

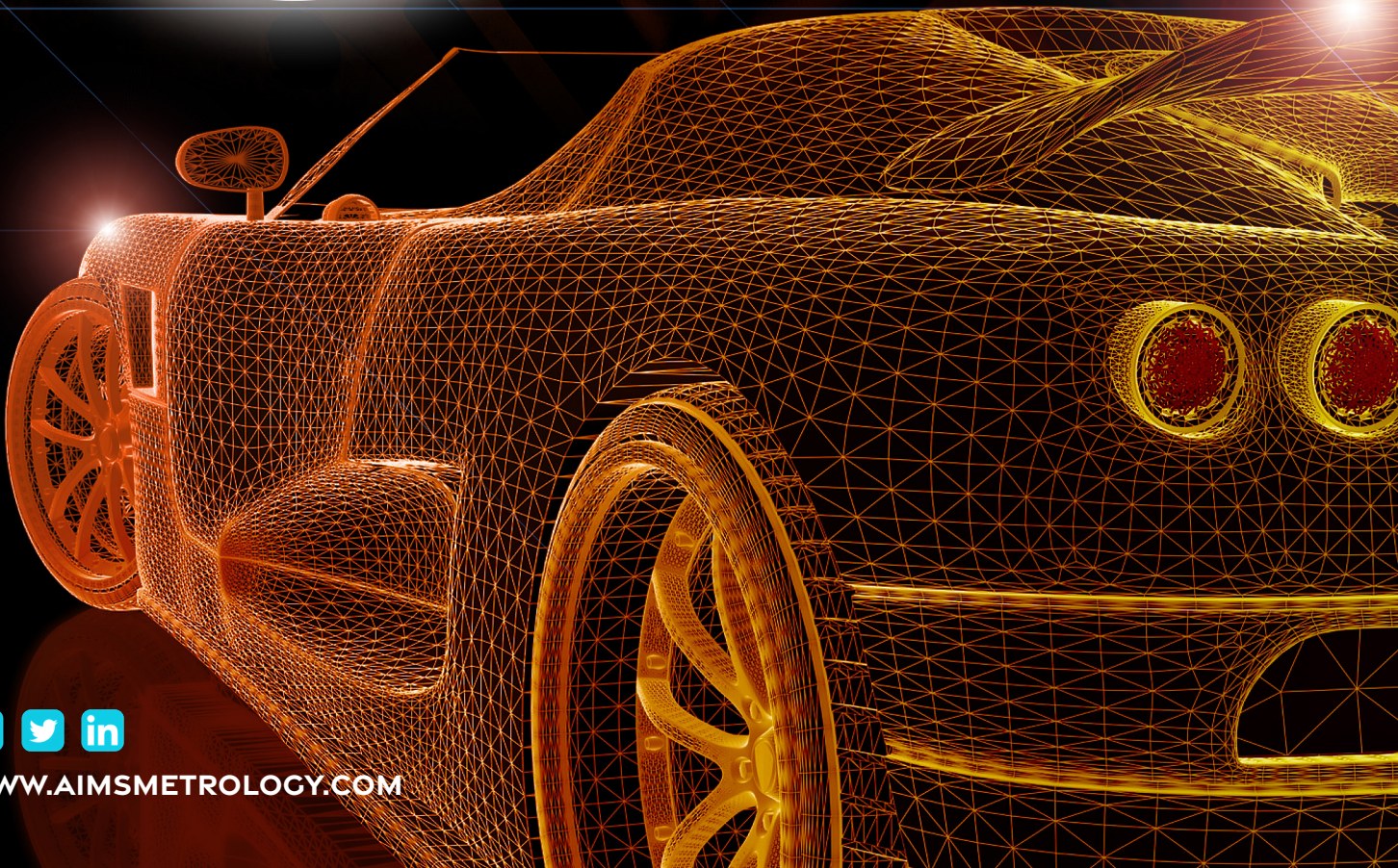
AIMS ADVANCED
INDUSTRIAL
MEASUREMENT
SYSTEMS

IT'S

DRIVE TIME



**The Race Toward
5-axis Advanced
CMM Technology
in the Automotive
Industry**



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TABLE OF CONTENTS

- 02** Introduction
- 03** Market Overview
- 04** Part Types & Measurements
- 06** Non-contact Inspection
- 07** Updates To Quality Standards
- 08** Conclusion
- 09** Resources
- 10** About AIMS Metrology



