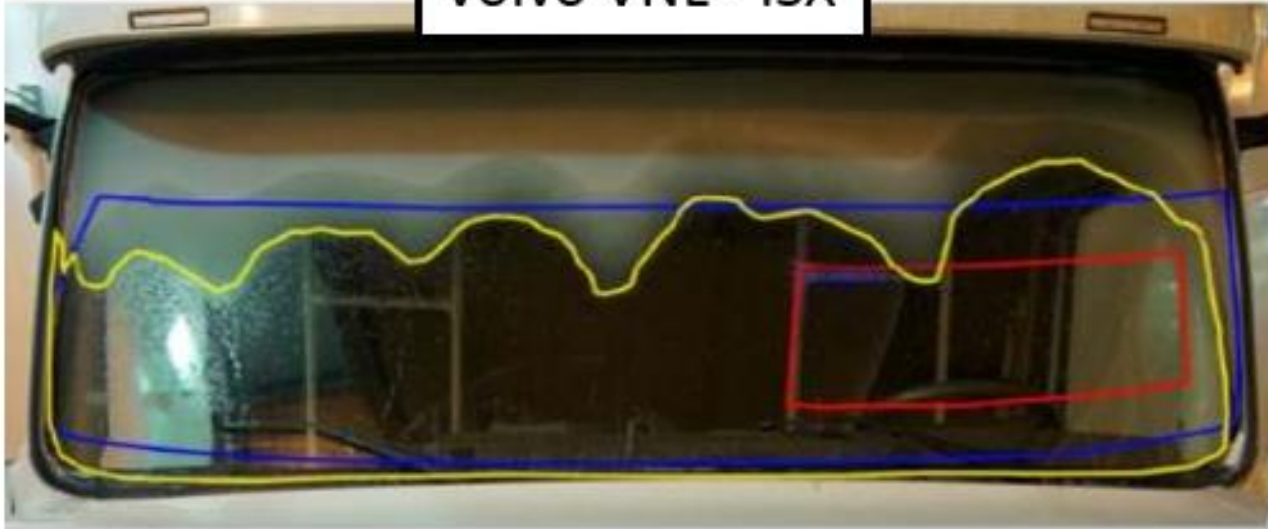
Enablers for improved LT defrost performance

- HVAC module and ducts
 - Increased air flow to windshield and side windows
 - Improved distribution
 - Improved heater core capacity
 - Improved panel airflow distribution

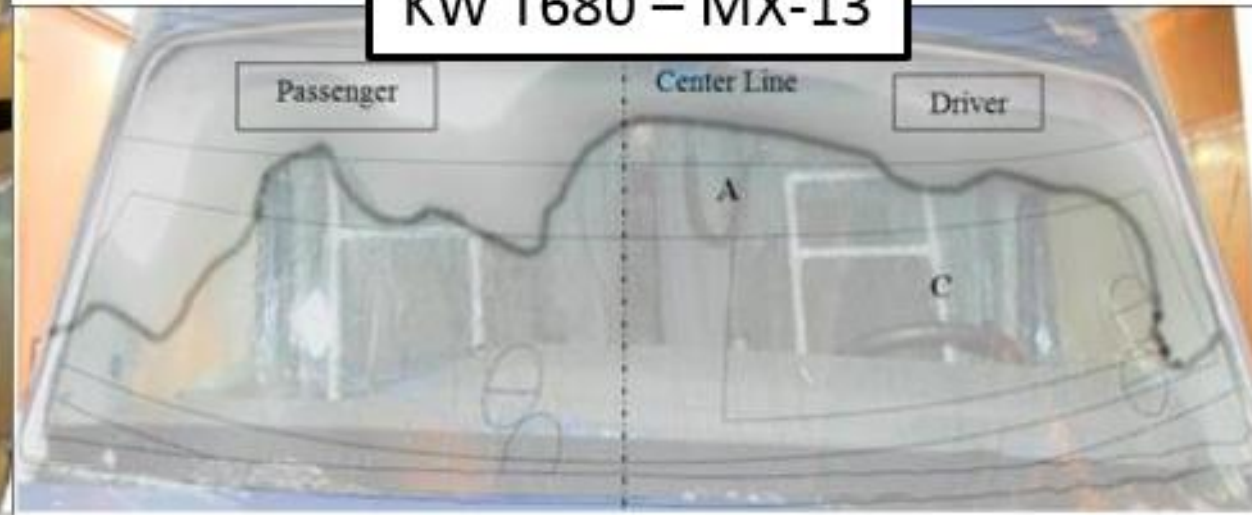


ProStar competitive defrost performance (after 30 Minutes)

Volvo VNL - ISX



KW T680 - MX-13



FL Cascadia - ISX



ProStar - N13



LT defrost performance

- Windshield
- LT Best In Class defrost performance
- Featuring “max defrost” button



