

ANALOG DEVICES INC

Moderator: Maria Tagliaferro
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Maria Tagliaferro: Hello, this is a Maria Tagliaferro. I'm head the Corporate Communications Department for Analog Devices. Thank you for joining today's webcast. This is the second in the series that we've developed exploring the growth drivers behind our business.

As many of you know, approximately 85 percent of our revenue derives from industrial communications infrastructure. And the topic of today's webinar, the Automotive Application.

I'm joined here today by Dave Zinsner, ADI Chief Financial Officer; and Mark Gill, ADI Vice President of our Automotive Business Group.

Many semiconductor manufactures highlight the automotive industry as a key growth driver, so much so that many market watchers are sort of struggling to understand why. After all, the semiconductor industry in 2012 had only about 8 percent of revenue coming from the automotive industry. So, it may seem to many that it's garnering sort of an unfair share of the conversation.

But for Analog Devices, where the automotive revenue is nearly 20 percent of our total revenue and the automotive market is one that we've been actively involved in for about 40 – I'm sorry about 20 years, a closer look really does make a lot of sense. So, during today's webinar, we'll begin with a brief presentation highlighting the trends, strategic applications, and growth drivers for our automotive business. And you may submit questions at any time during the webinar via the online chat feature and we'll answer those questions after the presentation.

So, with that, let's take a closer look at ADI's Automotive Electronics opportunity.

VIDEO PRESENTATION

Analog Device's opportunity in automotive business is significant. About 80 million cars were built in 2012 and we estimate that more than 100 million cars will be sold by 2020. And the electronics and semiconductor content is growing at an even faster pace. ADI's automotive signal strategy is inspired by the vision of making tomorrow's cars better and three high level industry macro-trends describe how consumers define better. That is, they want their cars to be greener, to be safer and to be smarter. Sophisticated electronics are being integrated into safety systems, power train systems and infotainment systems, creating a significant opportunity for ADI's high performance signal processing technology.

As manufacturers make cars safer, greener and smarter through electronics, automotive semiconductor content is expected to grow at least twice as fast as the unit growth rate of cars and light trucks. IHS iSuppli forecasts the automotive semiconductor market is growing at a compounded annual rate of approximately eight percent from 2012 to 2017 and will reach \$45 billion dollars by 2020.

The portion of the market that's targeted by ADI's high performance signal processing capabilities is approximately \$5 billion dollars. Clearly the automotive opportunity for ADI has significantly expanded since ADI entered the market over 20 years ago.

In the early '90s, airbag systems came into play and Analog Devices is one of pioneers in introducing MEMS technology to do a very low cost, high reliability, high performance single chip MEMS accelerometer. Since that time, the technology has further expanded to include gyros, low-g accelerometers and combo sensors that Analog Devices is now introducing.

As airbag safety systems evolved from a premium feature to a mandated government regulation, ADI's investment in MEMS inertial sensors deepened and relationships with automotive industry innovators brought -- by 2007 ADI's sales into automotive safety applications reached \$100 million dollars and total automotive sales were over \$200 million dollars as the served available market was rapidly expanding into Powertrain and Infotainment solutions. Over the next five years, ADI's sales growth would significantly outpace car unit sales growth.

The automotive ecosystem is comprised of over 60 car companies worldwide who in turn are supported by a vast array of primary suppliers called tier one suppliers. It's these tier one electronic subsystem suppliers that are ADI's direct customers. ADI engineers collaborate with both tier one suppliers and car manufacturers and in some cases this collaboration with the car manufacturers is formalized. Audi, for example, recently selected ADI to be part of the Audi Progressive Semiconductor Program which aims to bring technical innovators deeper into the ideation process of future Audi cars.

The timeframes from idea to production are very long in automotive applications. It can take five years for new safety features or power train systems to get to market. Today, automotive design hubs in the United States, Japan, Korea and Germany are making technology and component choices for automobiles that won't hit showroom floors for many years to come.

