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ALIE18

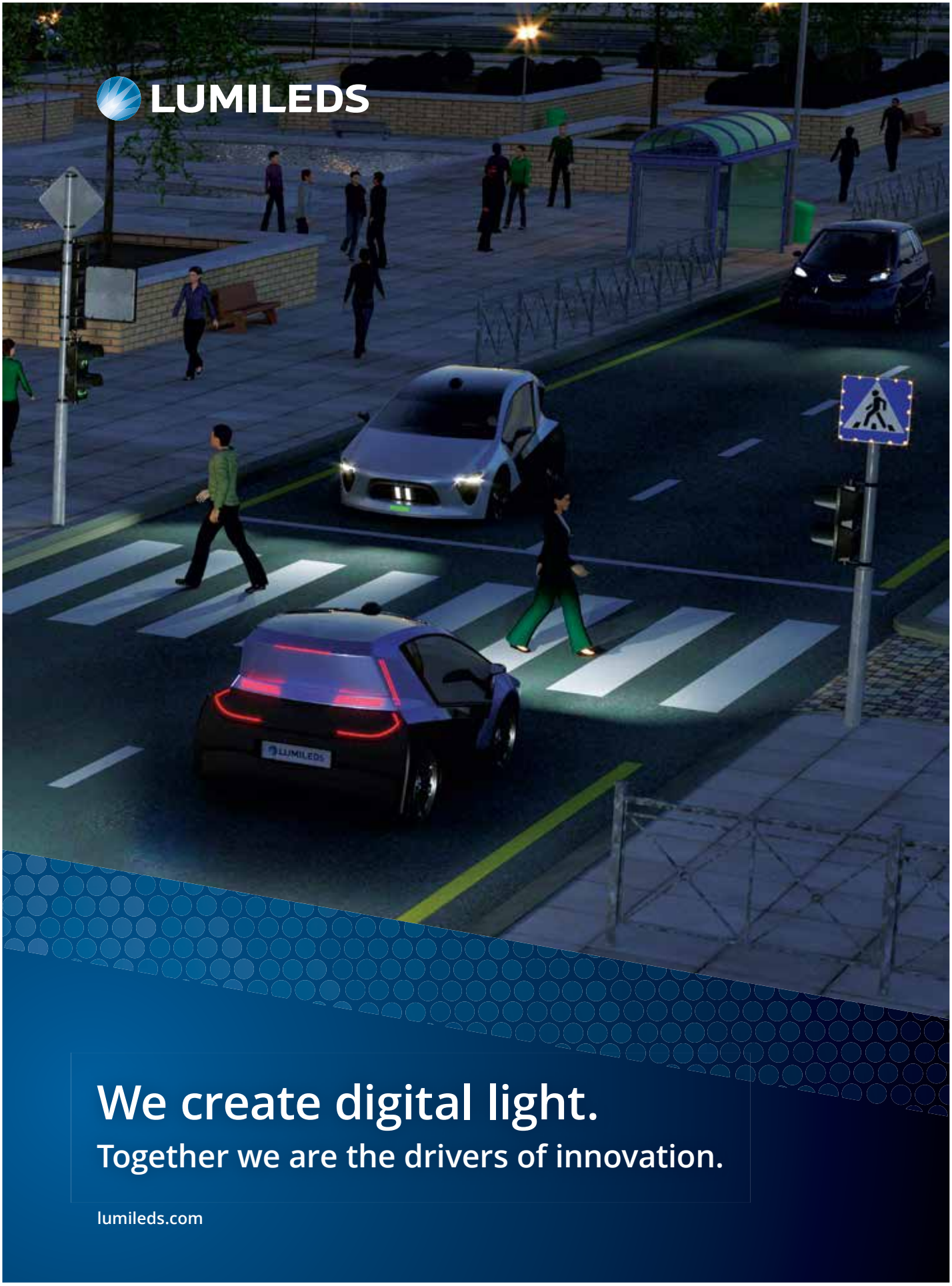
Advanced Lighting Innovation Expo

OCTOBER 10-11, 2018

DESIGN SHOWROOM, PDC, DEARBORN, MI, USA

Conference / Guest Speakers / Panel Discussion / Exhibition / Showcases

BOOTH 21



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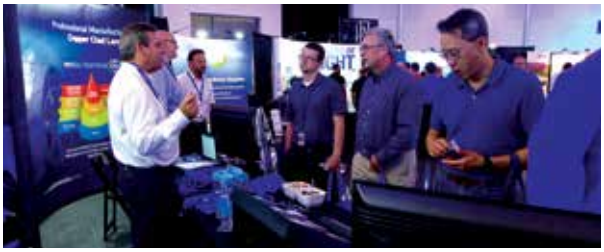
POSITIONING FORD AS A GLOBAL LEADER IN AUTOMOTIVE LIGHTING SHOWCASING INNOVATIVE AND ADVANCED LIGHTING TECHNOLOGIES

PROVIDING A GLOBAL FORUM FOR ALL SUPPLIER TIERS



EXTENSIVE NETWORKING AND LIGHTING EDUCATION OPPORTUNITIES

The Advanced Lighting Innovation Expo debuted in 2014 and continues annually every October. This ground-breaking program was created to catapult Ford's global position as an automotive lighting leader. Ford is committed to building relationships with suppliers