

# VISION FOR INNOVATION

**POWERING  
A WORLD  
THAT'S  
ALWAYS  
ON.**



**ALWAYS ON**

**HOLSET TECHNOLOGY RANGE**

**HOLSET**<sup>®</sup>  
TURBOCHARGERS

# A TRADITION OF INNOVATION

## 100 YEARS OF TECHNOLOGICAL EXCELLENCE

We've been turning challenges into opportunities since company founder, Clessie Cummins, developed the first Cummins engine in 1919. Always at the forefront of technology, our Holset brand, incorporated in 1952 has been delivering innovative, reliable turbocharger solutions for more than 60 years.

**1952**

Holset Engineering Co. Ltd. Was incorporated on 29th March, a subsidiary of BHD Engineering.

**1954**

License granted by inventor of the turbocharger, Dr. Alfred Büchi, for the manufacture and sale of exhaust gas driven turbochargers.

**1973**

Cummins Engine Company purchased Holset, recognising its status as a market leader in turbocharging.

**1978**

The millionth Holset turbocharger was built. The 14 litre E290 was released, the first Cummins engine to include a Huddersfield designed turbocharger.

**1991**

Holset first to the market with a heavy-duty wastegate turbocharger.

**2006**

The company name changed to Cummins Turbo Technologies. A new facility opened in Charleston, S.C. (U.S.) focusing on heavy-duty VGT.

**2002**

Holset celebrated its 50th anniversary.

**2000**

The Holset Turbocharger brand was officially launched.

**1998**

The world's first sliding wall variable geometry turbocharger (VGT) was launched.

**1992**

Development in the 1980s of two-stage turbocharging led to the launch of the Cummins KT50 for mining equipment, locomotives and power generation.

**2010**

Official launch of a new range of turbochargers for 2L to 5L diesel engines.

**2013**

Cummins Turbo Technologies celebrates its 60th year.

**2014**

Cummins Turbo Technologies launches its largest turbo range, supporting the 2.5L to the 95L diesel engines.

**2018**

Cummins Turbo Technologies celebrates 20 years of VGT innovation.

**2018 / 19**

Collaboration project between Cummins Emission Solutions and Cummins Turbo Technologies results in a concept integrated system to help customers meet future CO<sub>2</sub> and NO<sub>x</sub> challenges.