When a new vehicle model reaches production, not only must quantities ramp very quickly, but the components used throughout the vehicle must withstand harsh environments over warranty periods of 100,000 miles. This level of quality and reliability is similar to ADI's industrial business and a sharp contrast to consumer products.

To ensure these quality levels were integrated into ADI's manufacturing operations, the company adopted an automotive qualification process. Today, hundreds of ADI products are released to this automotive standard, making a catalog of ADI products available on pre-approved vendor lists of the world's leading tier one suppliers.

Evolving mandates are propelling innovations in safety systems, fleet-wide fuel efficiency and reduced emissions. For example, the US began requiring electronic stability control systems in 100 percent of all passenger vehicles under 10,000 pounds in 2012. The European Commission requires that all new cars be equipped with electronic stability control systems by 2014.

With respect to fuel efficiencies, US corporate average fuel economy or CAFE standards will require vehicles achieve 35.5 mpg in 2016 and 54.5 mpg in 2025, almost double today's current standard. These mandates are a significant force behind the trends for safer, greener, smarter vehicles.

In each of these trends, the key differentiator for ADI is high precision technology which is reliable, even in the harsh conditions experienced in automobiles. Safer vehicles require high precision signal processing to detect and classify collision hazards from among a very complex changing mix of cars, trucks, motorcycles, bicycles, pedestrians and fixed obstacles.

Greener vehicles that provide fuel efficiency without compromising engine performance and reduced emissions use high precision signal processing to monitor and control information thousands of times every second from dozens of engine, transmission and battery sensors, while overcoming the very disruptive flood of electromagnetic interference and a harsh operating environment within the engine and battery compartments. And smarter vehicles with sophisticated in-cabin information and entertainment systems require high precision signal processing to run complex acoustical algorithms that reproduce the sound heard in home theater systems or extract reliable voice commands from within the very noisy environment of the passenger compartment.

ADI is solving these high precision signal processing challenges with a broad portfolio of converters, high performance amplifiers, MEMS inertial sensors, RF receivers, transmitters and transceivers, power and battery management, processors and interface and power isolators.

Safety has become a major driving force behind a lot of the automotive electronic systems in use today. Manufacturers are putting in systems to vehicles to augment what the driver's capabilities are. These are called advanced driver assistance systems. In airbag systems, the systems in the car were known essentially as passive safety. A more modern approach, however, uses active safety systems. In an active safety system, the vehicle uses advanced sensors such as gyros and low-g accelerometers, essentially creating an inertial measurement unit much like you'd find in avionics to look at the yaw, roll, rate and lateral and longitudinal acceleration of the vehicle. All this information is processed by the vehicle control systems to maintain control of the vehicle in adverse conditions such as ice or emergency maneuvers and in all those instances the objective is to maintain stability and avoid a crash.

And now from active safety we're enhancing it further by bringing additional sensor information to the vehicle electronic control systems. Forward-looking radar is used to detect objects immediately in front of the vehicle, alert the driver, and provide emergency braking situations to avoid the crash. In addition, radar is also used looking to the sides of the vehicle to provide blind spot detection and cross-traffic alerts.

When ADI first entered the automotive market with MEMS solid state airbag crash sensors, single axis accelerometers were used in front impact airbag systems to protect passengers during a crash. With the addition of side impact airbags, ADI's dual axis MEMS sensors significantly reduced system cost by replacing two single axis products. Importantly, the high precision of ADI's MEMS sensors made it possible for software algorithms to better time the airbag firing based on the severity of the crash.

ADI's MEMS sensors can detect when a car starts to spin by using a multi-axis low-g accelerometer plus gyroscope to measure rotation, which together deliver a level of robustness, vibration immunity, precision and total system cost reduction not possible with any other sensor, product or technology, whether quartz, mechanical or solid state.

The need to improve safety on today's roads is growing rapidly. In established markets the demographics are shifting so that there are more and more elderly drivers. In emerging markets, millions of first-time drivers are operating within highly congested urban environments that still have a very heavy mix of bicycle and pedestrian traffic. According to the World Health Organization, road traffic injuries caused over a million deaths worldwide in the year 2010 and half of all road traffic deaths involve pedestrians, cyclists and motorcyclists.