from around the world in the pursuit and development of advanced technologies and innovation solutions. In March, ALIE's sister expo, the Seating Expo Advanced Technology Showcase debuted with plans for a second event Wednesday, September 25 - Thursday, September 26, 2019.

FordAlie.com FordSeatExpo.com ShowReadyTech.com

Innovation-Creation Expos Produced for Ford Motor Company by Show Ready Technologies

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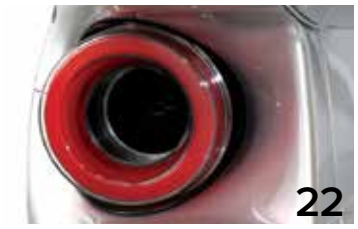
Empower the Eyes
of the Vehicle to See

Interior Lighting for Health
and Wellness Benefits



Additive Manufacturing
Lighting Innovation Enable

The ABC's of AVs

Lighting the Way

EXPLORE THE EXPO

INSIDE THE ADVANCED LIGHTING INNOVATION EXPO

BOOTH 15

THE ART OF SIGHT

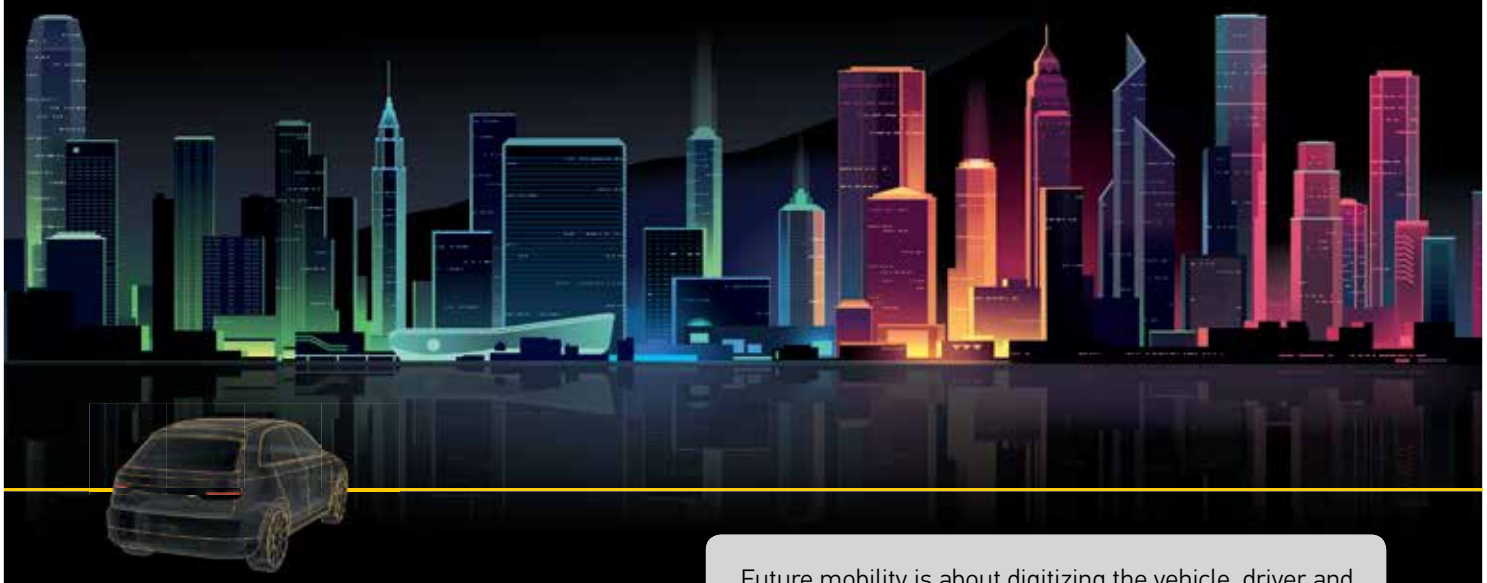
Improving communication without a single word