ProStar

88 l/s Total Defrost Airflow

	Results	Target
Zone A:	28%	85%
Zone C:	38%	99%



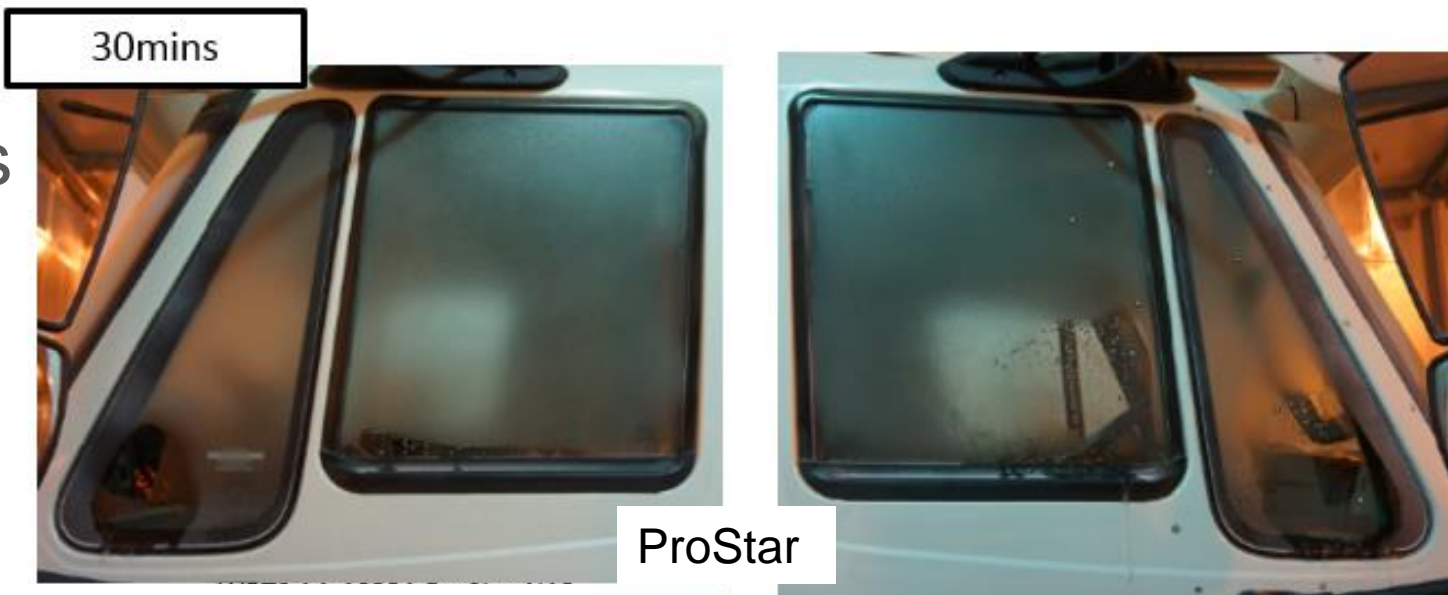
LT

108 l/s Total Defrost Airflow

	Results	Target
Zone A:	100%	85%
Zone C:	100%	99%

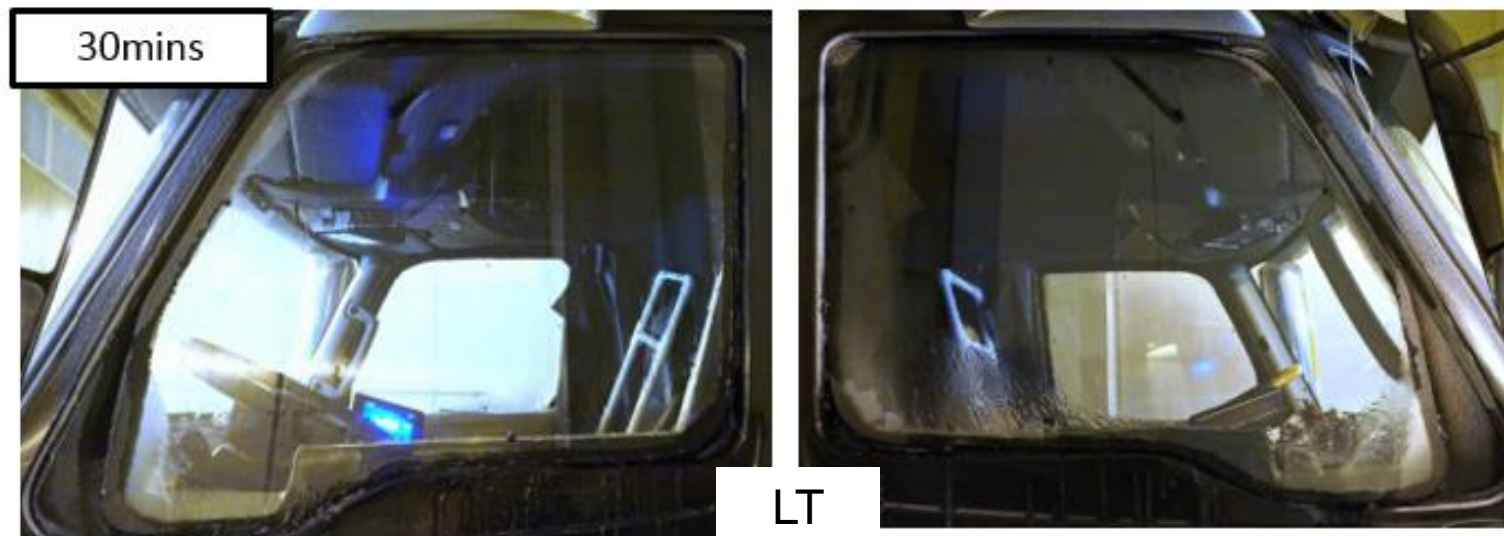
LT defrost performance

- Side windows
 - Best in class defrost performance.
 - Featuring “max defrost” button



Side Mirror – 30min		
	Results	Target
Dr:	0%	70%
Psgr:	36%	75%

Side Window – 45min		
	Results	Target
Dr:	22%	65%
Psgr:	62%	70%

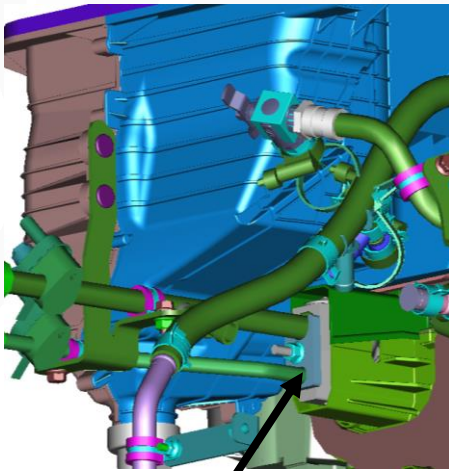


Side Mirror – 30min		
	Results	Target
Dr:	100%	70%
Psgr:	99%	75%

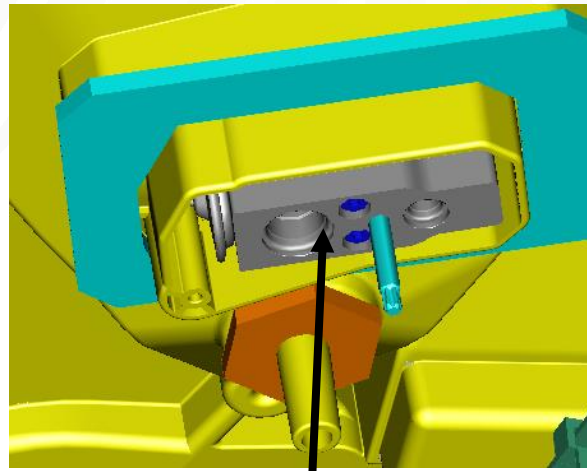
Side Window – 45min		
	Results	Target
Dr:	100%	65%
Psgr:	100%	70%

Uptime

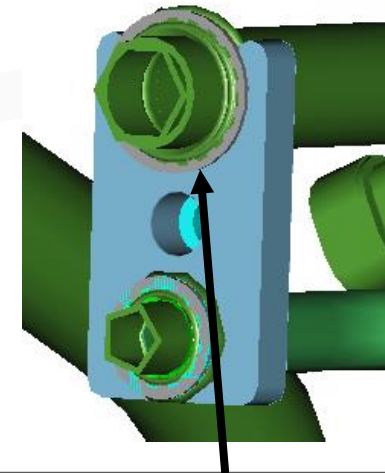
- HVAC refrigerant seals
 - Face seal joints implemented at cab and sleeper TXV
 - More robust during assembly and service
 - Lubricant not required
 - Designed to eliminate refrigerant leaks that plagued ProStar
 - Integrated receiver drier (IRD)
 - Eliminated refrigerant connections on ProStar



Cab TXV



Sleeper TXV



A/C fittings to TXV

Uptime

- HVAC low refrigerant sensor
 - How it works
 - Sensor measures pressure and temperature, infers refrigerant level
 - Sensor reports a leak early, sends a fault code
 - Benefit
 - Operating the HVAC system low on refrigerant can cause a costly compressor failure
 - Leak can be repaired before a compressor fails, reducing repair cost and down time

Uptime

- HVAC in LT adopts SAE J1939 controls and improves diagnostics
 - What is it
 - J1939 is a method of communicating between electronic systems on the vehicle
 - It is used for diagnostics
 - How it works
 - HVAC diagnostics will detect shorts and opens for actuators
 - Lights will flash briefly, faulted actuator will stop functioning, and a fault code will be logged
 - Benefit
 - Allows diagnostic capabilities (improved fault detection and device definition), reducing repair time
 - LT uses J1939 for HVAC, ProStar did not
 - Manual recalibration possible
 - Press recirculation button and max defrost button for 5 seconds, blower off, full hot