The use of radar systems presents a promising yet highly complex solution which requires high precision signal processing. Radar-based ADAS systems emit ultra-high frequency radio waves into the area surrounding the car that then bounce back from people, objects and other vehicles. The reflective signals are captured by antenna and then passed to ADI ICs that filter and amplify the raw signals to extract usable information from among significant amounts of RF interference. This highly integrated radar analog front-end integrates more than ten discrete components into a ten-by-ten millimeter package. The integrated solution withstands parasitic losses and imperfect device matching that plague discrete implementations.

Going green is a theme in many industries and the automotive business is no exception. Hybrid vehicles use a mixture of gasoline and cleaner battery power to provide propulsion. Precise voltage measurement of the hundreds of individual cells is essential for maximizing both range and battery longevity. Essentially, going green in the modern car is providing an excellent opportunity for ADI's signal processing technology.

Internal combustion engines are incorporating innovative techniques to reduce fuel consumption and emissions without compromising performance. Today, you can find a two liter engine that generates a staggering 360 horsepower.

Sensors are required throughout the vehicle to monitor the crankshaft position, exhaust gas temperature, intake manifold pressure, variable valve timing, variable ignition timing, fuel injection pulse with modulation, detonation,

turbo-charger inlet/outlet temperatures, oil quantity, quality and pressure and fuel quality and pressure.

Today's start/stop systems can improve fuel efficiency by 10 percent by eliminating engine idling during routine driving such as at a red light or in stop/go traffic. By 2015, more than 35 million start/stop vehicles worldwide will be built each year. These start/stop systems present a critical challenge. The restart must be guaranteed and must be relatively instantaneous. Precise measurement allows the start/stop system to work more aggressively over a wider range of driving conditions and deeper discharge levels, yet maintain perfect reliability and drivability, thus maximizing the savings the start/stop systems can provide without ever leaving a driver stranded.

Analog Devices provides complete system solutions for battery monitoring in standard 12-volt lead acid as well as high voltage lithium-based batteries for hybrid and electric vehicles. These devices integrate all of the required features to precisely and intelligently determine the battery charged state, condition, health and lifespan. Integrated micro controllers preprocess the required battery variables and manage communications with the vehicle's main electronic control unit via local interconnect network interface that is also integrated on chip.

First time ownership of a vehicle has been empowering for many people but the increase in the number of vehicles on the road has broadly outpaced the upgrades in infrastructure, leaving us with plenty of road congestion. Infotainment is the macro-trend that aims to take the hundreds of hours each of us spends in the car every year and make them more enjoyable and more productive.

Consumers are demanding that their cars be smarter and more comfortable through greater ease of use, better entertainment experiences and higher levels of seamless integration that make their cars an extension of their home and business lifestyles. With car audio amplifiers equipped with embedded processors and ADI audio codex, car companies and tier one suppliers can deploy proprietary high precision algorithms that invoke psycho-acoustics to

create virtual concert halls or restore the detail and nuances lost when using compressed MP3 files.

The Shark processor speed and programmability, coupled with the precision of 56 bits, enables dynamic adjustments that tailor the sound to the specifics of each individual car. Adjustments compensate for speaker performance and placement, cloth versus leather seating surfaces, windshield angle, the number and position of people in the car, side windows that are up or down, and even the use of a convertible top. Licensed third party algorithms from companies such as Dolby Laboratories, SRS Labs and THX, coupled with proprietary road and engine noise cancellation ensure that the audio experience intended by the music studio engineer is faithfully reproduced in the car.

These trends for safer, greener, smarter vehicles and the importance of precision signal processing technology are generating a rich pipeline of design opportunities over the next several years. Across all these trends, sensors, transducers and the signal processing electronics that surround them will be increasingly critical. By 2025, ADI's opportunity in automotive electronics could reach \$8 billion dollars.