EFFICIENCY & ELECTRIFICATION

CONNECTIVITY & DIGITALIZATION

AUTONOMOUS DRIVING

INDIVIDUALIZATION



Future mobility is about digitizing the vehicle, driver and environment. Passenger comfort and increased road safety drive home the benefits of automated functions, like high-definition lighting and radar systems. HELLA systems process and analyze environmental data for optimal driving and prevention of dangerous situations in the blink of an eye.

Automotive News PACE AWARD 2018 FINALIST

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Advanced Lighting
Innovation Exposition
Chief Engineer, Global
Design Engineering

MARK BOSCA
Program Co-Chair,
Advanced Lighting
Innovation Exposition
Exterior Systems Chief,
Core Exterior Trim
and Lighting

Welcome

It is our distinct pleasure to welcome you to the fifth annual Ford Advanced Lighting Innovation Exposition. Our goal this year, as in the past events, is to showcase cutting-edge technology for the benefit of our exhibitors, Ford employees, attendees, and guests.

The 2018 Exposition offers a new emphasis on automated vehicles, a disruptive innovation that has challenged the best minds in the automotive industry to think in new ways. Although we haven't abandoned our emphasis on moving advanced lighting technology into our products and making technology affordable, our focus this year is on the new ways that lighting-related technologies can be applied in vehicles that automate all or part of the driving task. As you tour the exhibitor booths, listen to the speakers, join our exhibitors at their technology presentations, and share in the new ideas at the panel discussion, you will see and hear a lot about the following focus areas:

- Lighting for exterior communication
- Perimeter lighting
- Dead-front controls and displays and in-mold electronics
- Lighting for wellness
- Vehicle automation sensors integrated in lighting assemblies
- Additive manufacturing technologies including 3-D printing

Thank you for joining us at the 2018 Exposition. We hope it will inspire you to take an active role in creating the future of advanced lighting and automated vehicles.

Sincerely,
Dean Stevenson and Mark Bosca

Technical Committee and Planning Committee
Advanced Lighting Innovation Exposition

Show Ready Technologies, Incorporated
ALIE Production Company and Publisher

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INSIDE ALIE18

ENTRANCE/EXIT
The Advanced Lighting Innovation Expo takes place in the Design Showroom at the Ford Product Development Center (PDC) located off the PDC's Showroom entrance. 21175 Oakwood Blvd, Dearborn, MI

SECURITY
Expo badges will be provided for registered exhibitors and non-Ford attendees upon check-in. Access to areas outside of the showroom is not permitted, other than the exhibitor lunch tent and training classes. Expo badges must be worn at all times. Admission to the Expo is by invitation only and expo badges are non-transferable. Ford Employees must present Ford ID at the door to enter.

At least one exhibitor representative must remain in your booth area at all times. This includes during lunch. Two lunch shifts are provided for exhibitors.

Personal items, laptops, confidential materials and products must not be left unattended or overnight.

WAIVER
All exhibitors and non-Ford attendees are required to sign a Security & Procedures Waiver prior to entering. The waiver is available online at www.FordALIE.com, and at the Showroom entrance.

