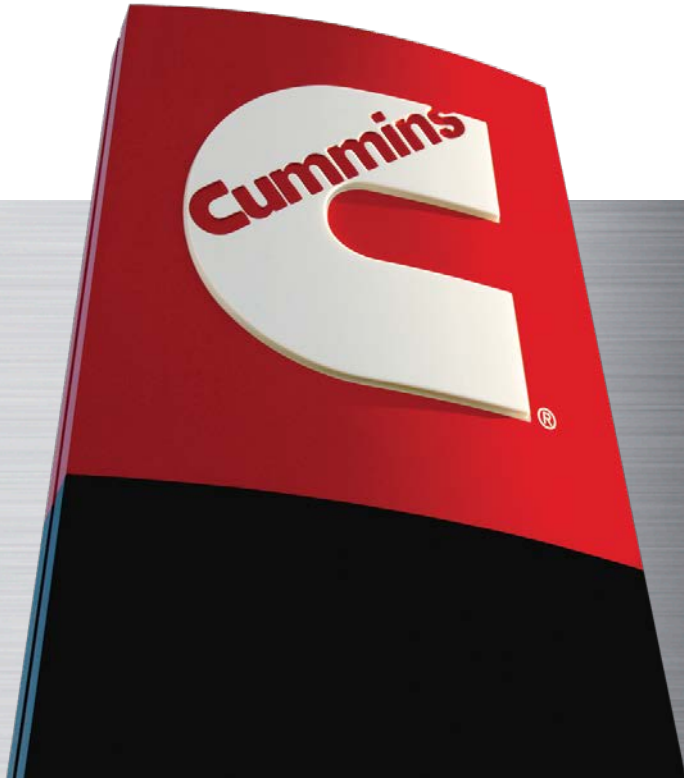
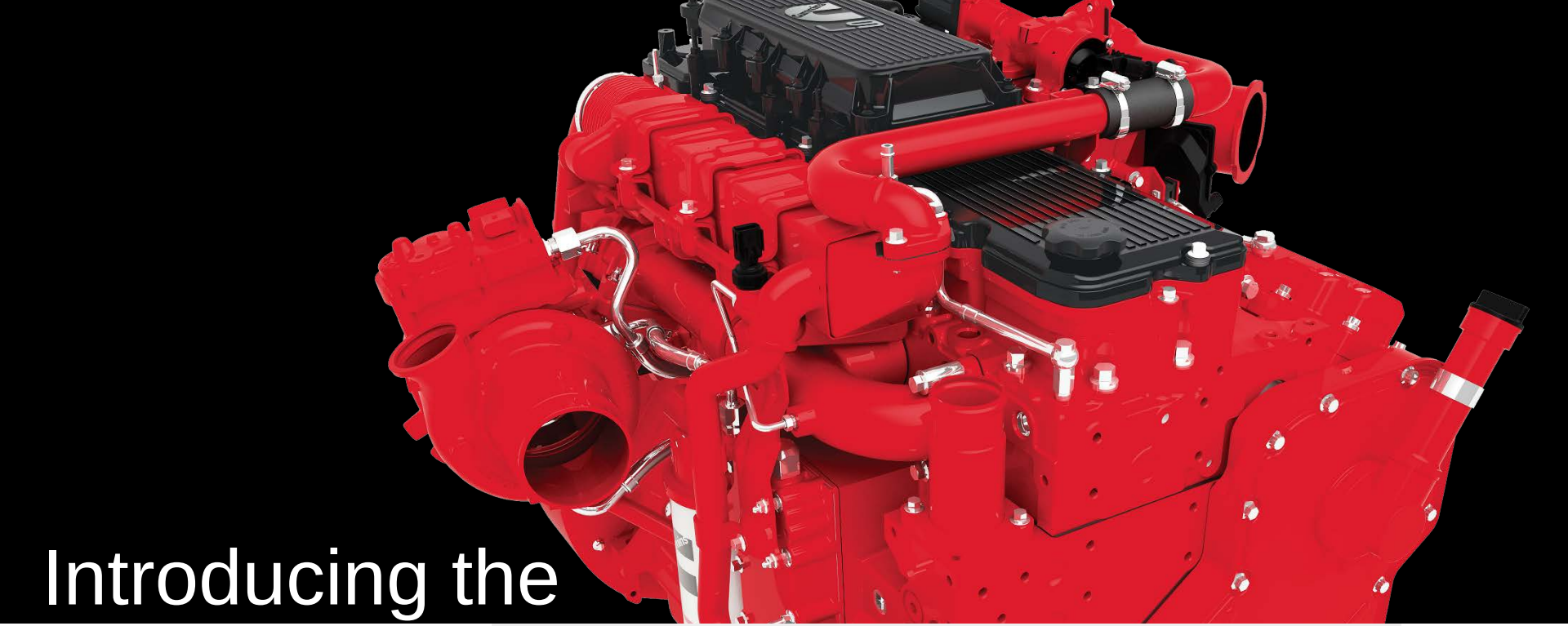
Cummins 2017 L9/X12/X15 Engines