## GLOBAL CAPABILITIES

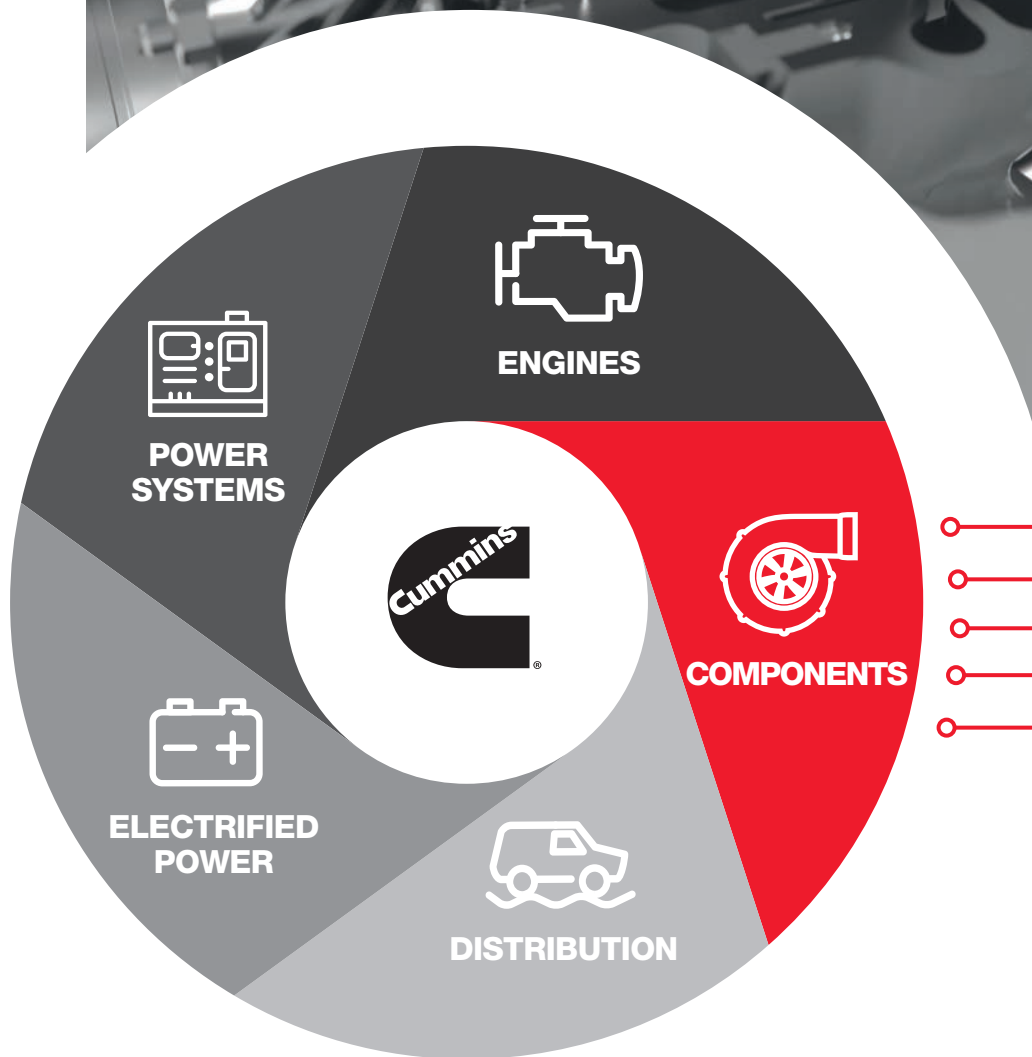
With locations in North America, South America, Europe and Asia Cummins is bringing the next generation of turbo technologies to the global market.



## WORLDWIDE LOCATIONS

- |          |  |           |  |
|----------|--|-----------|--|
| <b>1</b> | <b>Memphis</b><br>Aftermarket  | <b>6</b>  | <b>Nijkeek</b><br>Aftermarket                                |
| <b>2</b> | <b>Columbus</b><br>Customer Support Technical Centre                 | <b>7</b>  | <b>Dewas</b><br>Manufacturing                                |
| <b>3</b> | <b>Charleston</b><br>Manufacturing                                   | <b>8</b>  | <b>Pune</b><br>Customer Support Centre                       |
| <b>4</b> | <b>San Paulo</b><br>Manufacturing Aftermarket                        | <b>9</b>  | <b>Rudrapur</b><br>Assembly                                  |
| <b>5</b> | <b>Huddersfield</b><br>Technical Centre<br>Manufacturing Aftermarket | <b>10</b> | <b>Wuxi</b><br>Manufacturing<br>Technical Centre Aftermarket |

# OUR FIVE OPERATING SEGMENTS



**8,000 WHOLLY-OWNED AND INDEPENDENT DISTRIBUTOR & DEALER LOCATIONS**



## A WINNING COMBINATION

Our business is organised into five complementary segments combining to make Cummins Inc. the comprehensive provider of engines, power systems, electrified power, **components** and distribution.

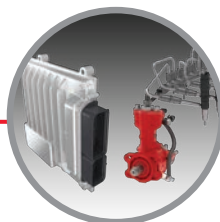
### COMPONENTS

Turbo Technologies sits within our components segment where we design and manufacture Holset air-handling technologies for on-highway and off-highway customers in the diesel engine market.