INTRODUCTION

Crossover or sport utility vehicle? Electric or driverless? These are some of the questions new car buyers will have to consider in the not so distant future. Stricter emissions guidelines are forcing companies to invest in hybrid and electric vehicles and other options for passengers and freight. Public transportation, car sharing, and ride-hailing companies are also on the rise. A recent PwC report, has coined the phrase “**EASCY**” to describe five main trends expected to shape the auto industry through 2030. They are:

Electrified | **A**utonomous | **S**hared | **C**onected | **Y**early updated

On the manufacturing side of things, automakers are working to reduce weight and costs while shortening production times. Two factors—the Internet of Things (IoT) and artificial intelligence (AI) —are producing technology-driven disruptions that include powertrains and advanced driver assistance systems, smart interiors, and vehicles that are becoming increasingly connected. Car manufacturers, mobility service providers, and autonomous technology companies are teaming up to be the first to market with their concept of autonomous shared transportation.



So what does all this mean for OEMs and their suppliers? In addition to connectivity, the need to reduce weight and costs while shortening production times remains crucial. Increasing automation, harnessing data, and machine learning are key focus areas to increase efficiency, quality, and flexibility.

A Snapshot

- In 2018, motor vehicles and parts accounted for \$518.1 billion of the \$18.566 trillion in total U.S. GDP
- The OICA [ES1], International Organization of Motor Vehicle Manufacturers, ranks the U.S. as the second-largest producer of automobiles, second only to China
- GM and Cruise, its' autonomous driving start-up, plan to launch an autonomous ride-hailing service in 2019
- Volvo, Ford, Jaguar, Land Rover, and Toyota announced their entire portfolio of cars will be electrified to some degree within the next decade
- Data from the supply chain to the warehouse is considered the "new gold"

Drilling Down

Demand for more automated processes and the need to gather and make sense of data have also expanded the role of mobile inspection solutions in the automotive industry. When it comes to measuring parts for engines or internal transmission applications, 5-axis mobile measurement technology can be a game changer. Mobile measurement is also suited to 3D components and can include a range of measurement requirements.

Reclaiming Production Time

Until now fabricators conducting surface finish measurements have had to use hand-held sensors or move a part to a dedicated measuring machine. The Revolution Series LM coordinate measuring machine (CMM) fitted with a Renishaw 5-axis REVO 2 head and SFP2 probe gives manufacturers the flexibility to inspect a diverse range of features on one CMM. The SFP2 automates surface finish measurement for reduced part handling and higher throughput.

Parts for today's vehicles are becoming increasingly complex, a trend that lengthens measurement cycles. The LM with REVO 2 and the SFP2 reduces cycle time significantly for increased throughput. While the LM can be used in the controlled environment of a laboratory, automakers can bring the LM onto the shop floor with the help of a protective enclosure.



Sampling of Part Types & Measurements

Manufacturers need to measure and verify a range of parts to meet ever-tightening tolerances, including:

- Surface measurement for component verification
- Deformation measurement and dynamic measurement
- Repeatability check of individual components
- Jig inspection and verification
- Alignment of hinge lines and body components
- Verification of shape analysis
- Adjustment of robotic equipment
- Production line measurements



When it comes to mobile metrology equipment, the Revolution HB CMM equipped with a Renishaw PH20 is a good choice. The harsh environment of a shop floor can make inspection and measurement difficult. The HB's composite base makes it slow to react to thermal changes while dampening vibrations. The mobile, 5-axis CMM is also easily adaptable to part design changes as well as process changes compared to dedicated gauges that must be re-designed, replaced, or modified.