Sutphen Dealer Retreat

September 19, 2017



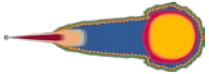


Introducing the

2017 L9

Total Engine System Integration

Air Handling & EGR



Combustion & Fuel Systems

Fuel and Lube Filters

Aftertreatment

Electronic Controls

2017 Single Module Aftertreatment

- Customer voice-driven design for full range of engines
- MidRange System features:
  - Up to 70% reduction in space claim
  - Up to 30% reduction in weight
- Enhanced thermal efficiency
  - Consistent Temperatures
  - Reduced Fuel Consumption
  - Improved Reliability

Innovative Aftertreatment System

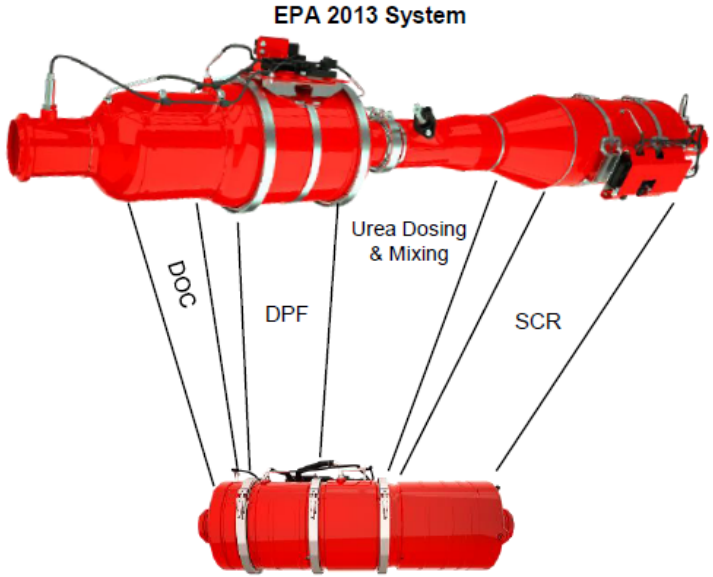
Catalyst Reduced size and improved thermal robustness

Mixing Technology Compact mixer gives >50% size reduction, improved uniformity, and reduces the risk of deposits

Packaging Design Compact design minimizes space claim, reduce overall system weight, and reduces installatio variation, which improves reliabilit

Single Module Aftertreatment Architecture

- How we did it →
- Five sizes to cover ISB through ISX
- Flexible system
  - Inlets and outlets from end or the side
  - Orientation of inlet and sensor table positions

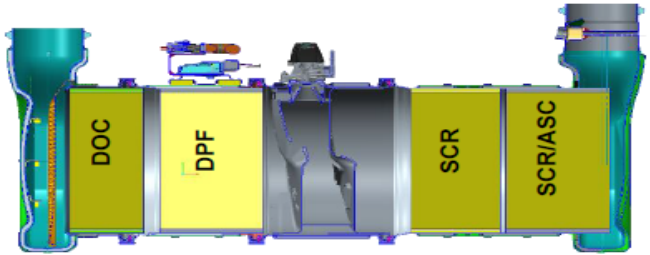


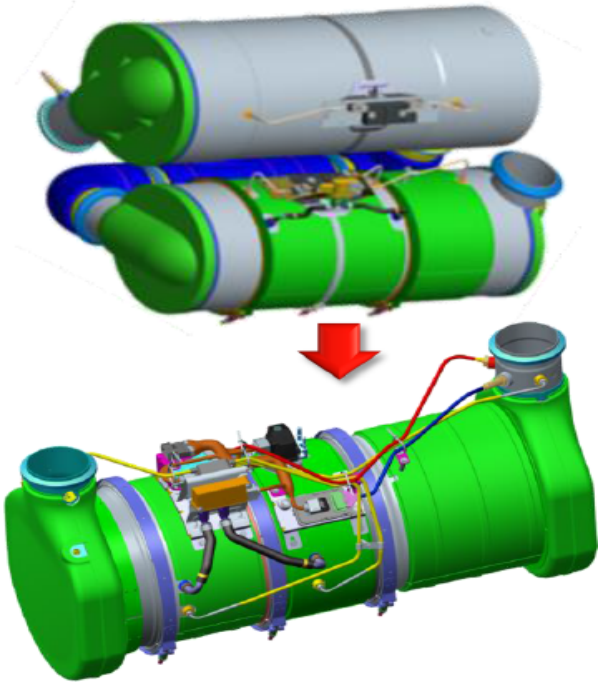
End In-End Out Single Module

Side In-Side Out Single Module

Single Module Aftertreatment

- Compared to 2013, SM Reduces:
  - Space Claim 60%
  - Weight up to 40%
- Improves emission and OBD robustness via reduced variation
- Reduces installation proliferation