#### FILTRATION



#### ELECTRONICS & FUEL SYSTEMS



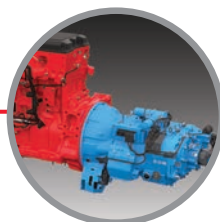
#### TURBO TECHNOLOGIES



#### EMISSION SOLUTIONS



#### EATON CUMMINS AUTOMATED TRANSMISSION TECHNOLOGIES

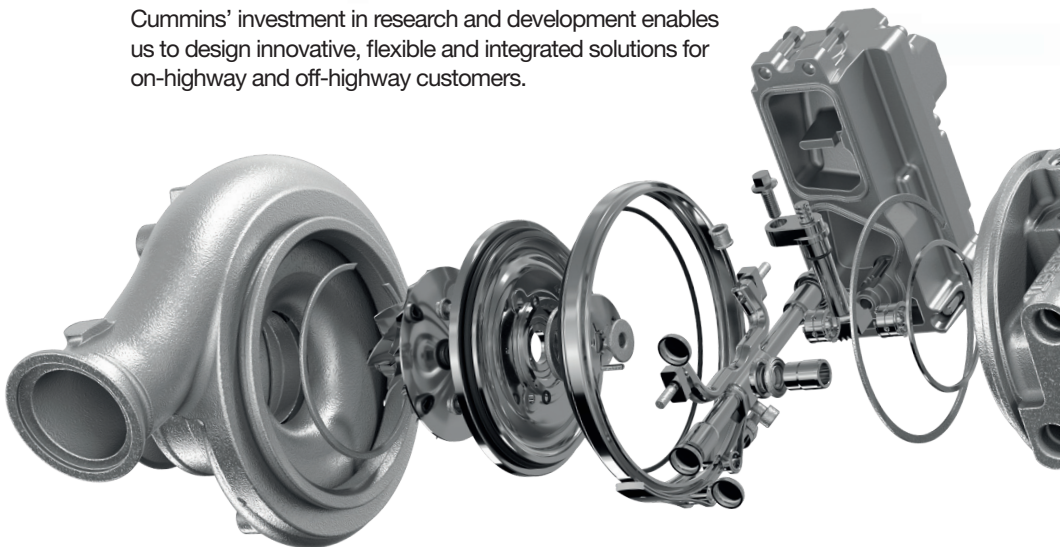


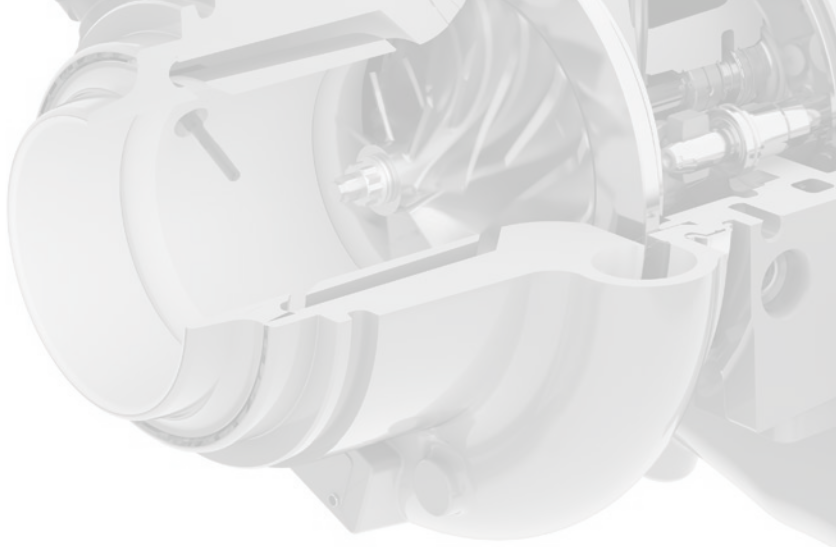
# CORE TECHNOLOGIES



## TAILORED FOR CUSTOMERS

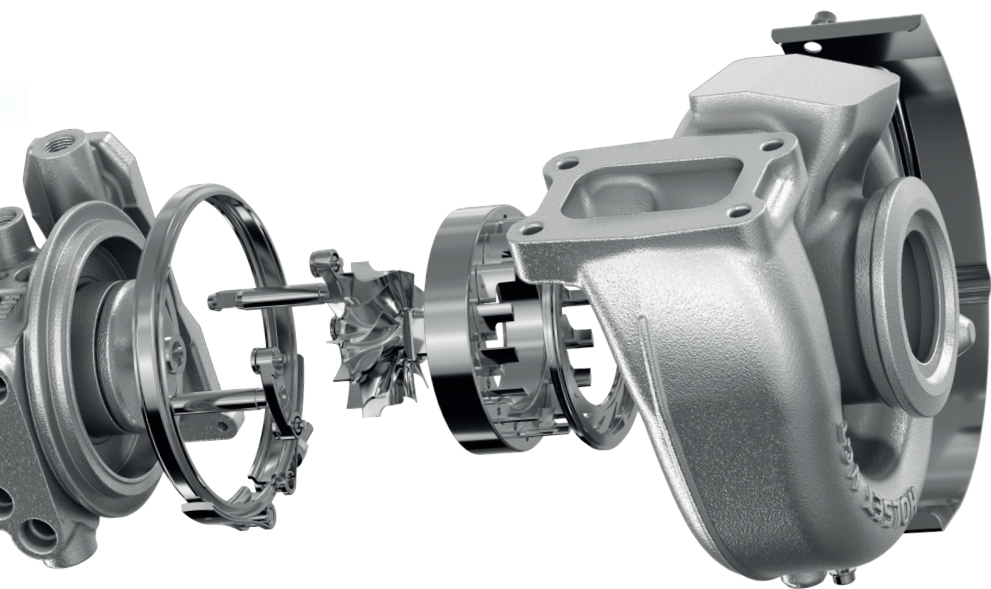
Cummins' investment in research and development enables us to design innovative, flexible and integrated solutions for on-highway and off-highway customers.





## **OVER 60 YEARS OF INNOVATION**

With over 60 years of experience understanding engine turbo machinery and a strong tradition of innovation, we will continue bringing the next generation of technologies to the global market.



