Foreword

Global Megatrends in the Automotive Industry

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The automotive industry is facing unprecedented change at a rate not seen since the introduction of mass production techniques by Henry Ford in the early 20th century which moved the automobile from a novelty for the rich to an affordable form of transport for the entire population.

The first major technology trend is a continuation of the powertrain R&D activities which have been ongoing since the mid 1970's when California began to introduce exhaust gas emissions legislation and over the past 40 years we have seen a complete re-engineering of the internal combustion engine as the industry has made remarkable advances in combustion control and exhaust gas after treatment technologies. Clearly HORIBA has played a major role in this decarbonisation revolution with a series of industry leading gas and particulate measurement systems. The drive to reduce the use of carbon based fuels has migrated into a drive to electrify some or all of the vehicle propulsion system and with California again leading the way there is a determination now to legislate that 100% of the vehicle fleet must be Zero Emissions Vehicles (ZEV) by 2050. Given the average 17 years to completely replace the vehicle fleet means that all new vehicles being produced by around 2035 will need to be ZEVs. This is an enormous change from the current ZEV production levels of less than 2% globally. The opportunity for HORIBA is to support this electrification activity with testing solutions for full electric drivelines combined with the development of on board power sources such as battery packs and fuel cells.

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The second major technology trend that has accelerated in the last few years is the rapid growth in both intelligence and connectivity on vehicles as the industry works towards delivering the long held vision of autonomous vehicles transforming the safety and efficiency of the road network. The transition to highly intelligent and connected vehicles dramatically increases the complexity of the software on a vehicle. Current high end vehicles have around 100 million lines of code on the vehicle and it is estimated that a fully autonomous vehicle could have upwards of 250 million lines of code. These vehicles will be the most complex consumer product in the world and this complexity plus connectivity to the internet brings huge development challenges around product integrity and resilience to cyber security concerns. Again for HORIBA, focusing on testing solutions and engineering services that deliver enhanced vehicle resilience will provide huge long term opportunities for growth into new areas.

The final major change to the automotive sector is the move to Mobility as a Service MaaS where consumers and the logistics industry are buying mobility rather than a vehicles. This can already be seen in advanced markets such as Japan and USA with the reduction in car ownership among the Gen Y and Gen Z allied with a growth in ride sharing services driving down car ownership among younger travellers.

Combining this societal trend with a fully electrified and autonomous vehicle fleet and it is clear that the automotive sector is entering the most disruptive period for over 100 years. The challenge for all of us in HORIBA is to ensure we are positioning our products and services to meet these opportunities while continuing to deliver today's solutions to address today's automotive R&D needs.