The expansion in ADI's served available market and revenue growth will be driven by a confluence of factors, including increasing electronic content per vehicle, accelerating vehicle unit growth, particularly given that today 90 percent of all cars are sold in regions with less than 10 percent of the world's population, continued technological advancement as a differentiator in premium automotive brands, and proliferation of premium features into mass market cars in order to conform with government mandates.

In the years to come, high precision signal processing technology will be integral to transforming the driving experience and making tomorrow's cars better.

VIDEO END

Maria Tagliaferro: Hello. All right. Welcome back everyone. Thank you very much for joining the webcast. So, we have a number of questions to get started on and you can, as I said, chat your question online via the webcast interface.

So Mark, if I can follow up on – we just ended on the – some of the serviceable available markets to Analog Devices, but can you take us through what kind of growth rate you think we can expect to see in the space and maybe in – do that comparing it to the unit growth rate of the automobile industry to the extent you can?

Mark Gill: Yes. Absolutely, Maria. So, the automotive business has been a good growth business for ADI, growing from the low \$200 million dollar levels in 2007 to mid-\$400 million dollar levels into 2012. And that's a double-digit compound growth over that period. And as we just saw on video going forward, there are many drivers for growth in Safety and Infotainment, Powertrain applications. Many of the innovations that we see there are initially seen in the premium level vehicles. And then as they've got rising acceptance, you get the consumers drawing them into the midrange vehicles with greater volume.

ADI's name is synonymous with leadership and innovation. And as those products and technologies moved from midrange – from the premium vehicles into midrange vehicles, you see a higher growth for ADI.

So right now, what we're looking at is focusing on the designs for model year '16, which really starts production in about 2015 period. Our pipeline for that period is very strong. That's even higher than it has been for the preceding five years. And so my best sense here is that over the long-term, we grow at two to three times the vehicle unit growth rate.

Maria Tagliaferro: Okay and that growth rate is a 3 or 4 percent unit growth rate of vehicles?

Mark Gill: Of vehicles, yes, approximately.

Maria Tagliaferro: Great, got it. So, you know, in my opening remarks, I mentioned that there is a lot discussion about the automotive industry, especially applications like Infotainment and Powertrain. And can you help the audience understand what

applications is ADI targeting within that space or are we all essentially after the same opportunities?

Mark Gill: Yes. So, as we said this, we're focusing about \$5 out of the \$45 billion dollar semiconductor TAM. So it's clear that a lot of things that we are not addressing by choice. And the Infotainment market you touched on there is arguably the biggest portion in that automotive semiconductor TAM. And using that single term, you know, it drives a lot of need for clarity for sure.

Within Infotainment, there are number of areas that are not of either business or technology interest to ADI. Take FM radios for example, or take CD players, they're highly commoditized at this point in time. They don't add a lot of extra high accuracy signal processing.

On the other hand, there are excellent opportunities for ADI such as audio amplifier systems that really strive to achieve the richest sound experience within the vehicle or audio and video transmission systems that connect things like the navigation processors up to the high resolution displays where the value is found at a system level by providing high efficiency transmission in an environment that's really full of EMC interference that would otherwise disrupt that visual image.

I can see you've got a quizzical look there. So what does that mean? So let me explain that for a second. If you cast your mind back to the days before cable TV, you know, your TV had those bunny ears on top of the TV there. And if you didn't set them up correctly, then the image was snowy, right? Or even you'd see the image jumping if the horizontal sync was lost and the equivalent essentially what happened in the car if you cannot operate in a high EMC environment. So, ADI's product there provides a lot of immunity to that sort of interference.

You mentioned Powertrain. And equally, there's quite a mixture of value in Powertrain electronics. Your basic engine sensors, window motors, pressure sensors for oil or tire pressure they're really of very little interest to us, they've got quite loose specifications on accuracy. On the other hand, there are high-accuracy pressure sensing things like the new refrigerants or for

diesel fuel injection, that are very difficult problems to solve and are fully aligned with our technology.