PDC LOBBY & SHOWROOM POLICY
Complimentary WiFi service is provided for Exhibitors for texting and emails only. Bandwidth will not accommodate heavy use. Excessive use will result in service interruption and possible banning of further WiFi use. Network and passcode is included in the Exhibitor Welcome Packet distributed during set up and at the Expo Help Desk.

Phone calls are discouraged inside the Showroom and in the lobby. Please step outside the building for lengthy calls.

Photography and videography are not allowed by anyone other than Show Ready Technologies, Inc. Violation will result in the confiscation of your cell phone and/or camera, and you will be asked to immediately leave the Expo and Ford property.

FORD TRAINING ACCREDITATION
Ford employees are encouraged to attend the Expo and receive credit toward your training objective.

ATTENTION FORD MANAGERS & TEAM LEADERS
Want to help drive innovation and cost savings at Ford? Discover how this exclusive, highly effective program can benefit other departments and areas within Ford. For more information email info@ShowReadyTech.com, call 888-651-5411, or visit the Expo Help Desk.

NEED ASSISTANCE?
If you need any assistance, please ask any of the Show Ready Tech Team members and they will be happy to assist you.

FEEDBACK
Feedback surveys will be available at the Expo Help Desk and online at FordALIE.com. Your feedback is very important to the success of future expos. Please fill out a Feedback survey before leaving the Expo and give it to a Show Ready Tech Team member or drop in the Feedback Box at the Expo Help Desk.

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Keynote Address

RANDY VISINTAINER

CTO, FORD AUTONOMOUS VEHICLES LLC

Randy Visintainer is the Director for Autonomous Vehicles at Ford Motor Company. In this newly created organization within the company, Visintainer leads a global team responsible for driving Ford's autonomous vehicle research and development.

This new role follows the roll out of the Ford Smart Mobility plan to use innovation to take the company to the next level in connectivity, mobility, autonomous vehicles, the customer experience and big data. Visintainer reports directly to Ken Washington, Vice President Research and Advanced Engineering.

Most recently, he was Director for Global Product Development Quality and Global Product Development Systems at Ford where he was responsible for leading cross-functional enterprise product creation processes and product quality for all global vehicle programs.

Visintainer has been with Ford Motor Company for 29 years and has held several positions in Product Development including Director for Research and Advanced Engineering where he was responsible for leading a global organization of research scientists and engineers in Aachen, Germany; Dearborn, MI and Palo Alto, CA.

Prior to joining Ford Motor Company, he was an officer in the U.S. Navy and an adjunct faculty member at the University of Michigan, College of Engineering. Randy has a BS and MSE in Engineering from the University of Michigan and an MBA from Michigan State University.

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Guest Address

KARL HEIMER

PRINCIPAL, HEIMER & ASSOCIATES, LLC

Karl Heimer serves as Chief Technical Cybersecurity Advisor for Show Ready Technologies, Inc. and co-creates international cybersecurity conferences, workshops and special events. Karl is currently Senior Technical Advisor for Cybersecurity to Michigan's MEDC Auto Office and the Michigan Defense Center; he also sits on the DHS Government Vehicle Fleet Managers' Cybersecurity Steering Committee, the Advisory Board of Walsh College's automotive cybersecurity program, Advisory Board Member of the SAE new journal of Transportation Cybersecurity and Privacy, as well as serving on the board of several start-up companies. He is a chapter author of a heavy vehicle cybersecurity book scheduled for release in September 2018. Karl founded the CyberAuto Challenge (now the SAE CyberAuto Challenge) while at Battelle and is also the co-founder (with Dr. Jeremy Daily, University of Tulsa) of the CyberTruck Challenge – both events sharing the goal of developing transportation cybersecurity skills in the next generation workforce and helping to forge mentor-protégé relationships between these students and industry experts.

Karl's experience includes Sr. Research Director for Cybersecurity at Battelle where he started a commercial vehicle cybersecurity practice while simultaneously managing the global enterprise's incident response to a critical network security requirement. Within the Department of Defense community, as both a contractor and a uniformed service member, he ran projects ranging from developing provably secure mobile communications platforms, creating secure architectures, managing special tool development activities, being a red team member, and managing cyber-forensics.