Serviceability

International



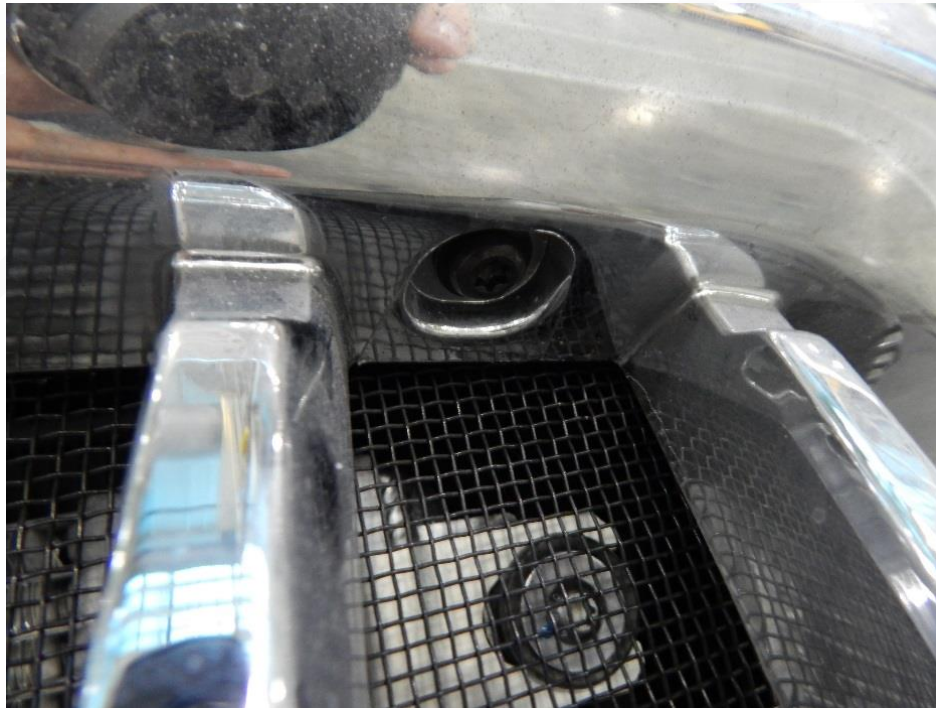
IT'S UPTIME™

Excerpt of complete serviceability index

Description of Maintenance Item		ProStar (N13)	Cascadia (DD15)	KenWorth (MX)	Volvo (ISX)	Horizon (2017)
Hood tilt adequate to allow access to engine with inner fender splash panels in place.	3.22	Uncompetitive	BIC	Competitive	Competitive	Competitive
Grille removal by single individual, with common tools and no component interference.	2.22	BIC	Competitive	Competitive	Competitive	BIC
Headlamp/ turn signal/ side marker lamp bulb accessibility, change capability without tools or component interference.	3.67	BIC	Competitive	Uncompetitive	Competitive	BIC
Sub-Section 5: Engine						
Oil fill identification/ accessibility with no component interference, add oil without tools.	3.78	BIC	Competitive	Uncompetitive	Competitive	BIC
Fuel system primer pump accessibility and ease of operation with no component interference, without tools.	3.89	Competitive	Competitive	Uncompetitive	Uncompetitive	BIC
Drive belt tensioner identification/ accessibility range of travel indicator visual check capability with no component interference.	3.89	Uncompetitive	BIC	Competitive	Competitive	Competitive
ECM accessibility and removal with no component interference.	4.89	BIC	Uncompetitive	Competitive	Competitive	BIC
Sub-Section 7: Chassis-Non-Engine Related						
Skirt and Battery removal time with single, common socket.	3.22	Uncompetitive	Competitive	Competitive	BIC	Competitive
DEF tank lines quick-connect fittings installation, accessibility, and understandability.	3.00	Competitive	Competitive	Uncompetitive	Competitive	BIC
Section 2: Life-Cycle Maintenance & Repair Items						
ECM wiring harness accessibility w/ sufficient harness length to allow connection of diagnostic ECM without removal of production-installed unit.	3.33	BIC	Uncompetitive	Competitive	Competitive	BIC
EGR valve/ cooler assembly accessibility/ removal capability with no component interference, with common size sockets/ wrenches.	4.22	Uncompetitive	Competitive	Uncompetitive	Uncompetitive	Competitive
Rocker arm cover accessibility/ removal with no component interference, with common size sockets/ wrenches.	3.44	Uncompetitive	Competitive	Competitive	Competitive	Competitive
HVAC compressor accessibility/ removal capability as single elements, with minimal component interference, with common size sockets/ wrenches.	3.56	Uncompetitive	BIC	Competitive	Competitive	Competitive
Power Steering hydraulic pump accessibility/ removal capability as single elements, with minimal component interference, with common size sockets/ wrenches.	3.11	Uncompetitive	Uncompetitive	Competitive	BIC	Competitive
Engine exhaust manifold accessibility/ removal capability with minimal component interference, with common size sockets/wrenches.	3.89	Uncompetitive	BIC	Competitive	Competitive	Competitive
Engine turbocharger accessibility/ removal capability as single elements, with minimal component interference, with common size sockets/ wrenches.	4.00	Uncompetitive	BIC	Competitive	Competitive	Competitive
Engine intercooler accessibility/ removal capability as single elements, with minimal component interference, with common size sockets/wrenches.	3.22	Uncompetitive	Competitive	Competitive	Competitive	Competitive
Engine coolant pump accessibility/ removal capability as single element with minimal component interference, with common size sockets/ wrenches.	3.11	Uncompetitive	Competitive	Competitive	Competitive	Competitive
Cooling system thermostats, hoses, valves, switches accessibility/ removal capability as single elements, with minimal component interference, with common size sockets/ wrenches.	3.33	Competitive	Competitive	Competitive	Competitive	BIC
Cab door hinge accessibility/ visual inspection capability/ removal and reinstallation capability without component interference, with common size sockets/ wrenches.	2.33	BIC	Competitive	Competitive	Competitive	BIC

Improved serviceability

- Grille fasteners / Bug screen
 - Hidden grille fasteners are easy to remove / re-useable fasteners
- Headlights
 - Tool free bulb replacement



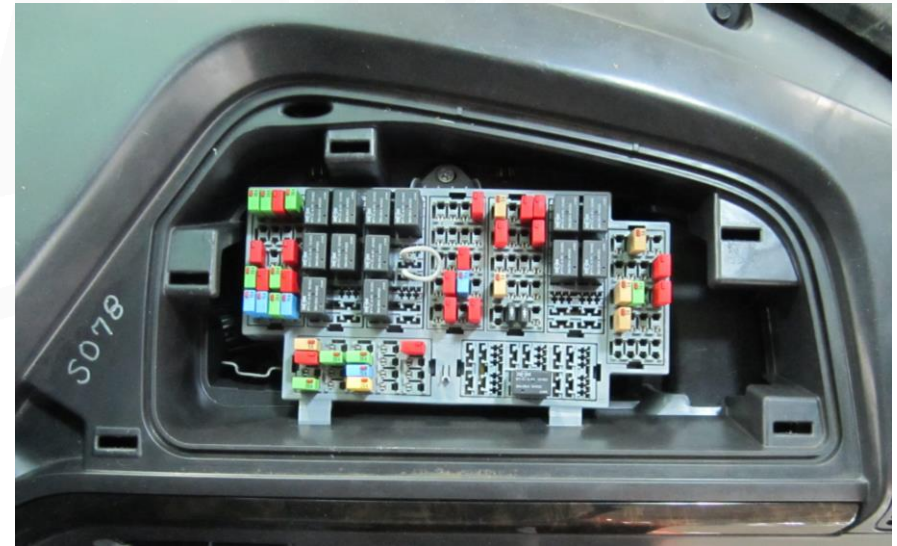
Improved serviceability

- Pedestal mirrors
 - Only three mounting bolts
- Wire harness connector at the mirror base
- Easy glass replacement
 - No tools required