Emission Solutions

Fuel Filters by Fleetguard

- NanoNet Fuel Filters have been used since 2013
  - 10-13 times more effective at removing 4 micron particulates
  - Traps and retains contaminants even under real world vibration and flow surge
  - Protects high pressure injectors from damaging fuel systems
  - Increases fuel system robustness
  - Separates water for better fuel protection
  - 2017 L9 requires stage 1 NanoNet filter

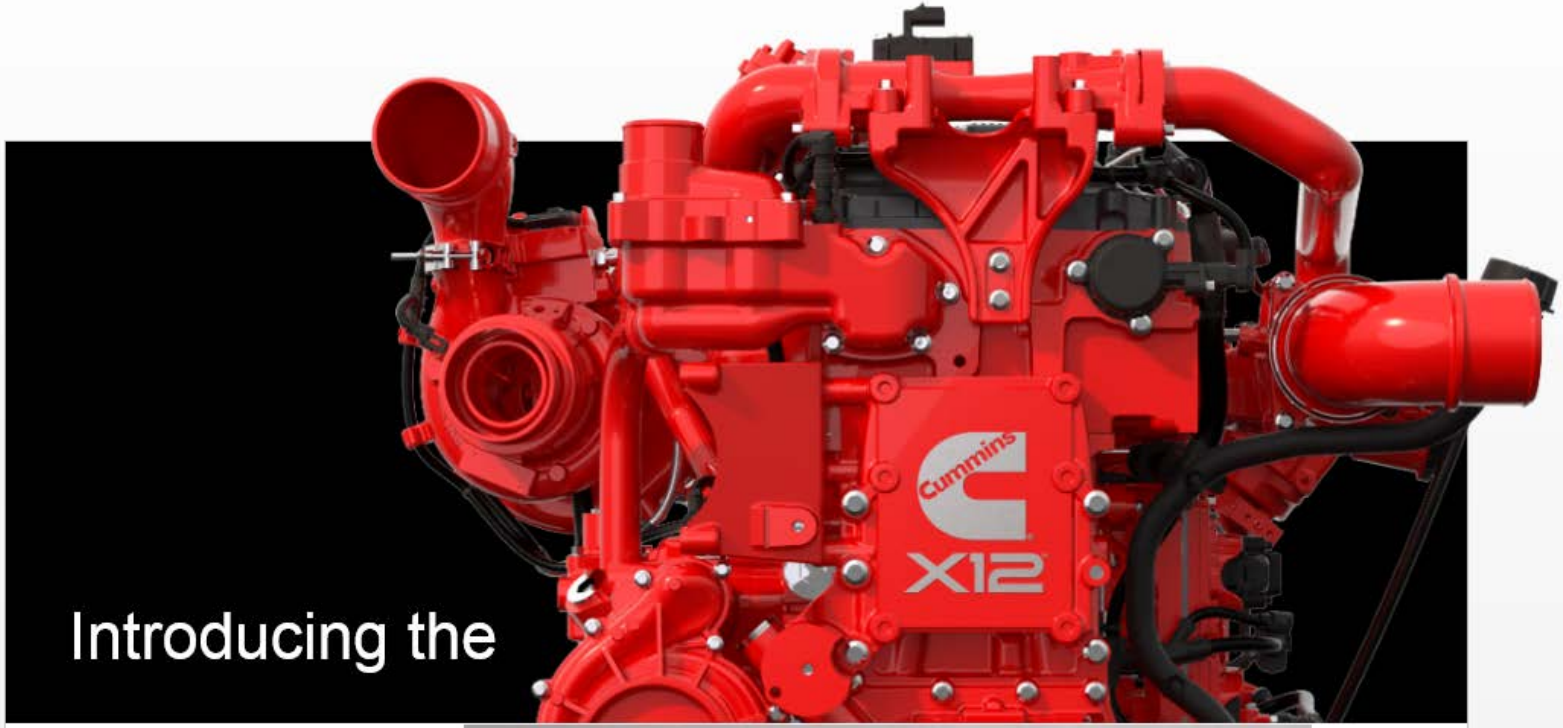
Engine Oil specification for 2017 EPA Diesel Engines

2017 CK-4 Engine Compatibility

Engine	CK-4 (PC-11a)	FA-4 (PC-11b)
B6.7, L9, X12	Compatible	–
X15	Compatible	Recommended

Notes:

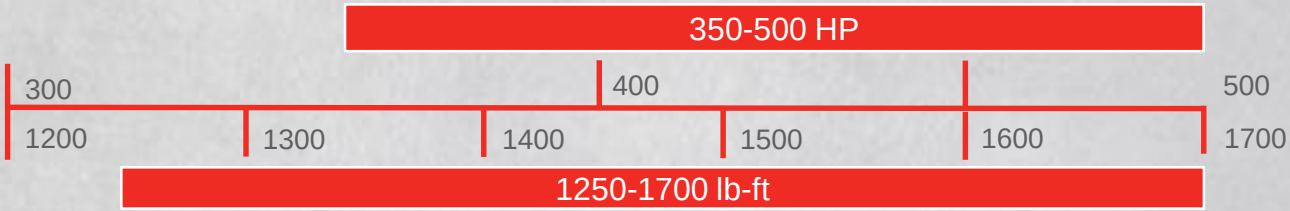
- Oil specification changed from C-J4 to CK-4/FA-4
- Lower oil viscosity for improved fuel economy
  - Changing from 15W40 to 10W30



Next Generation X12

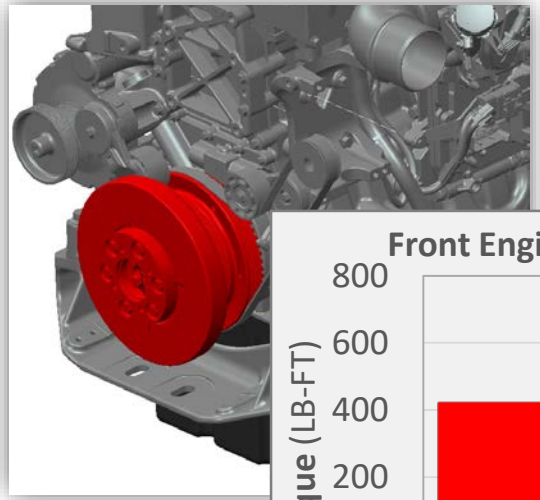
X12™

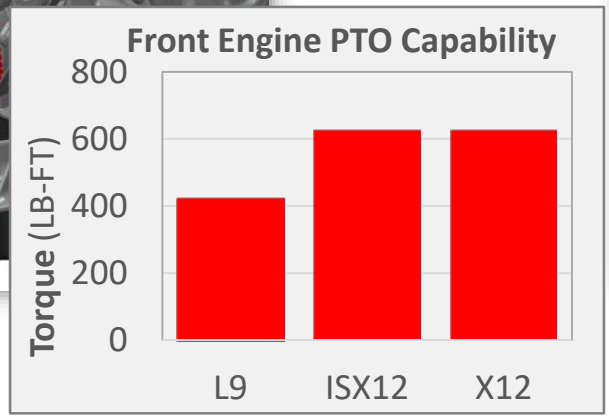
- The Productivity Champion
- Powerful Performance
  - Power 350-500 HP @ 1900 rpm
  - Torque 1250-1700 lb-ft (1830-2300Nm)
- Lower Operating Costs
- Maximizes Payload for:
  - Regional Haul
  - Vocational
  - Intra-city

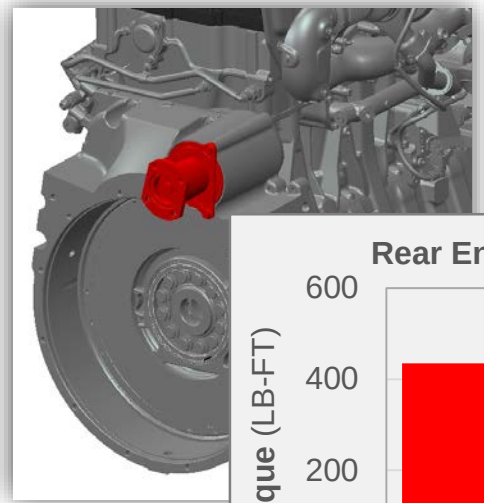


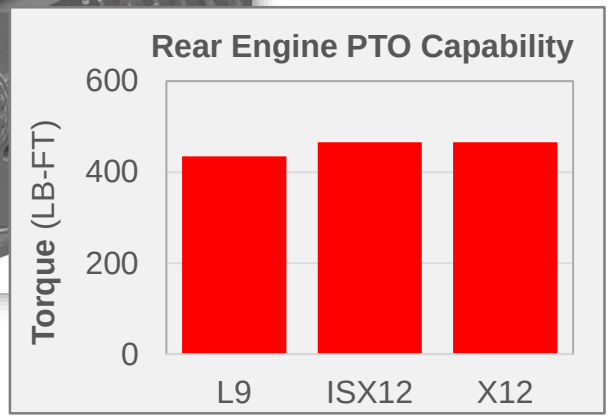
Power Take Off (PTO)