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KEYNOTE ADDRESS

Randy Visintainer
CTO, Ford Autonomous Vehicles LLC

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CELERITY GUEST HOST

ANDREW HUMPHREY, CBM

METEOROLOGIST & REPORTER

Andrew Humphrey is back as celebrity guest host for the Advanced LIghting Innovation Expo. Andrew is an Emmy Award-winning meteorologist and reporter at WDIV-TV Local 4. In addition, he is proud to have earned the AMS Certified Broadcast Meteorologist (CBM) distinction and delivers science and technology reports for "Tech Time With Andrew Humphrey." These honors are indicative of Andrew's passion for weathercasting and storytelling that help people stay informed and safe.

Born and raised near the nation's capital, Andrew went to school in Wolverine country, earning his BSE in Meteorology from the University of Michigan. He earned his MS in Meteorology from the Massachusetts Institute of Technology.

Andrew came to WDIV from the Fox affiliate in Toledo, Ohio, where he was chief meteorologist. Prior to that, he was seen globally on CNN and CNN International and got his start in Washington, D.C. at the local NBC and Fox stations. He worked as a research scientist at NOAA and NASA, also.

Andrew enjoys being involved with the community, especially as a featured speaker to students at every grade level. He is Founder and Chair Emeritus of the Digital Journalism Task Force of the National Association of Black Journalists (NABJ); is Past President of NABJ's Detroit chapter; serves and has served as Board Member and volunteer of the Chandler Park Conservancy, the Michigan Humane Society, the Detroit Chapter of the National Association Of Asian American Professionals, the Council of Asian Pacific Americans, the University of Michigan Club of Greater Detroit and University of Michigan's Department Of Climate And Space Engineering.

Andrew's awards include an Emmy Award, the Spirit of Detroit Award from the Detroit City Council, a distinguished service award from The Boys & Girls Club, DAPCEP's Real McCoy Award and the Community Service Award from NABJ.

BOOTH 16

ILLUMINATING
THE ROAD AHEAD

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- Multishot
- Laser

AUTONOMOUS

SIDE MARKERS
- LSR – Flexible lighting

FOGLAMPS
- Magnesium lightweight
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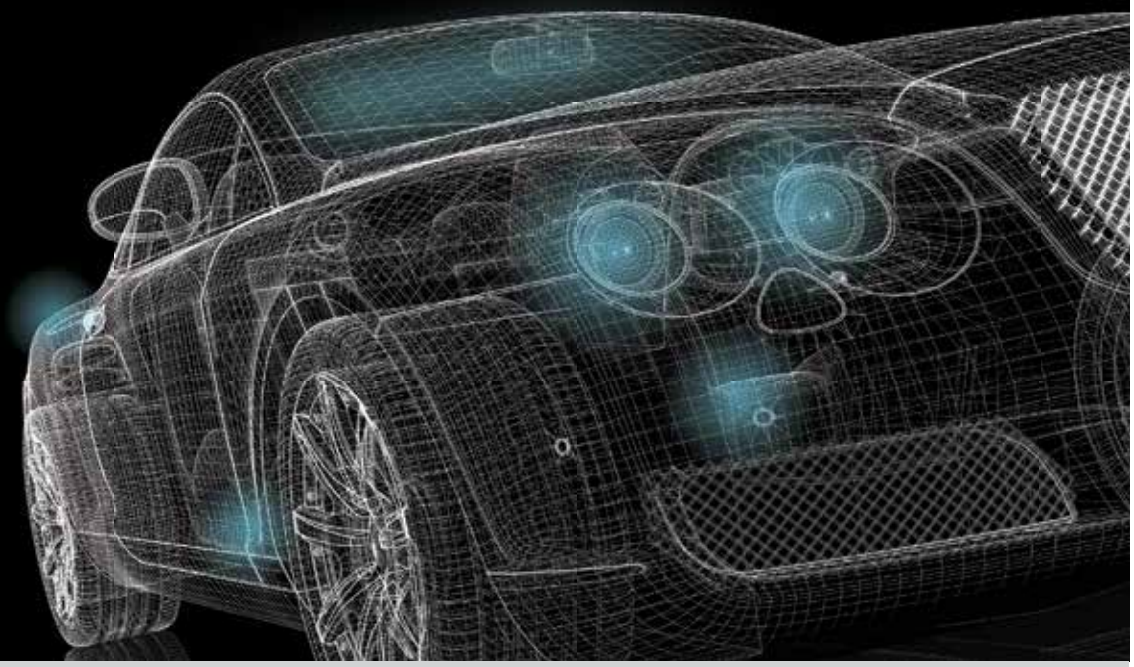
- LSR optics
- Electronics optimization