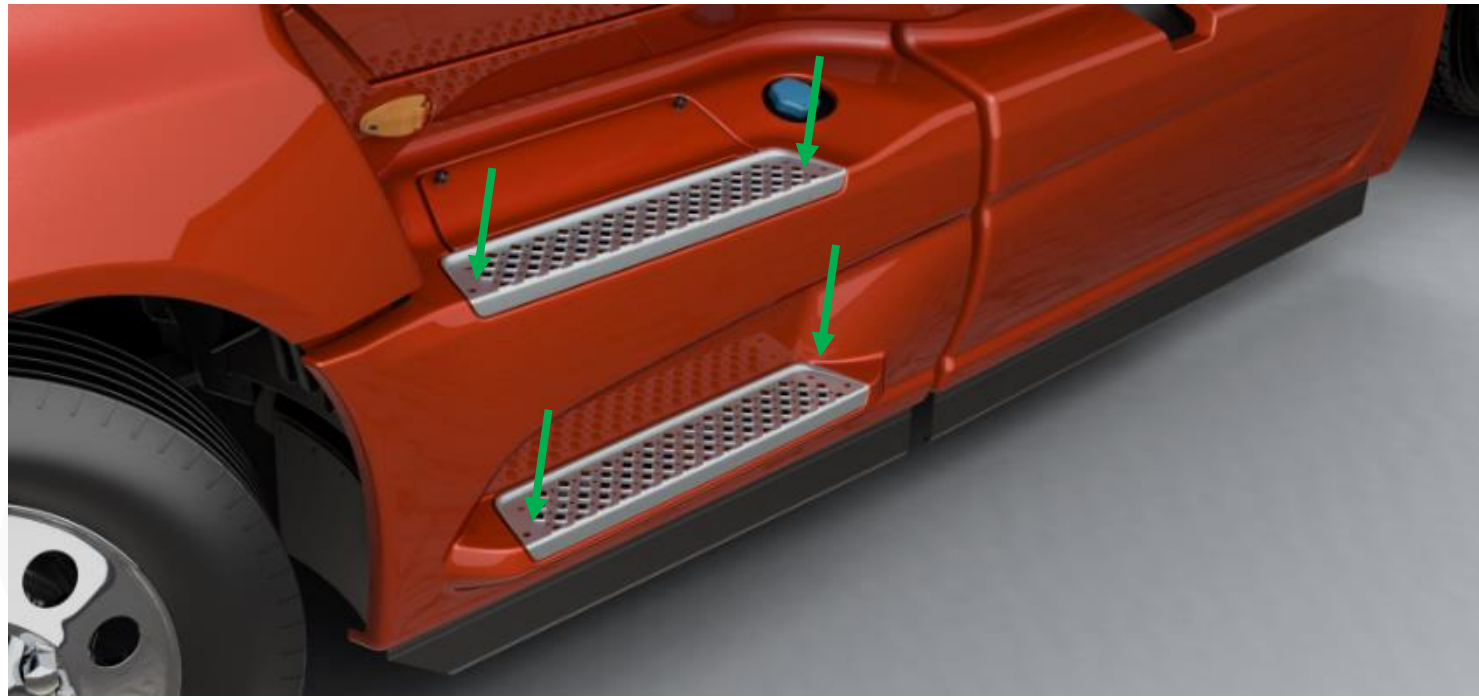
Improved serviceability

- Fuse panel
 - Easy access fuse panel in the passenger side dash
 - Gutter around the panel protects electronics from spilled liquids



Improved serviceability

- Skirts
 - Remove four bolts with a common tool to remove skirts, improving serviceability



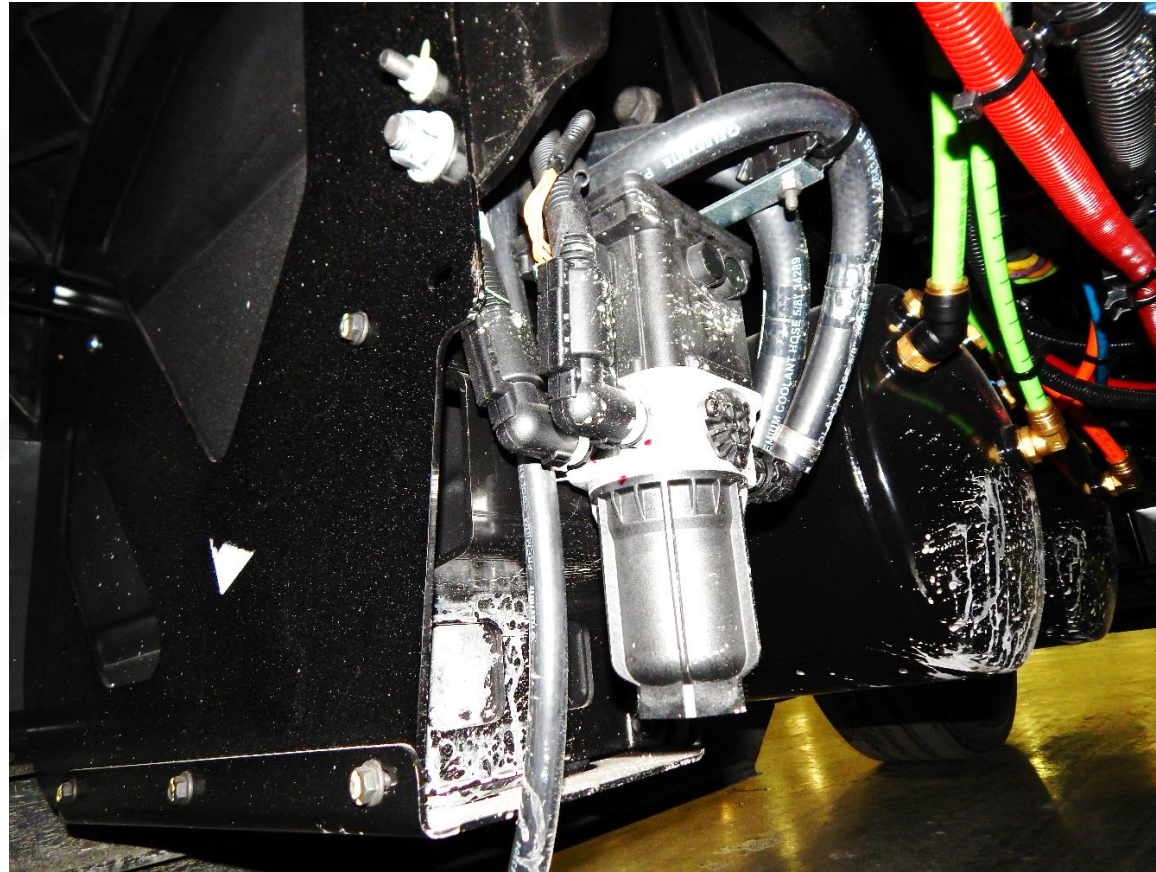
Improved serviceability

- After treatment
 - Cummins Emissions Solutions single canister SCR after treatment
 - A26 and X15
 - Larger size used for X15 Performance Series
 - Single canister design features a smaller, simpler, lighter weight, and easier to service architecture than twin canister used on ProStar