# TECHNOLOGY RANGE



## BROAD PORTFOLIO OF SOLUTIONS

Cummins' range of industry-leading technologies provide original equipment manufacturers and end users a broad portfolio of solutions which exceed customers' expectations for performance, efficiency and reliability.

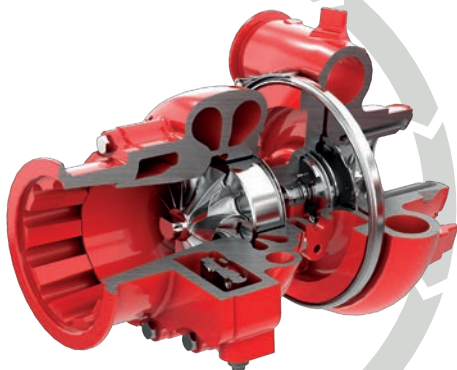


### FIXED GEOMETRY

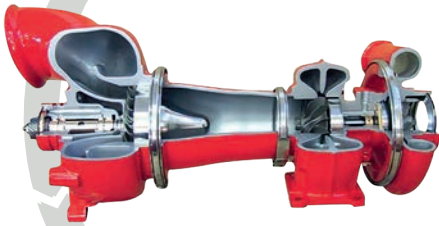
- Cost-effective method for boost, Holset excelling in technical performance
- Fuel-economy advantages mean fixed geometry turbochargers are a key customer solution

### WASTEGATE GEOMETRY

- Pneumatic or electronically controlled
- Cost effective, reliable and durable
- Diverts 'waste' exhaust for better match with most conditions
- Helps to prevent turbocharger over-speeding and engine over-boost
- Improves efficiency