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Booth#	Company
1	Radiant Vision Systems
2	Dow Chemical Company-Dow Performance Silicones
3	LumenFlow Corporation
4	Melexis
5	Integrated Silicon Solution, Inc (ISSI)
6	Excellence Opto, Inc.
7	Aismalibar SA
8	Stanley Electric Co., LTD
9	NKK Switches
10	Rebo Lighting & Electronics
11	Ventec International Group
12	Covestro LLC
13	Nichia America Corporation
14	SL America–Auburn Hills, MI
15	HELLA
16	Phillips-Medisize, a Molex company
17	Myotek North America, Inc.

Booth#	Company
18	Pioneer
19	Cree, Inc.
20	Mektec International Corporation
21	Lumileds
22	ANSYS OPTIS
23	ON Semiconductor
24	EBW Electronics
25	Valeo
26	Magna International
27	Seoul Semiconductor, Inc.
28	Taiwan Color Optics, Inc.
29	DBM Reflex Enterprises, Inc.
30	Flex
31	Varroc Lighting Systems
32	Evonik Cyro LLC
33	Dominant Opto Technologies North America, Inc.
34	Texas Instruments

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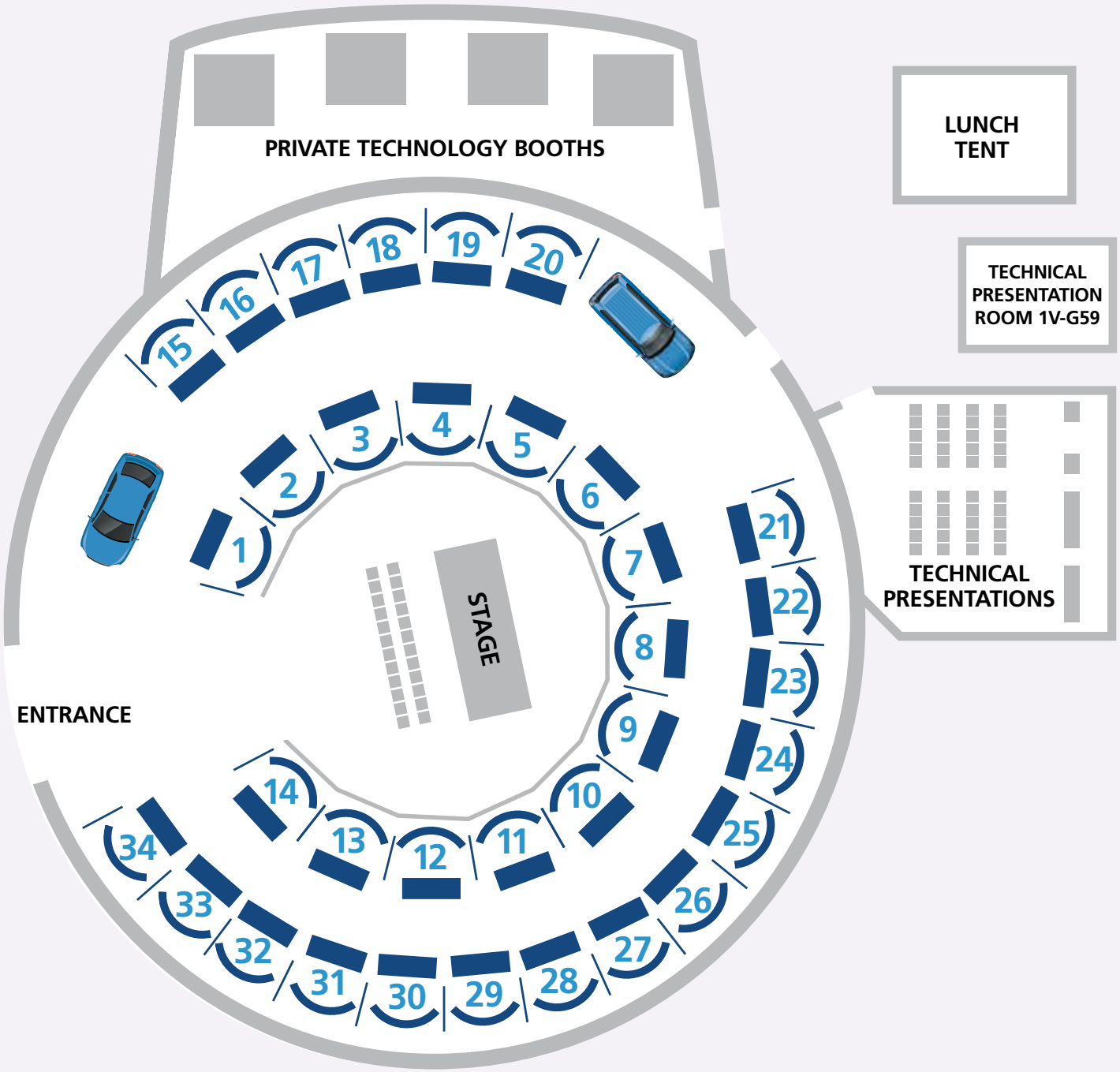
FLOOR PLAN