- X12 maintains PTO capability of ISX12, Front and Rear

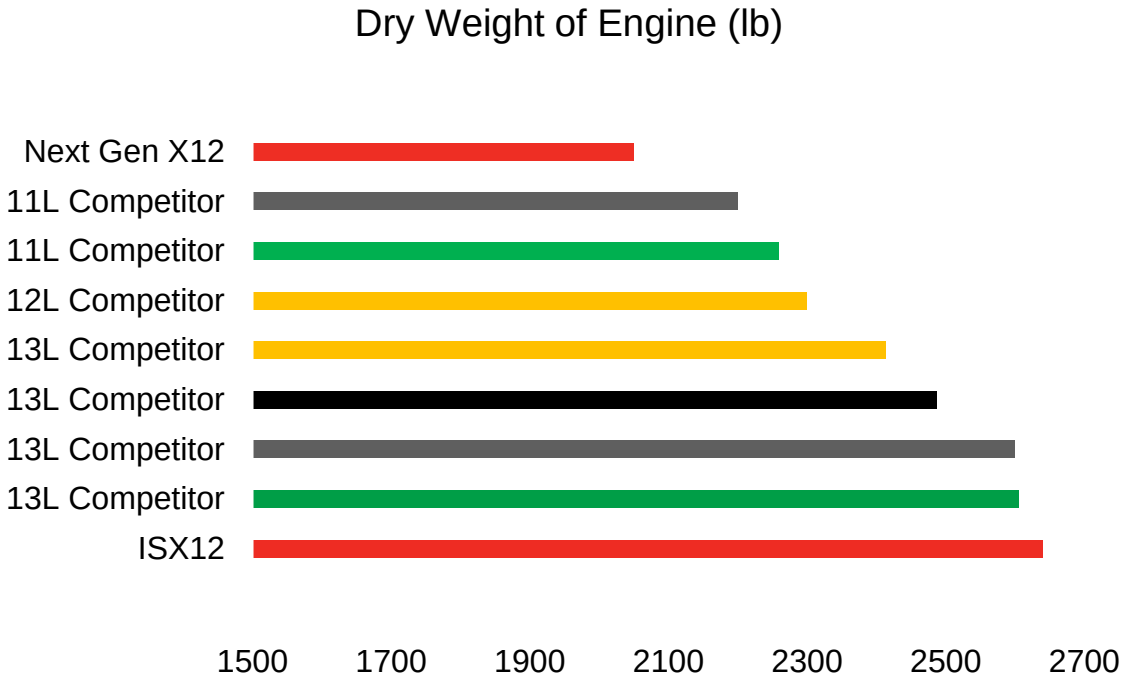








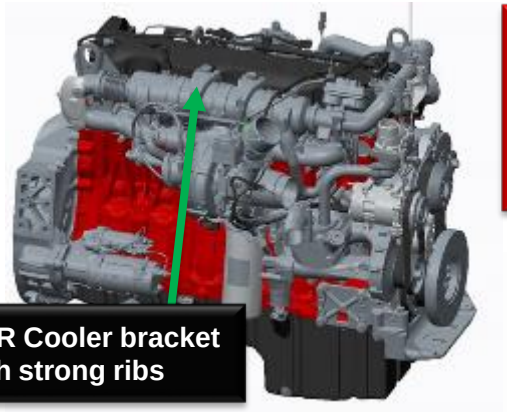
Best-in-Class Power Density



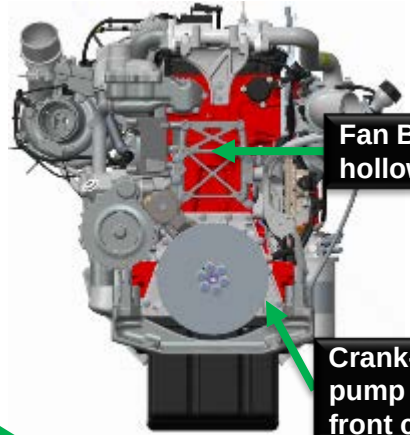
Cylinder block was designed using latest technology to eliminate excess mass with no durability impact

Reduced Weight & Complexity

External components have been designed with next-gen optimization tools to put the material exactly where needed