Improved serviceability

- DEF module and DEF filter
 - Easy access for quick repairs
 - Easy access to DEF filter for quick replacement



Improved serviceability

- HVAC
 - Automotive style integrated receiver drier condenser
 - Industry leading
 - Improves service ability
 - To service desiccant and filter
 - Remove snap ring
 - Pull out Komo plug, filter, and desiccant bag

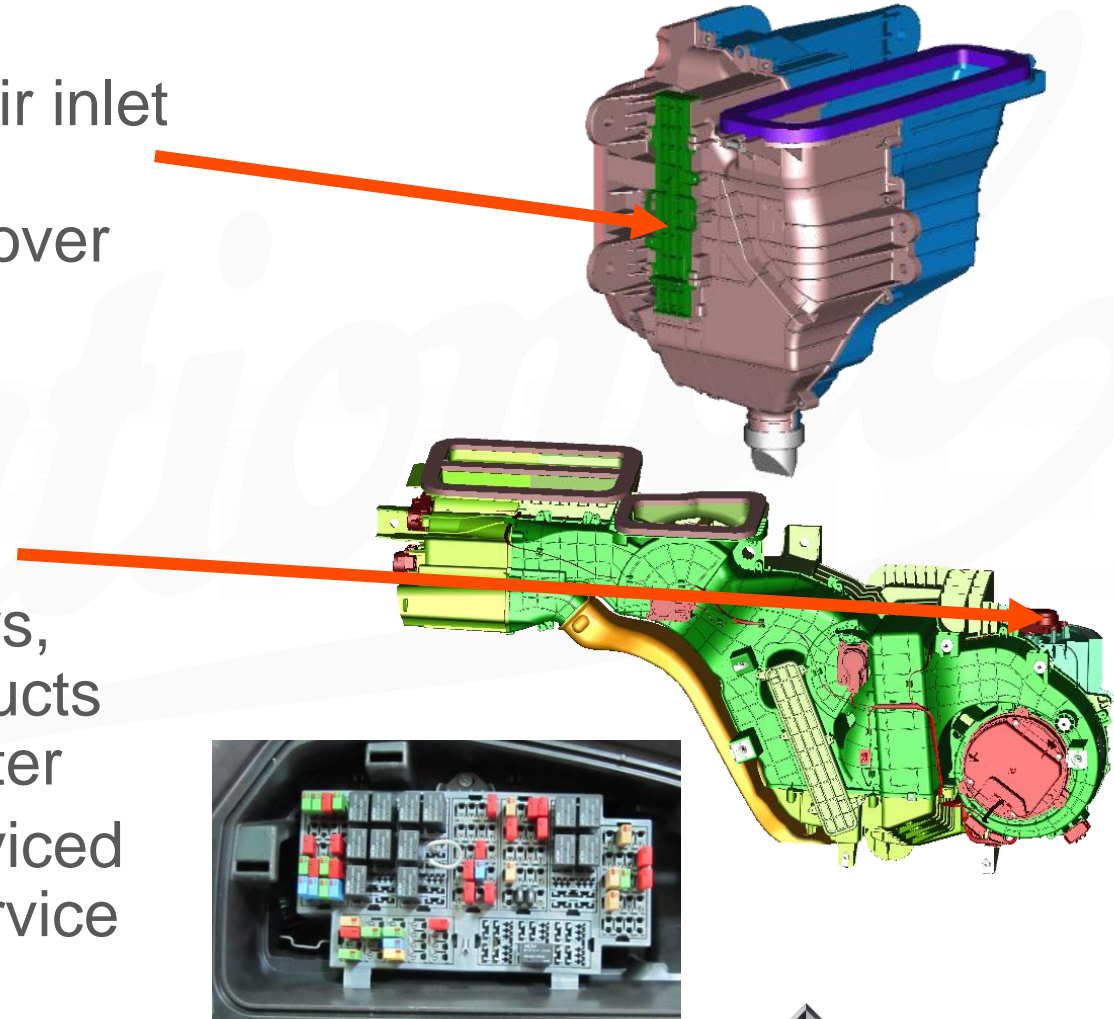


Improved serviceability

- HVAC cab module
 - Blower motor, heater core, freeze probe improved for service
 - All actuators are serviceable with instrument panel in place, except panel actuator
 - Engine cover accessible with floor ducts and HVAC module in place
 - Evaporator core is serviceable from engine compartment
 - Rain tray can remain in place
 - Inlet air assembly does need to be removed

Improved serviceability

- HVAC fresh air filter
 - ProStar - two thumbscrews secure the air inlet cover over the air filter
 - LT - retaining tabs are molded into the cover
 - Tools no longer required
 - Same filtration efficiency as ProStar
 - 85% efficient per SAE J1533 fine dust
- Recirculation air filter
 - ProStar - two separate filters, four screws, three instrument panels, and two floor ducts need to be removed to change the air filter
 - LT - one filter, one cover, one screw serviced through the PDM fuse panel, easy to service



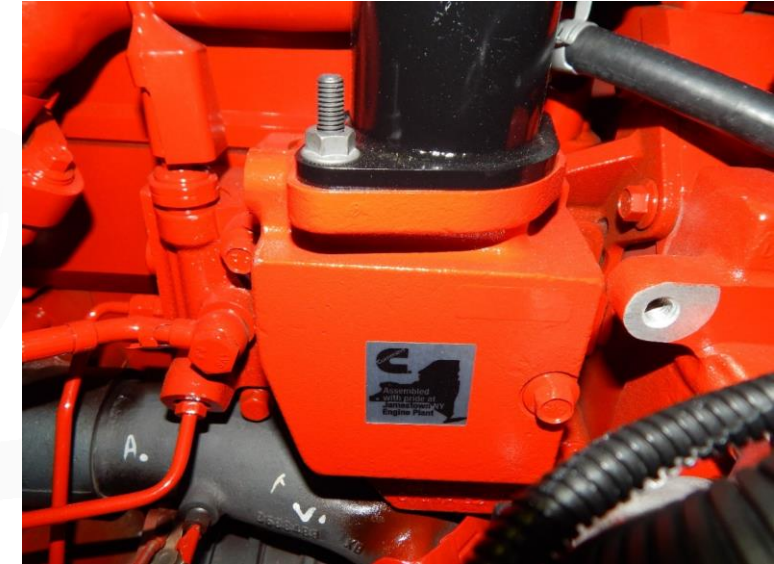
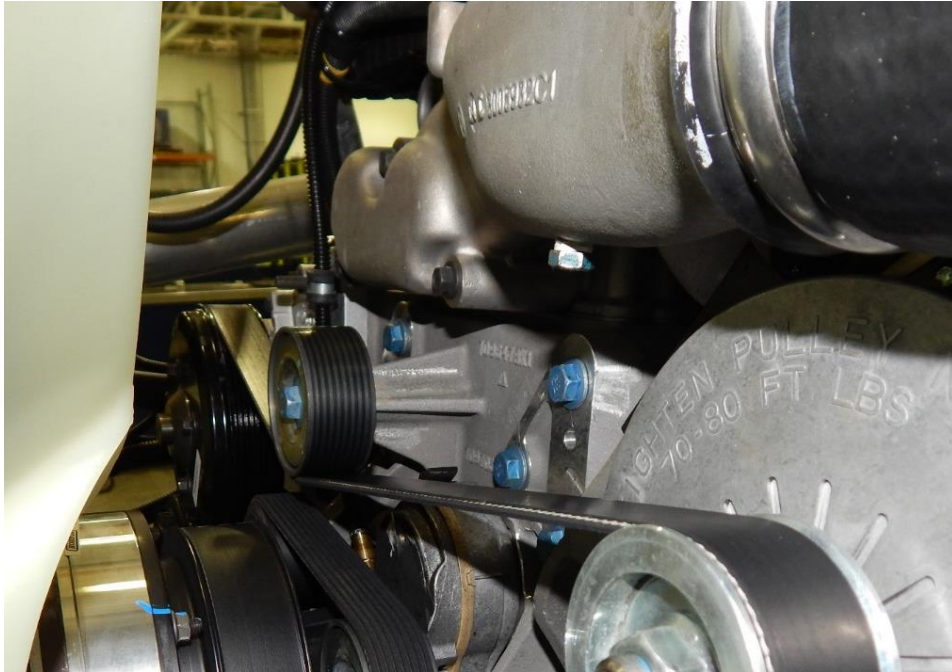
A26 and X15 improved serviceability