So, breakthroughs like start/stop technology, another example, really wouldn't be possible without some of the – without the ability to measure battery health and charge extremely accurately.

Now, you didn't mention Safety Systems but if I can I'll just touch on that. Vehicle Safety Systems is using a variety of sensors to gather data from multiple sources these days. Another trend that's occurring which might be called "sensor fusion" where the car is looking to integrate sensors and information from all sorts of different locations around the vehicle. If we think about MEMS for a second, ADI is one of only two automotive MEMS suppliers that has all technology, the Low-g technology, the High-g technology, the Gyro technology that forms the basis of that sensor fusion integration. And this last year, we saw some historical suppliers backing out of next-generation quotations because they don't have all those pieces that are necessary for the levels of integration.

If you think about ADAS, that's Advanced Driver Assistance Systems, ADI is one of the few suppliers that's got all the technology for radar, radar systems. We have the RF, we have the mixed signal, we have the processors for that. And we see radar as one of the key growth drivers in the industry as we're coming up to the next design cycles.

OEMs and consumers alike find value in these products such as Lane Change Assist. And you see the New Car Assessment Program in North America, in Europe is rewarding manufacturers for that 5-star ratings offering autonomous emergency braking for example and that's all enabled by radar systems.

So as safety becomes more integrated at the vehicle level, sensor fusion becomes more dominant, more important, and ADI has the ability that, you know, we're making sure that the combination of our MEMS sensors and our radar systems are smarter than the individual pieces that are there. So overall, vehicle safety and decision making, you know, at that level, ADI is really able to stand out from the rest of the crowd.

Maria Tagliaferro: So in that safety area that's obviously where we've been playing for a number of years going on decades, two decades, I believe, but all over the automobile as you've just kind of stepped through, car manufacturers are incorporating more and more electronics. And our audience is just trying to understand, what do you think is behind that, what is propelling that integration of electronics?

Mark Gill: Yes. That's a great question. I put it down to three different factors. Let's say first off, over the last 15 years, we've seen multiple waves of new applications that are demanded by both consumers and by governments. And they broadly couldn't be satisfied by the piece of bent metal that was the historical tool of choice for the automotive industry. Take an example, the recognition that vehicle emissions may be harmful to us or to the environment, or the increasing desire for overall better safety systems in the car, or the introduction of digital music to the consumer. When you look at all of those, vehicle manufacturers have found that all of the major innovations really could be enabled by semiconductor content. So, as we just saw looking forward, these ways continue to grow as we move towards ADI's vision of making cars better with zero accidents, zero emissions, and a fully connected experience within the vehicle. So that's the first thing there.

Secondly, the car manufacturers just have an intrinsic desire to have their vehicles break out of the peloton, that mass group there and requires looks for a very highly-differentiated in otherwise a confusing array of new model entrants.

And I'd say, lastly, semiconductor manufacturers for their part have improved quality and they've improved reliability of their products. And so, what you've got is the problem and the solutions got closer together and can feed off each other. We have customers becoming more comfortable with more and more technology integrating the vehicle over time. So I think you take those three things altogether, that's what driving growth in the content.

Maria Tagliaferro: Right. So that's interesting. So there's obviously an opportunity that a lot of companies and competitors are seizing. And one of our listeners asked, "How

do you maintain a high barrier to entry given all that magnetism from the opportunity that's developing in the market?"

Mark Gill: Yes. So first, ADI focuses on high performance, high accuracy problems rather than commodity. For example, the more accurately that you can measure the health of the car battery, the less residual you need to leave for, let's call it margin of error. So, the further you can confidently drive on one charge, so you can see merely how high accuracy reflects and connects to a better user experience.

But high accuracy technology is hard to get at the right quality levels. And then you have to build these products for very high volumes, and hopefully, for a very long period of time. So, it's not just merely rigorous testing of consumer-type devices, at ADI, we developed special design rules, very special specifications, manufacturing know-how, et cetera, for these mission critical automotive systems.