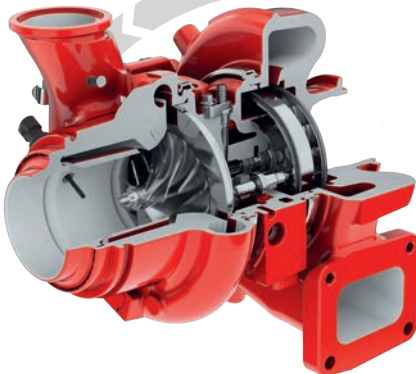


## POWER TURBINE

- Assists in energy recovery of exhaust gas recirculation (EGR) pumping work
- Improves fuel efficiency by up to 5% enabling engines to meet CO<sub>2</sub> targets
- Downsizing capabilities to further enhance fuel economy and reduce emissions
- Reduces turbo lag due to high pressure turbo providing boost pressure at lower RPM range

## TWO-STAGE SYSTEM

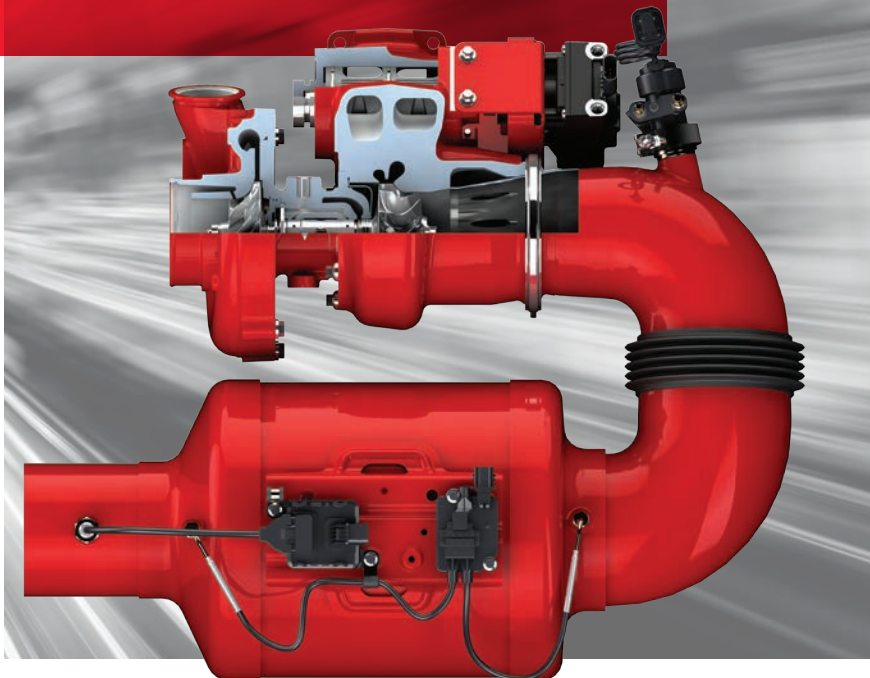
- Enables higher engine horsepower density for engine downsizing and increased power
- Efficient ultra-high boosting capability with fewer turbo limitations
- Extends air flow range flexibility
- Superior altitude air capabilities
- Reduces air handling controls complexity



## VARIABLE GEOMETRY

- Patented sliding nozzle ring
- Wide flow range for higher boost pressures at low speeds
- The most fuel-efficient driving of short-route EGR
- Vanes slide axially so fewer moving parts and fewer wear sites

# FUTURE TECHNOLOGIES



## OUR COMMITMENT TO CLEAN DIESEL ADDRESSING FUTURE CO<sub>2</sub> AND NO<sub>x</sub> CHALLENGES

With an increased focus on sustainable, clean fuels driven by government bodies globally, Cummins is committed to delivering clean diesel solutions that can be tailored to customer applications for future CO<sub>2</sub> and NO<sub>x</sub> challenges.