PART TYPES & MEASUREMENTS

The low mass of these machines allows them to operate at high speeds without compromising repeatability or accuracy. And, inspection time is cut from days to minutes without sacrificing accuracy. The PH20 is three times faster than conventional probe heads. A roll-around stand makes moving the HB from one area to another easy. The only 5-axis mobile unit on the market currently, the HB uses 110/220 volt outlets, eliminating the need for shop air.

The Equator Gauging System is a good fit for smaller, high-volume parts like brake calipers, rocker arms, water pumps, pistons, and brackets.

Part Geometry

The lab-grade Revolution Series LM with a 5-axis REVO 2 probe head is especially suited to applications that require an auto supplier to measure part geometry for precision machined components such as drivetrains or suspensions.

Short lead times are equally challenging for car makers. The LM can provide improved throughput of up to 50 percent. Most 3-axis CMM programs take approximately 20 minutes to run. The 5-axis LM with REVO 2 can measure or test parts in as little as 10 minutes.



NON-CONTACT INSPECTION

The REVO-2 also gives manufacturers the ability to automate surface finish inspection, which up until now has been conducted manually. In addition to recouping production time, a supplier can free employees to perform other value-added tasks. For example, a REVO video probe allows auto OEMs to perform non-contact inspection for features such as tiny holes and thin edges.

In cases where 100 percent inspection and efficient cycle times are critical, such as when measuring a high volume of parts, the LM and Renishaw's Equator can work in tandem. Able to bridge the gap between the lab and production parts that must be measured, the Equator has the flexibility to support continuous part fabrication or production of diverse parts assigned to regular batches. It can switch programs and fixtures in seconds for medium- to high-volume applications.



Along with having the right metrology equipment, compliance with the ISO 9001 standard for quality management and the industry-specific ISO/TS 16949 helps support consistency in business operations and ensures products meet stringent specifications.

These standards received significant updates in 2016. The ISO 9001 standard was upgraded from its 2008 version to a 2015 version, and ISO/TS 16949 has been disconnected in title and structure from ISO 9001. The International Automotive Task Force (IATF) now controls IATF 16949 and will provide future updates.

IATF 16949 still requires compliance to ISO 9001:2015 but also stands as a separate document. Certification audits conducted to the new standard for organizations previously registered to ISO/TS 16949 began October 1, 2017.

To keep pace with quality standards and measurement requirements, a key consideration is working with an OEM that can provide 5-axis, lab-grade and mobile CMMs as well as a range of custom gauge choices. It's also important to make sure your metrology OEM has ISO/IEC 17025:2005 accreditation for calibration. Metrology support is also being developed for the growing production of electric vehicles.