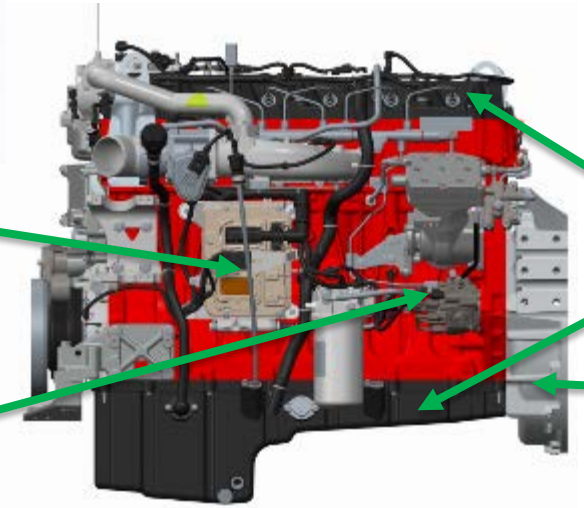


EGR Cooler bracket with strong ribs



Fan Bracket with hollow pockets

Crank-centered oil pump incorporates front cover



ECM bracket incorporates fuel priming pump

Fuel Lubricated high pressure fuel pump saves space and weight over bulkier oil lubricated pumps

Composite valve cover and oil pan reduce weight, corrosion, and noise

High-strength aluminum Flywheel Housing incorporates gear cover. Eliminates separate housing, gaskets, and oil leak paths

Matured in Global Markets

- Next Generation 12L has over a billion miles of real world experience
  - Over 120,000 produced since start of production in 2014
  - Over 100,000 powering tractor trailer, dump truck, flat bed, and off-highway applications

Tractor Trailer crossing Kunlun Pass (15,600 ft altitude)

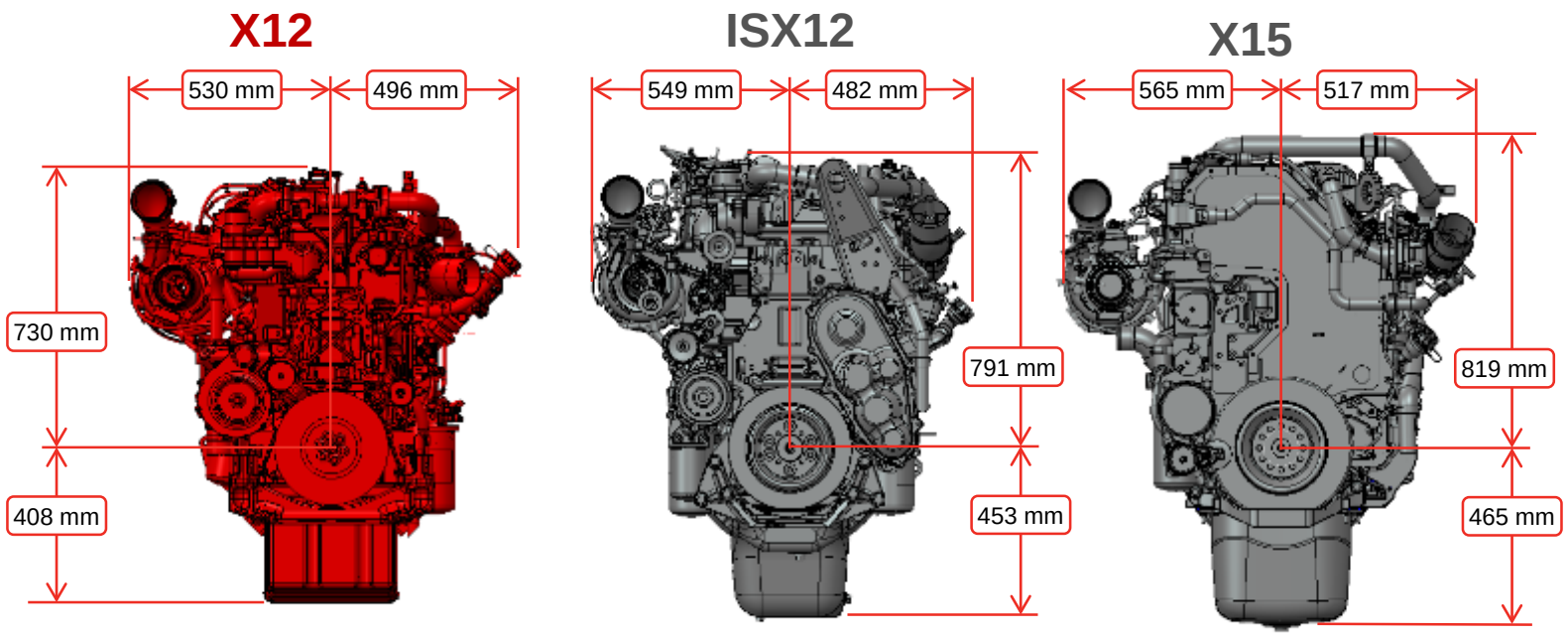
Snow Groomer works the torque curve in the Alps (QSG12 T4F)

