Five Waves Status Report

Introduced in 2002, the *Five Waves* strategy continues to provide the basis for how the company views the overall market development. The production status for each of the *Five Waves,* based on the full-year production rate of 3.3 million Engine Equivalents is summarised in the following table:

Wave 1 V-Diesel Passenger Vehicle Engines in Europe	Full-year production: 300,000 Engine Equivalents (15,000 tonnes) Series production for: Audi, Ford, Jaguar, Land Rover, Maserati and Volkswagen SinterCast-CGI Components: Cylinder blocks ranging from 2.7 to 4.4 litres Overview: 15% growth in 2019, despite overall reduction in diesel penetration
Wave 2 Commercial Vehicle Engines Worldwide	Full-year production: 1,180,000 Engine Equivalents (59,000 tonnes) Series production for: DAF, Ford-Otosan, Hyundai, Jiangling Motors, MAN, Navistar and Scania SinterCast-CGI Components: Cylinder blocks and cylinder heads ranging from 3.9 to 16.0 litres Overview: 20% growth in 2019 with near-term and long-term global growth opportunities
Wave 3 In-Line Passenger Vehicle Diesel Engines	Full-year production: 500,000 Engine Equivalents (25,000 tonnes) SinterCast-CGI Components: Cummins 6.7 litre for Ram Super Duty pick ups Overview: Long-term potential depends on performance demands, downsizing and emissions legislation
Wave 4 V-Diesel Passenger Vehicle Engines Beyond Europe	Full-year production: 850,000 Engine Equivalents (42,500 tonnes) Series production for: Ford, Kia, Nissan and Ram SinterCast-CGI Components: Cylinder blocks ranging from 2.7 to 6.7 litres Overview: 15% growth in 2019. Growth potential as North American pick ups provide diesel options
Wave 5 Passenger Vehicle Petrol Engines Worldwide	Full-year production: 325,000 Engine Equivalents (16,250 tonnes) Series production for: Ford and Lincoln SinterCast-CGI Components: Cylinder blocks ranging from 2.7 to 3.0 litres Overview: 40% growth in 2019. Growth potential for additional engines and vehicle applications, including hybrids

Other Growth Opportunities

Automotive - Other than Passenger Vehicle Cylinder Blocks	Full-year production: 65,000 Engine Equivalents (3,250 tonnes) Series production for: Various OEMs and Tier I suppliers including BorgWarner and Honeywell SinterCast-CGI Components: Exhaust manifolds, turbocharger housings and bedplates Overview: 65% reduction in 2019 due to reduced exhaust component production in China
Industrial Power	Full-year production: 115,000 Engine Equivalents (5,750 tonnes) Series Production for: Allen Diesels, Cameron Compression, Caterpillar, Cummins, Deutz, Doosan, Federal Mogul, General Electric, Jenbacher, MAN, MTU and Waukesha SinterCast-CGI components: Agriculture, marine, locomotive, off-road and stationary power applications Overview: 30% reduction in 2019. Growth opportunity as new products come on-stream

Note: All information as of 1 May 2020