But there's really one other thing there and that is that ADI carries a really broad portfolio of products. And, you need that broad portfolio these days to be a strategic partner and supplier to the manufacturers. Throughout the industry, the car manufacturers are looking to reduce their supplier base and those tier ones are looking to reduce their supplier list. So, having that broad portfolio where we can more quickly leverage products from our industrial base or our communications infrastructure base really strengthens our position.

Maria Tagliaferro: You mentioned that qualification process getting very high reliability, can you help the listeners understand ADI's qualification process a little better, maybe go a little deeper there?

Mark Gill: Yes. So, the specifications that we have that defines out automotive qualification, we started and we defined that – co-defined that with leading automotive manufacturers and customers. There's a broadly used industry standard there and we use that as our basis as necessary, but not sufficient. We build up from there.

I think a fallacy assumed by some new entrants is that they can take a product destined for the consumer world and just add some temperature testing to make the product good enough for automotive. But you rapidly find that to achieve the required levels of reliability and robustness and quality, the products really need to be architected from the beginning and designed with an automotive mindset in addition to just manufacturing and the testing. And you need to have zero PPM in mind. Zero part per million failure that needs to be in mind. But it takes a lot more than that.

Maria Tagliaferro: In the presentation, we actually talk about there's a lot more affinity with industrial sector than a consumer sector even though we obviously think of automobiles as consumer products. And so that brought up a question from one of the listeners. Just kind of talking about beyond that, what's the alignment with the company's financial model? What beyond the testing, so to speak, and the quality levels would you cite?

Mark Gill: Well, we've been doing automotive for a long time, at this point in time, since the early 1990s. And some time back, really tried to ring fence this business, recognizing it does have strong affinity with our overall business model. If you think about the long lifecycles of the business, and in particular, vehicle is typically in production for 7 to 10 years, and then you've got after that spares that go with it. It's also industrial business, right, it mirrors that.

There are high barriers to entry, high performance as we just described. But the industry values reliability and robustness; capture that with the high performance that's similar to our CIFR business. You need to have those as well.

Maria Tagliaferro: Comms infrastructure.

Mark Gill: Thank you. Communications infrastructure business. So, we are a small piece of the overall bill of materials in the vehicle, but it's a very critical function. So I think it fits very well with the overall –ADI's overall extended financial model.

Maria Tagliaferro: So Dave, actually, maybe following up on that, maybe specifically on the financial model, how would you describe the automotive industry up against the rest of the company?

David Zinsner: Well, first of all, as Mark talked about, the growth is fantastic as he cited, I think that growth rate on a compounded annual basis is probably like kind of mid-double digits or mid-teens in terms of growth rates. And so, that aligns nicely because that's what we're trying to do, trying to grow the business.

Also, as he talked about, just the requirement in terms of quality requirements and in terms of innovation, he talked about specifically in the MEMS area, how we only have one other competitor that can really deliver the breadth of products that we have. I think that's probably true in a lot of the different sub-applications within the automotive space. So, when there's not a lot of competitive threat because they don't have the technology, when the quality standards are very high, that kind of eliminates a lot of the competitors from being able to participate. You can get a good return on your investment in this space.

And so we've kind of seen that. I would say, specifically, we have had some products that even though we're getting great ASPs, sometimes the margins have been a little bit challenged because the cost of manufacturing, because it's a new technology and we are kind of learning our way through it in some ways, hasn't been quite up to snuff. But Mark and his team have a pretty solid roadmap to getting the cost more aligned with what you would expect in this space for certain of the products. A lot of them already have great margins. But for certain of the products, which I think one of the other greater parts of the story for Mark is going to be that the gross margins in this space are actually going to be expanding and they'll probably expand quite rapidly over the next four or five years. So, take that together with a pretty good topline story, you get really good operating margin growth rates that should be really accretive to the bottom line of ADI.

Maria Tagliaferro: Excellent. Great. Thanks. Okay, shifting gears here, you knew I was going to say something like that... Can you talk a little bit – I guess, Mark, this one's for you, about the geographic concentration of the automotive business.