- Under hood
 - Engine mounted air filter improves engine and bulkhead access



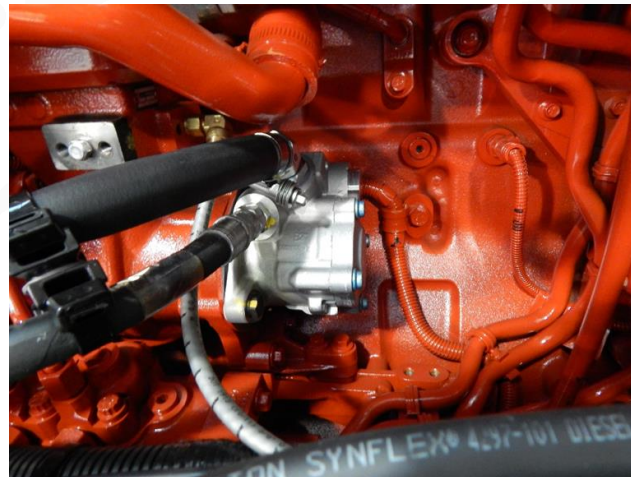
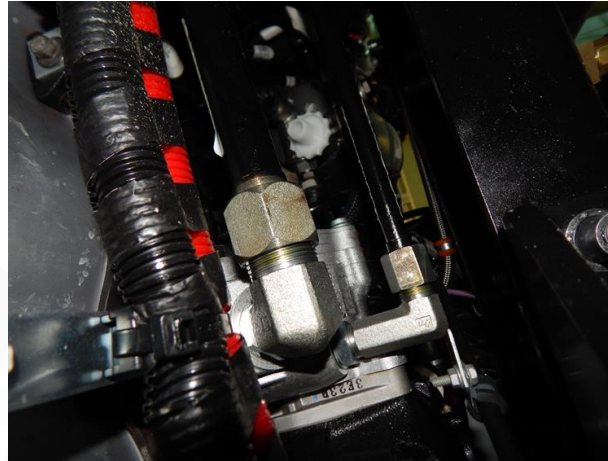
A26 and X15 improved serviceability

- Thermostats & Water Pumps
 - Easy access for quick repairs



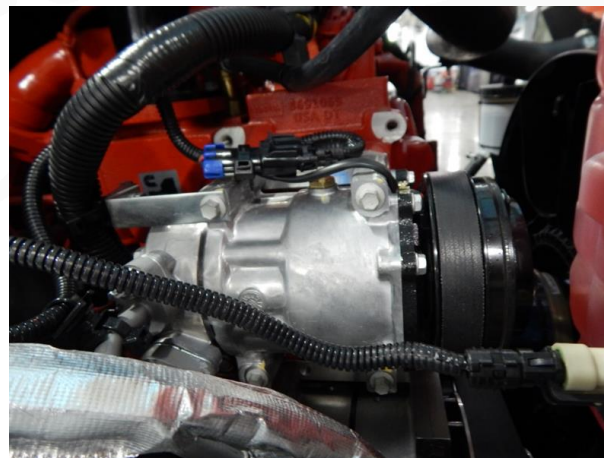
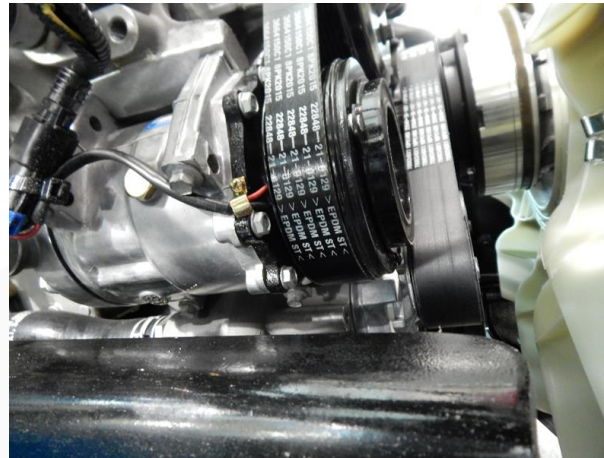
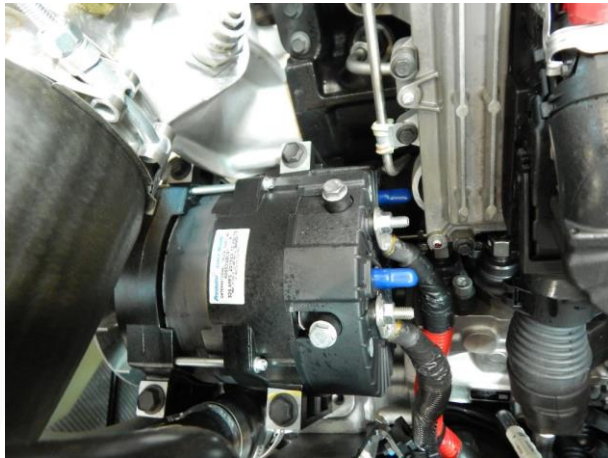
A26 and X15 improved serviceability

- Engine control modules & Power steering pumps
 - Easy access for quick replacement