The phase II design concept of an integrated turbocharger and aftertreatment system combines engineering expertise from Cummins Turbo Technologies and Cummins

Emission Solutions to deliver new air and thermal management architectures in a single system.

Cummins has a strong history of leading in diesel innovation and this integrated architecture is another example of that technology leadership. This technologically advanced concept product is critically important for our customers and the environment.

## COMBINED ENGINEERING EXPERTISE.

### THE NEW PHASE II CONCEPT INTEGRATED SYSTEM DESIGNED TO HELP CUSTOMERS ADDRESS FUTURE CO<sub>2</sub> AND NOX CHALLENGES

The concept integrated system is made up of four core technologies; the Integrated Rotary Turbine Control (RTC), UL4 Urea Doser, Flex Coupling Compensator and the Close Coupled Unit. The phase II design system, which is still under development, illustrates Cummins' continued expansion of the Components portfolio to solve customer challenges. Cummins is committed to developing integrated components that provide value across the powertrain that can be tailored by customers for their applications. The design of this concept system will continue to evolve as Cummins will partner with OEMs on optimisation of packaging.

#### INTEGRATED RTC VALVE

##### 1. Optimised heat management:

Up to 100% exhaust gas bypass, enabling the aftertreatment to reach operating temperatures faster and reduce NOx more efficiently.

##### 2. Improved thermal management:

Generates back pressure for thermal management, driving Exhaust Gas Recirculation (EGR).

#### UL4 UREA DOSER

##### 1. Improved temperature control:

Increased ambient temperature capability and increased ambient temperature limit, up to 160°C (200°C limited time), is designed to enable post turbo urea injection.

##### 2. Improved reliability:

Together with the UL2.2, UL4 is one of the only liquid-only dosing systems on the market, offering freeze-robustness in its design. The system is designed specifically to prevent doser crystallisation and clogging.

#### FLEX COUPLING COMPENSATOR

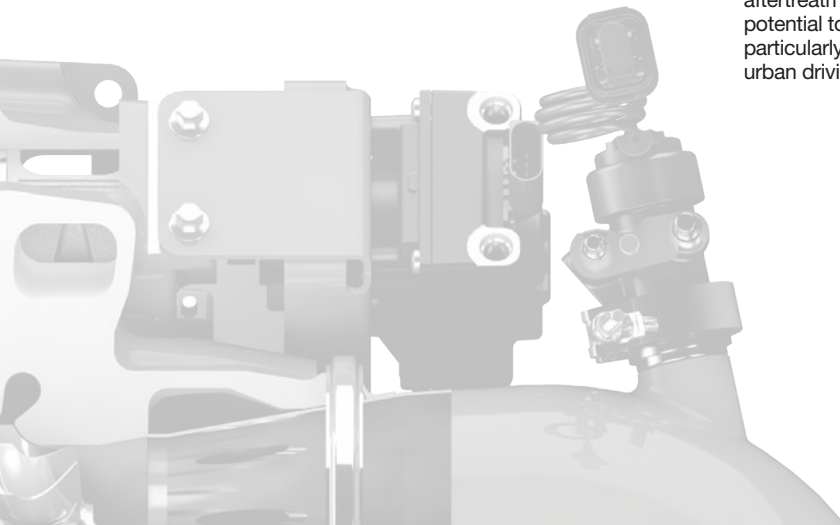
##### 1. Improved packaging:

The new Flex Coupling Compensator optimises the UL4 doser's positioning, dampens vibrations and offers installation flexibility.

#### CLOSE COUPLED UNIT

##### 1. Improved emissions integration:

The close coupled aftertreatment unit benefits from higher exhaust gas temperatures to enable more effective emissions conversion. When combined with the Single Module™ chassis mounted aftertreatment, it has the potential to improve emissions, particularly for cold start and urban driving operations.





**ALWAYS ON**

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