Mark Gill: of our automotive business

Maria Tagliaferro: yes.

Mark Gill: Okay. So it's true let's say that North America and the European customer design centers have been the growth engines for ADI over this last decade. But, really the best technologies deployed in the premium automotive market regardless of its geographic location. And then once the consumers like that it's brought into the mid-grade vehicles all around the world.

To say that Japan, Korea, China, they do represent another wave of upcoming growth for ADI. And I think that's reflected in the outlook, the positive outlook that we're able to think about here.

Maria Tagliaferro: Great. Yes. That's actually something we have talked about a number of times that with all the success that we've seen, the Asian markets are still sort of yet to come for us. We've been very focused in Europe and North America. So, you're pretty positive about how things are going for us in Asia?

Mark Gill: Yes. If you think about a lot of the innovations have come through some of those premium manufacturers in Europe and that has been our focus for a while. And during that same period, maybe some of the Asian markets, particularly in Japan, were more vertically integrated with their supplier base. But a lot of things happened, a couple years ago with tsunamis and all the supply chain challenges that really encouraged them to diversify their supply base. And as a result, they're now sourcing technology from suppliers all around the world that can both offer them differentiation at a product level and also that security of supply.

So, broadly, I think ADI is accelerating our designing process with suppliers, certainly in Asia, and the results are going to be seen in this next design cycle.

Maria Tagliaferro: Excellent, great. So we have another question that comes in regarding government mandates. And can you talk a little bit about what you think might be on the horizon and how it might impact our automotive business?

Mark Gill: Yes. So government mandates. They're a mixed blessing, Maria. But overall, I think they're good for ADI. They drive growth and they focus our investments.

But the critical factor here in making a government mandate good for ADI is quite frankly you need to be in there before it becomes a government mandate. And that is, ADI's name has to be linked with solving that problem, which we are well-positioned for.

So, thinking about mandates, several mandates and quasi-mandates are coming up on the safety front. For example, take rearview cameras; it's capturing the NCAP, the New Car Assessment Program for North America. ADI's had products there for some period of time now. We're there well before that becomes a mandate. The products are used in a variety of cars and what they do is they display that rear camera picture very rapidly on the dashboard or the mirror display, so you've got very rapid response and what may be behind the vehicle.

So, we've got a recognized solution. And, the mandate will just drive greater volume for us, so that's all good stuff there. Other mandates and that might be stability control, or autonomous emergency braking coming in, some pedestrian recognition things coming in, a lot of them driven by this New Car Assessment Program.

In the Powertrain area, there are also a broad set of mandates, maybe the most obvious one for us here is the CAFE standard for fuel economy, trying to achieve 35 miles per gallon by 2016. It increases fuel efficiency. It decreases emissions.

What we've been doing there is capturing – using that mandate to our advantage in bringing our product for what we could call our start-stop or enables the start-stop function. And from that, we believe that consumers would see anywhere from 5 to 15 percent fuel efficiency improvement in their vehicles.

And you've seen a number of different people out in the industry citing that maybe 30, 35 million of these things will be in vehicles in mid-decade. It is something that's certainly seeing a lot of interest from the consumer folks.

So, I think there's a lot of examples of mandates that are out there. We looked at them on the video there. I think they are going to drive additional content for us. Not a mandate, but a pressure point is this thing which is called the New Car Assessment Program, NCAP, and what NCAP is looking to do is put 5-star ratings on vehicles which would be additional benefits to consumers when they're choosing a vehicle, when they are going to buy a new vehicle.

And so many of those NCAP features are not yet mandates but there are ways where ADI is working towards solving those problems already. And then when they become a mandate later on, again, we're well-positioned before they become a mandate.

Maria Tagliaferro: Excellent. Great. So, you mentioned the word "content." And we do have a question, about content, what is ADI's product mix and typical dollar content in the automotive and how is it changing?