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AGENDA

PRE-EXPO – OCTOBER 9

5p-9p	Pre-glow reception, Ford's Garage (21367 Michigan Avenue, Dearborn) Admission by invitation only

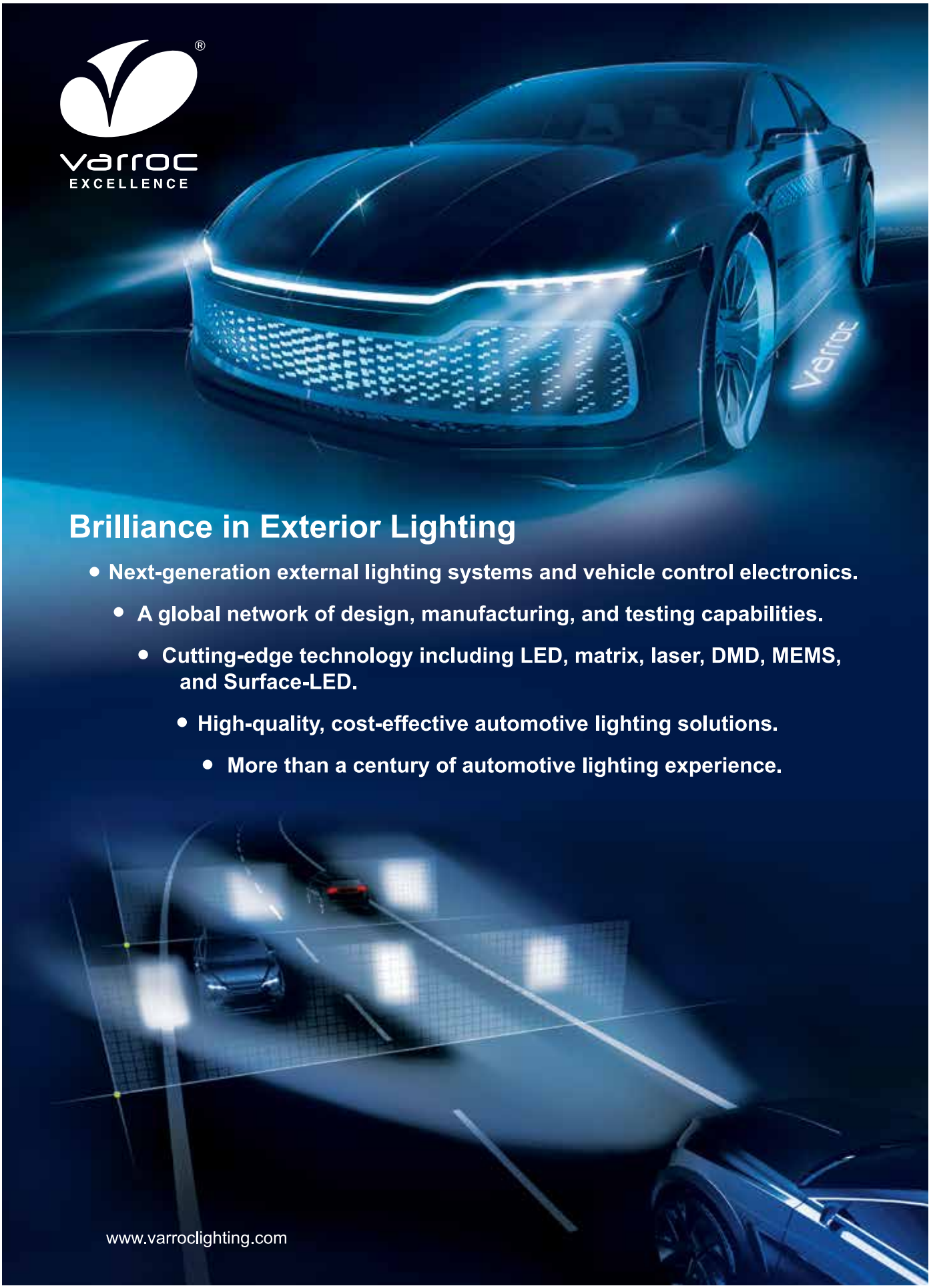
WEDNESDAY, OCTOBER 10

7:30a	Doors Open
7:45a-8:00a	Welcome – Andrew Humphrey, WDIV-TV, Celebrity Guest Host Mark Bosca, ALIE Program Co-Chair, Exterior Systems Chief, Core Exterior Trim and Lighting, Ford Motor Company
8:00a-8:30a	Keynote Address – Randy Visintainer, CTO, Ford Autonomous Vehicles LLC
8:30a-12:00p	VIP Meet and Greet
12p-1p	Exhibitor Lunch A
1p-2p	Exhibitor Lunch B
12p-3:45p	Open for Booth Visits, Classes, and Technical Presentations
3:45p-4:00p	Comments / Wrap

THURSDAY, OCTOBER 11

7:30a	Doors Open
7:45a-8:00a	Welcome – Andrew Humphrey, WDIV-TV, Celebrity Guest Host Dean Stevenson, ALIE Program Co-Chair, Chief Engineer, Global Design Engineering, Ford Motor Company
8:00a-8:45a	Guest Address – Karl Heimer, Principal, Heimer and Associates LLC. Cybersecurity and its Importance in Automated Vehicles
8:45a-9:30a	Panel Discussion – Stuart Salter, Moderator, Ford Motor Company The Role of Lighting in Emerging Vehicle Technologies
9:30a-3:45p	Open for Booth Visits and Technical Presentations
12p-1p	Exhibitor Lunch A