110K GVW B-Double in Australia runs over 1M km

Low Cost of Operation

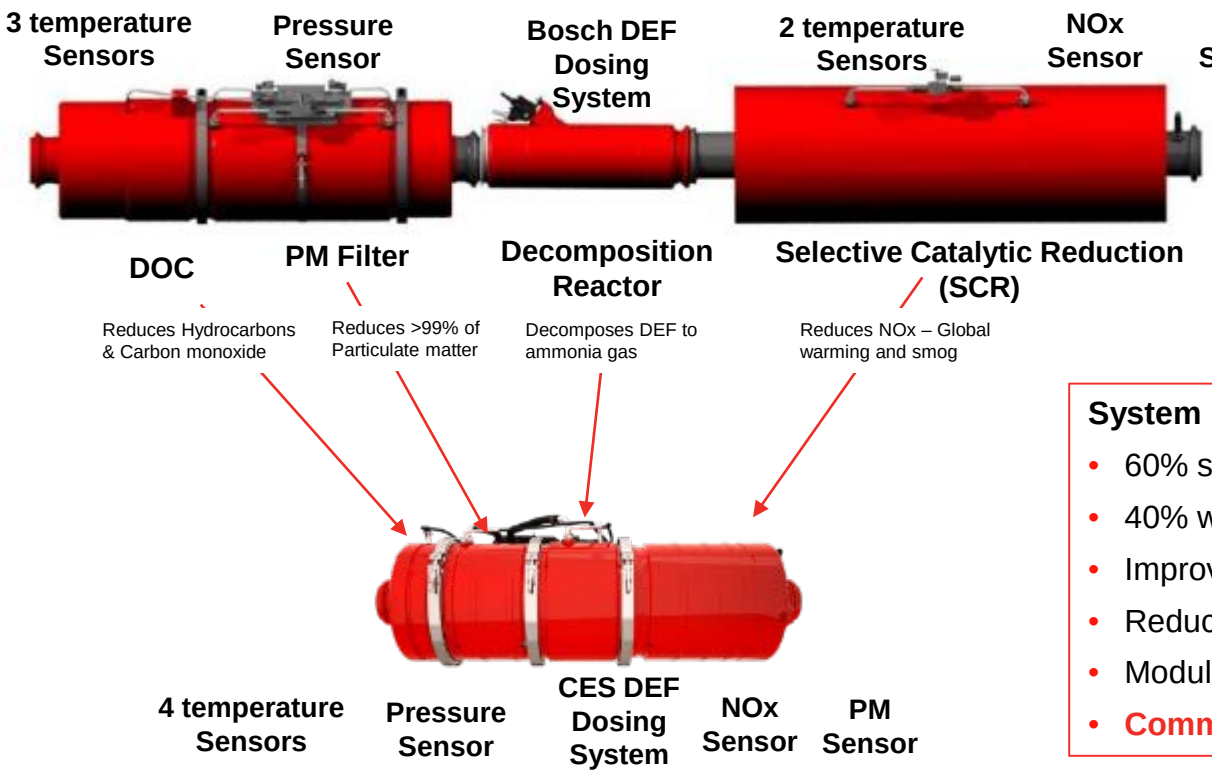
- Lower weight means same trips = more freight
  - Better payload allows higher asset utilization
- Low friction design minimizes parasitic losses delivering better fuel economy
  - Improvements from ISX12 seen at all speeds: idle to interstate
- Validating extended maintenance intervals similar to X15
  - Cummins OilGuard oil analysis program for customers who want to further extend oil drain intervals
- Extended Coverage options similar to ISX12 and X15
- More details will be provided closer to production launch

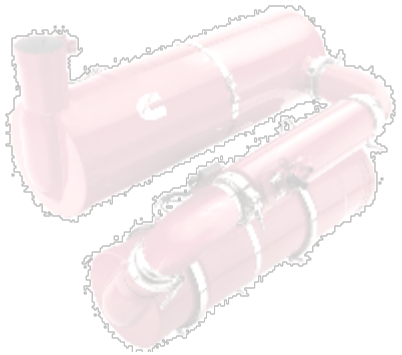
Designed for Wrench Room



Compact size helps *improves service accessibility* in shorter nose vehicles

Single Module Aftertreatment





System Features:

- 60% size reduction
- 40% weight reduction
- Improved ash holding / service interval
- Reduced complexity
- Modular and serviceable
- **Common with X15 Efficiency Series**

Manufactured in Jamestown, NY

- Built alongside X15 and ISX12
- Production typically exceeds 100,000 engine p.a.
- Reliable, skilled work force
  - 1300+ Employees
  - Team Based work system
  - ~100 employee Product Engineering staff dedicated to Current Product Development and Field support

Flexible Transition

	2017	2018	2019	2020
ISX12				
X12				
ISX12G				

- ISX12 available through end of 2018 with committed aftermarket support
  - Current ISX12 sales will transition to greater value Next Gen X12
- Next Generation X12 enters Production in 2018
- ISX12 G will continue serving natural gas market through end of decade