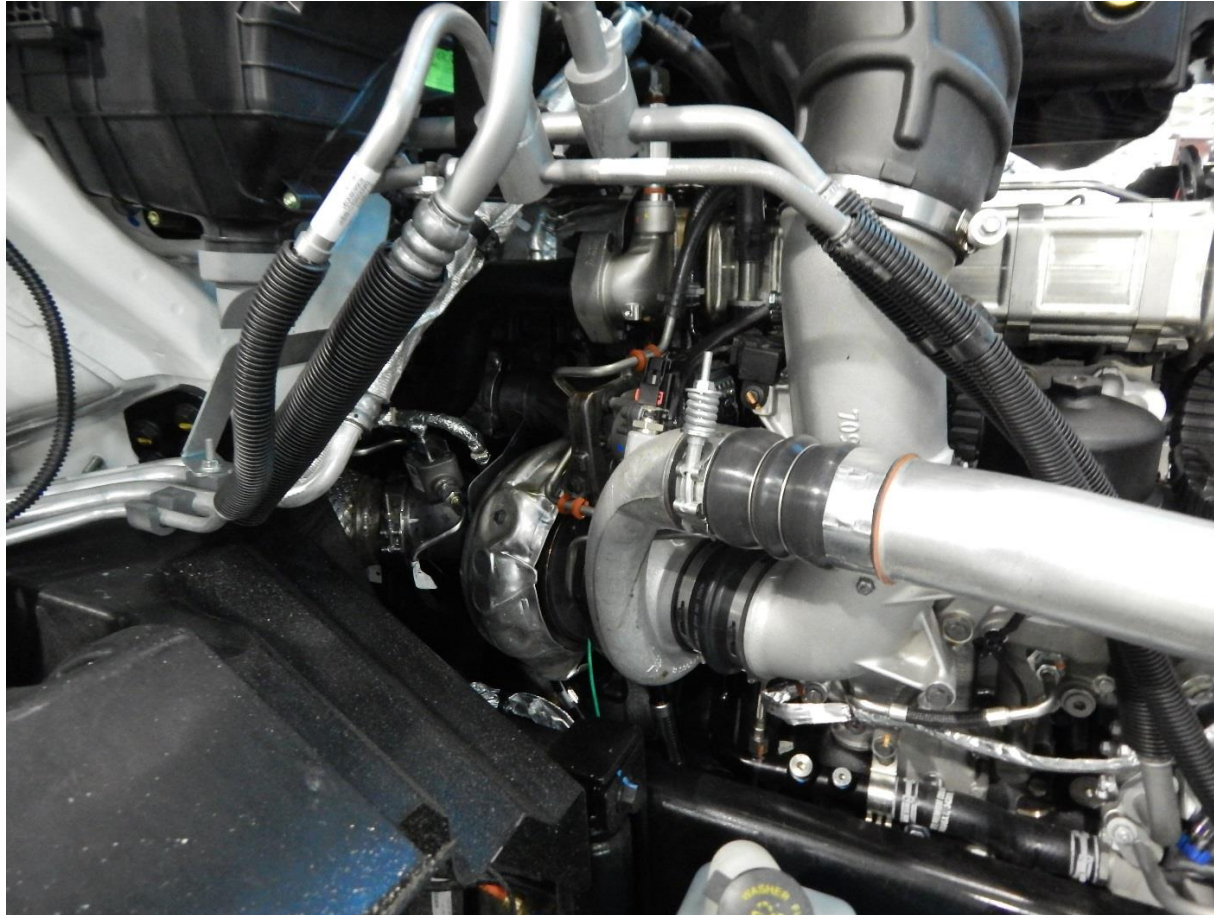
A26 and X15 improved serviceability

- Alternator & A/C compressors
 - Easy access for quick repairs



A26 improved serviceability

- Right side of engine
 - Single turbocharger with no low temperature radiator cooling system enables easy access to the engine