Mark Gill: Dollar content. There's really no typical answer to that one unfortunately. It's definitely more complicated. You can't just divide the annual revenue from ADI by the number cars shipped and come up with a number, I think that would be really misleading. In an entry level car with a small engine and then a basic radio and just basic air bag systems, clearly, the content is relatively low. In a midlevel, in a premium car, we have a high performance engine, a top of the line audio system, video going into the back seat, blind spot detection, you know, there's a variety of other safety features, then the content is really high.

So, I think overall, each vehicle purchase delivers a different level of content for ADI and the semiconductor content feature really factors on things like the vehicle class, the model, the options offered in those models, and even the propulsion method whether it's a gasoline vehicle, or whether it's a hybrid or electric vehicle.

And then you've got additional, regional variations that exist. European vehicles push more into the diesel direction. You've seen in China big pushes for electric vehicles. So, overall, you've heard us mention the SAM for ADI is growing faster than the vehicle units. And so, if I wanted to think about typical dollar content, it's likely to be increasing as we go forward, but putting a number on that I think is a very misleading...

Maria Tagliaferro: You are just not going to give it a number, are you? All right. I'm going to let you off the hook, I have control.

Mark Gill: Thank you.

Maria Tagliaferro: But, okay, you did mention electric vehicle.

Mark Gill: Yes.

Maria Tagliaferro: We have a question on that. How do electric vehicles expand the TAM or the SAM for ADI?

Mark Gill: Yes. I'd like to draw a distinction here between electric vehicles and electrification of the vehicle because what we see even in a gasoline-powered vehicle is a lot of electrification going on in the vehicle. So, let's say for example, move away from hydraulic power steering to electric power steering is an excellent opportunity for ADI. When you were in that start/stop system and vehicle has stopped, there's no engine belt driving any other motors within the vehicle. So, now you've got a lot of other motors and electrification going on, even though it's a gasoline-powered vehicle. So, electrification drives a huge market opportunity for ADI.

A pure electric-drive train car is quite – I think a little different, it will certainly have more high power electronics. But in the near term, there aren't many electric cars, with all the hype about it, but there aren't really too many cars on the road at this point in time. So, when it becomes important from the unit volume standpoint, ADI can take advantage of all the electrified systems that go around those high-powered propulsion systems.

Maria Tagliaferro: Well, great. Well, I think that's actually all the questions that we have. So, just to kind of wrap it up, maybe Dave ask you – I thought you did a great job kind of summarizing why we like this business.

David Zinsner: Yes.

Maria Tagliaferro: Can you maybe kind of give us a walk through the pie chart by end market and how you think about automotive in that context?

David Zinsner: Okay, good. Well, first of all I loved that. Mark did a great job and fortunately he's a big talker, so I didn't have to worry about talking, that's fantastic.

Yes. So listen automotive, I remember when we first – I think you were even involved in this, when we first broke out automotive. It was a sub-10 percent and it almost like didn't justify its own little category, and we thought all the growth potential on this business, it seems like this might be a bigger part of the pie at some point. So, why not get everybody kind of calibrated to how much we've been investing and what we got going on there and then just kind of see how it goes and now lo and behold, it is a big part of the pie. You know, when you break that down relative to like consumer, it's now bigger than consumer. It's basically neck and neck now with the communications infrastructure business. And so, now, it's a really significant component of our revenue and very important. And the good news is it such a big piece but it has such good opportunity for growth that really is going to pay dividends for us down the road to help us drive the topline growth of the overall ADI business.

So, we're excited about this business, if Mark comes to the table every year to try to get increased investments and it's one of the fewer ones where, you know, there's not a lot of argument, we can all kind of see the logic around increased investment in the space.

Maria Tagliaferro: Excellent. Great. Well, thank you both for joining us and thanks to the audience for listening in.

David Zinsner: Great. Thanks.

Maria Tagliaferro: Bye-bye.

Operator: Well, ladies and gentlemen, that concludes today's presentation. You may now disconnect and have a wonderful day.

END