X15™

EPA2017

X15™ PERFORMANCE SERIES Ratings

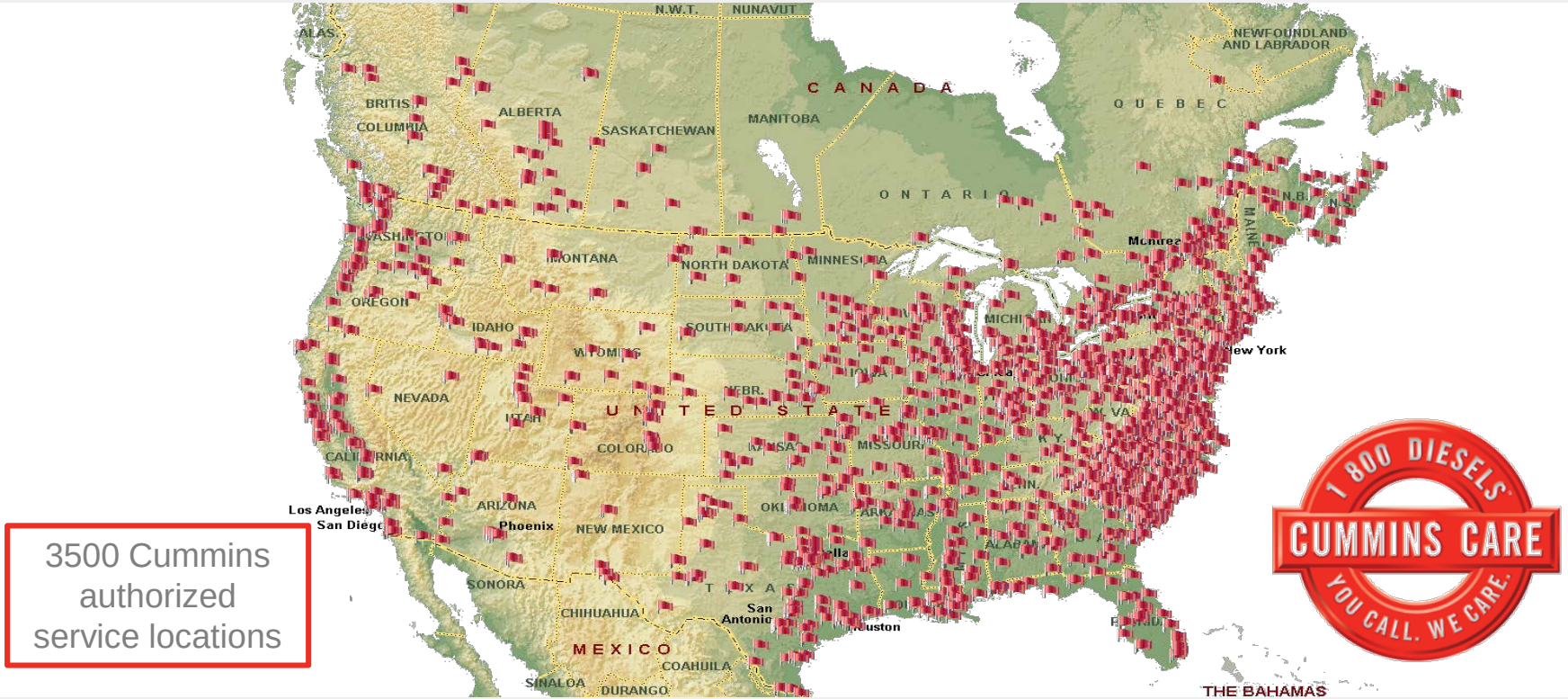
Heavy Haul / Vocational Truck 2000 rpm Gov	
485-1650	565-1850
485-1850	565-2050
505-1650	605-1850
505-1850	605-2050
525-1850	
Emergency Vehicle 2100 rpm Gov	
505-1850EV	600-1850EV
565-1850EV	
Recreational Vehicle / Motor Coach 2100 rpm Gov	
565-1850RV	605-1950RV

*All Efficiency Series ratings have 1000 rpm TDOS and all Performance Series ratings have 1150 rpm TDOS

X15™ Single Module Aftertreatment

- Customer voice-driven design
- Combines high-efficiency SCR, an enhanced dosing unit and a high capacity DPF into a single flow-through unit
- Enhanced thermal and fuel efficiency
- Heavy Duty System Features:
  - Up to **60%** reduction in space claim
  - Up to **40%** reduction in weight
- Reduced system weight and complexity for benefit of end user

Cummins Authorized Service Locations



3500 Cummins authorized service locations


Cummins