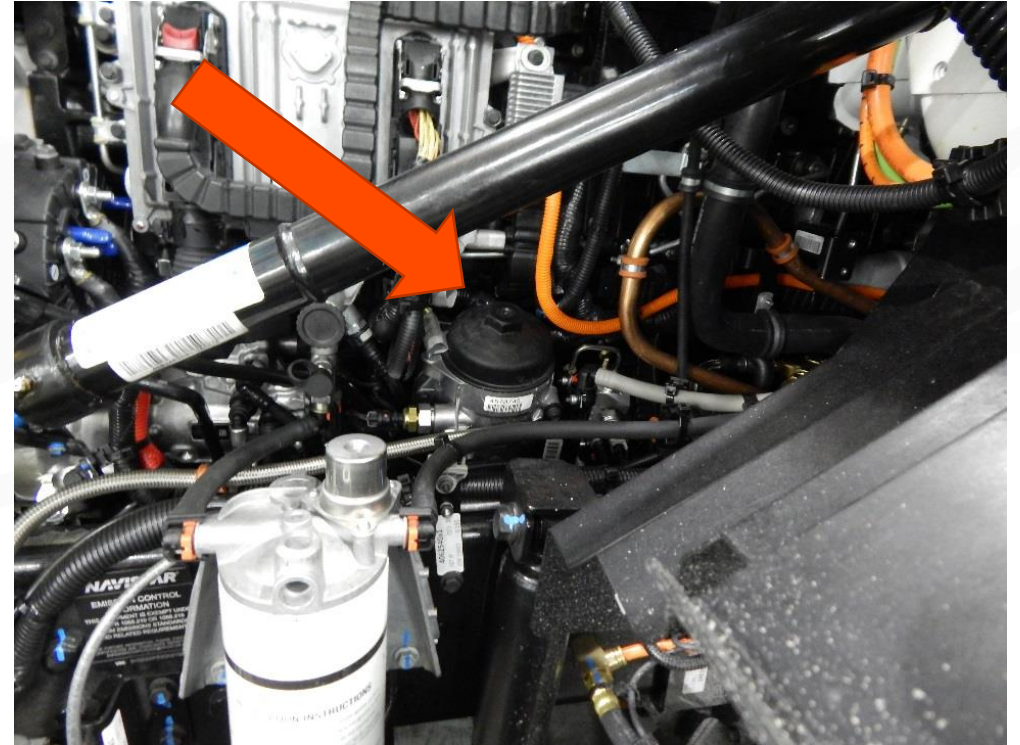


A26 improved serviceability

- Cartridge style oil filter
 - Easily accessed, including zone above the filter

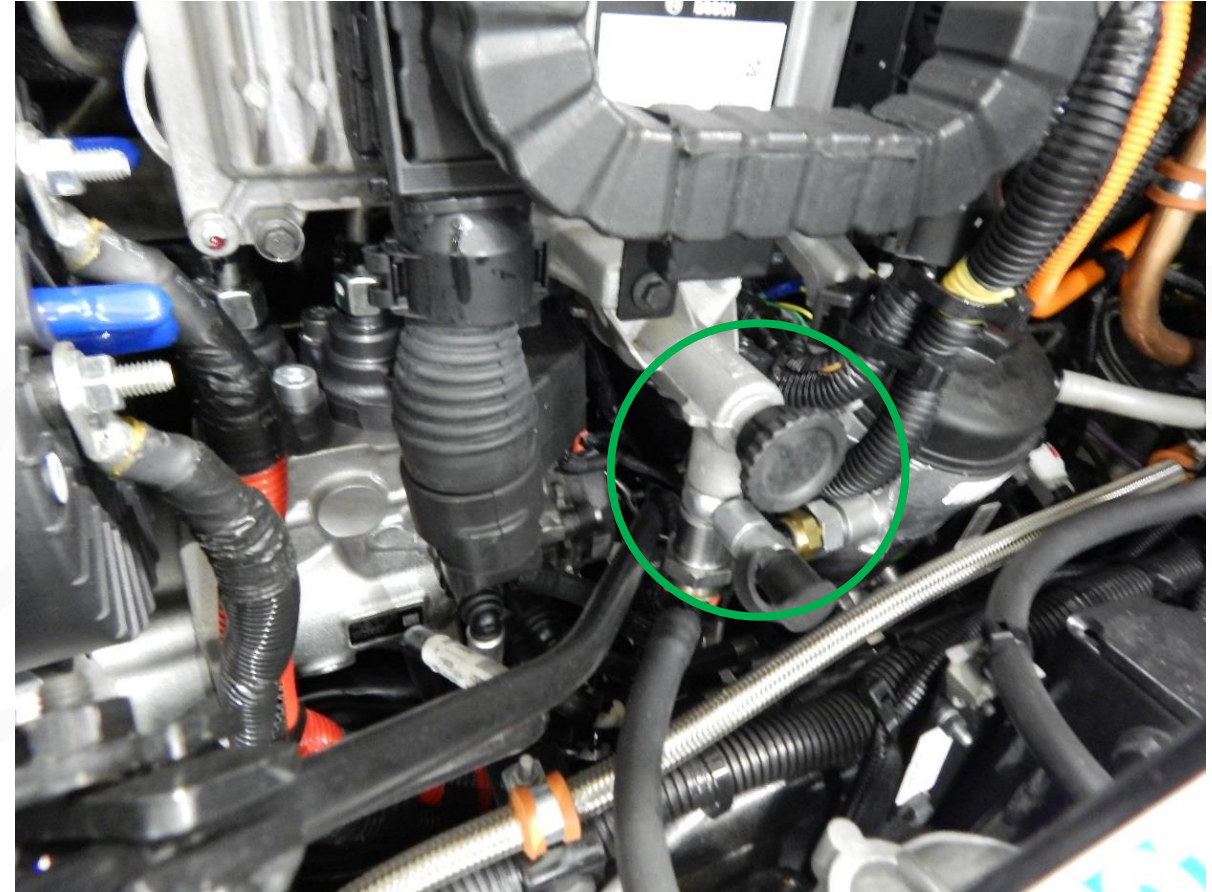


- Cartridge style fuel filter
 - Easily accessed, including zone above the filter



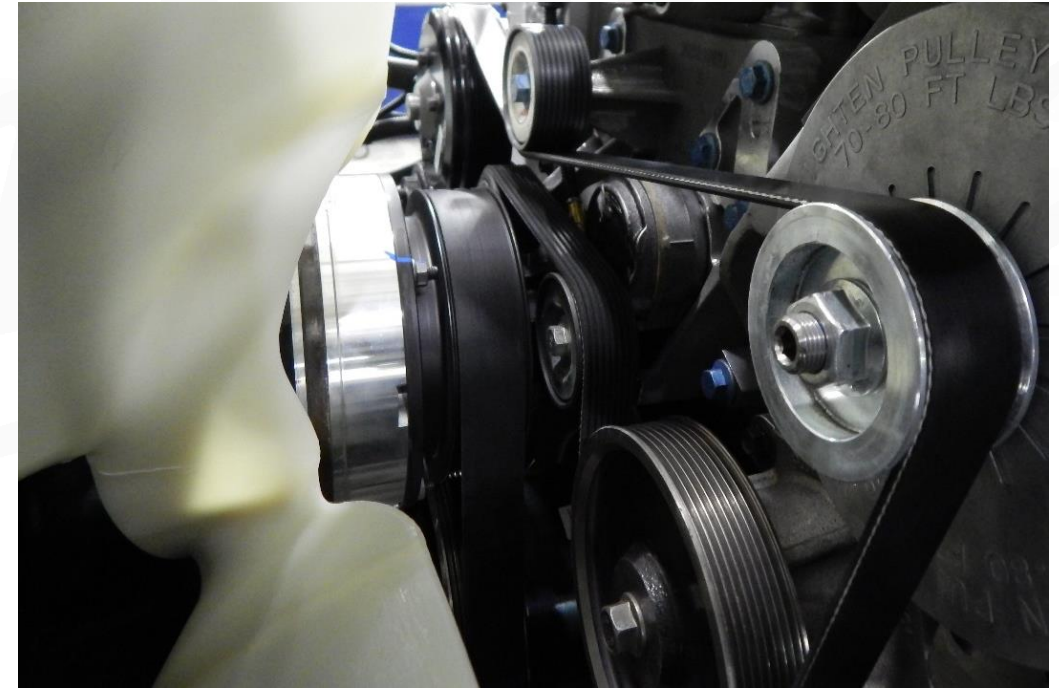
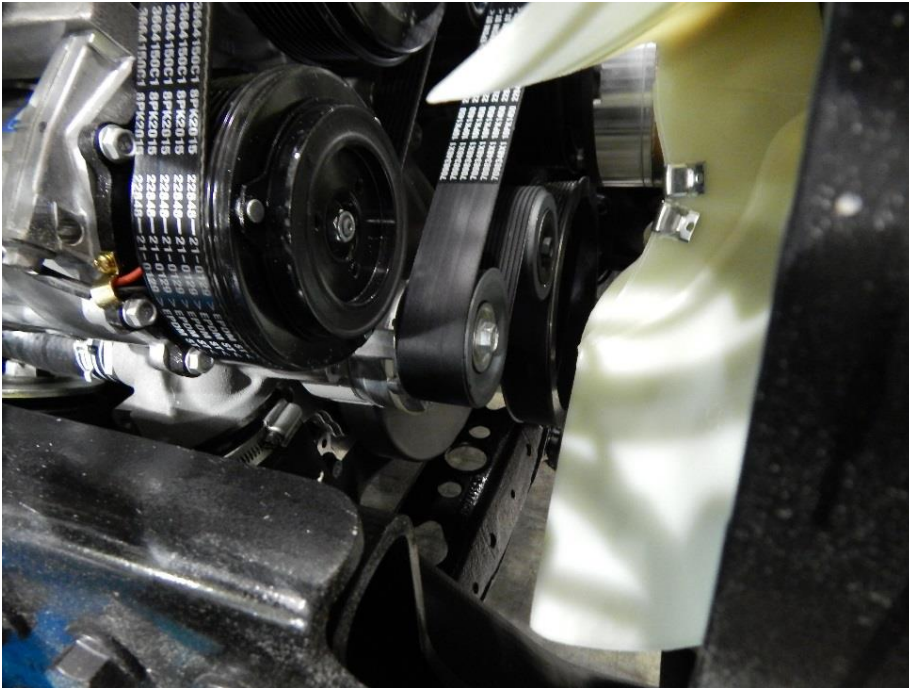
A26 improved serviceability

- Fuel primer pump
 - New outward facing location
 - Easy to reach
 - 2.5 times larger displacement per stroke
 - 2.5 times less strokes required to prime the fuel system



A26 improved serviceability

- Belts and belt tensioners
 - Easy access to check and replace belts
 - Easy access to belt tensioners



X15 improved serviceability

- Power distribution module
 - ProStar style PDM applied to LT with X15
 - Better access to PDM and under hood





To exit the course, click the **X** at the upper right of the screen. Next, click the Return button at the lower left to return to the course grade book.

Please click on and complete the course Post Test to receive credit for completing the course.