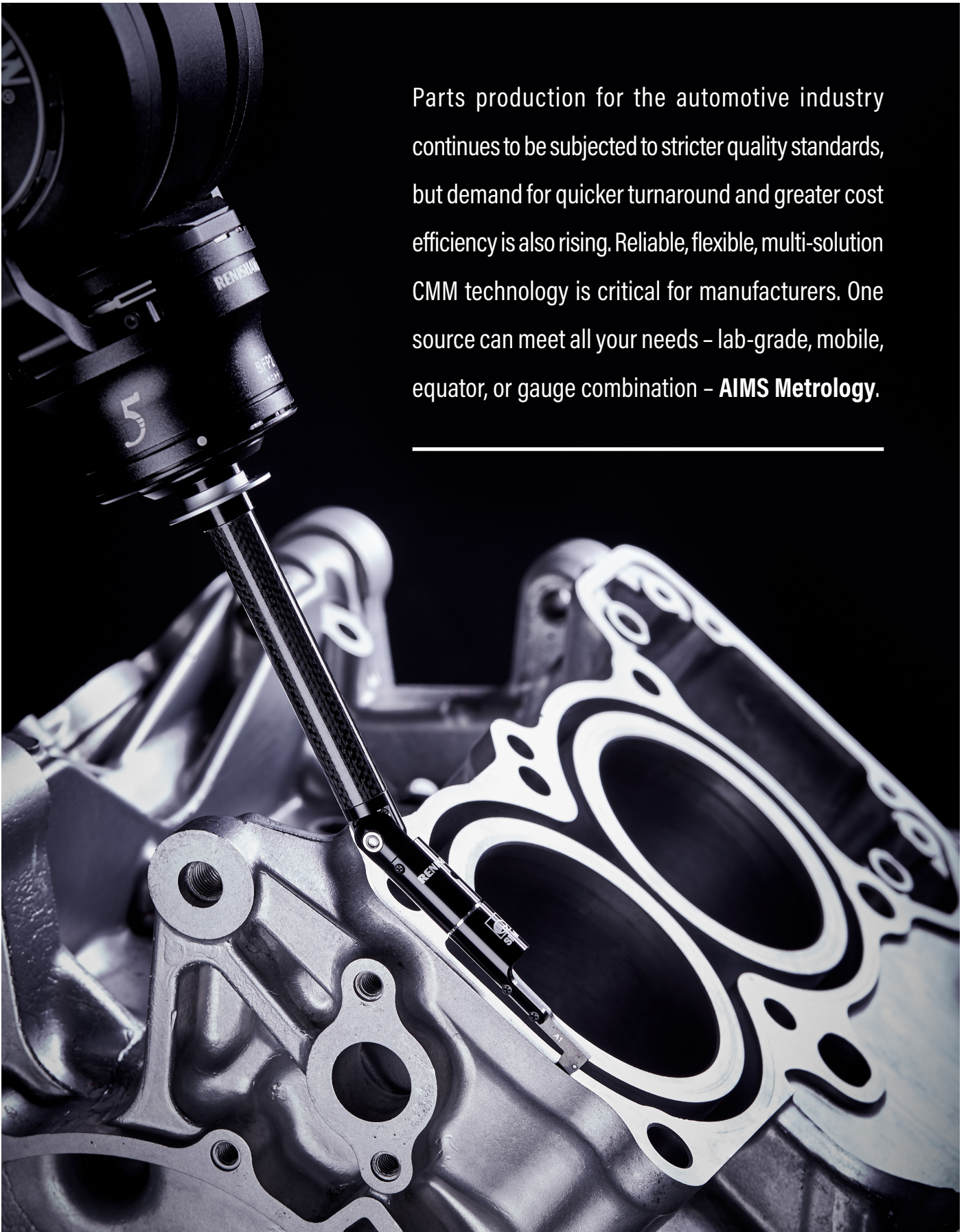
Tax Provision

An underutilized provision for tooling costs will give auto manufacturers and suppliers an opportunity to increase their research and development tax credit. Companies can claim new tooling costs and other qualified supply expenses resulting from new product development, product improvement and process improvements. According to RSM International, a global network of independent audit, tax, and consulting firms, including tooling costs has the potential to greatly increase an R&D credit.



CONCLUSION

Parts production for the automotive industry continues to be subjected to stricter quality standards, but demand for quicker turnaround and greater cost efficiency is also rising. Reliable, flexible, multi-solution CMM technology is critical for manufacturers. One source can meet all your needs – lab-grade, mobile, equator, or gauge combination – **AIMS Metrology**.



EBOOKS

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BLOG

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When it comes to metrology, you need a team with decades of combined engineering, field, programming and service experience. AIMS Metrology is that company.

We design, build and assemble our shop floor and laboratory CMMs right here in the U.S. We engineer our machines around Renishaw 5-axis technology. And, we support our CMMs with QC-CALC and MODUS software. We're equipped to guide our customers because there are very few market brands that members of our team haven't sourced, serviced or programmed at one time or another.

The intelligence we've gained from years of hands-on experience qualifies us to help guide our customers' choices today. Let us provide you with a turnkey solution that eliminates the guesswork for both the software and the hardware.

If you'd like to speak with a CMM expert, reach out to
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