1p-2p	Exhibitor Lunch B
3:45p-4:00p	Closing Comments / Goodbye

Booths are open during Exhibitor Lunch.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TECHNICAL PRESENTATION SCHEDULE

Open to Ford Employees and by invitation from Presenter

OCTOBER 10, 2018

1:00p-1:30p	**Taiwan Color Optics: Kenneth Li** High-temperature glass and crystal phosphors for use with high-output LED and laser sources
1:45p-2:15p	**Mektec International: Mirko Boeker and Suhail Halteh** Electronics packaging optimization including advanced PCB materials for thermal management
2:30p-3:00p	**Radiant Vision Systems: Matt Scholz and Chris Williamson** Applications of photometric measurement systems and software
3:15p-3:45p	**Lumileds: Ralph Peters** Advanced lighting technologies including 3D LED, LED headlamp bulbs, and next-generation modules

OCTOBER 11, 2018

10:00a-10:30a	**Pioneer Electronics USA: Bruce Wolfe and Lisa Carter** Flexible OLED development schedule, capabilities, design rules, and target specifications
10:45a-11:15a	**Integrated Silicon Solution Incorporated (ISSI): Aaron Reynoso** Exterior lighting for branding and interior lighting for wellness; driver hardware solutions for both applications
11:30a-12:00p	**Dominant Opto Technologies: Dustin Kooyers** SmartRGB LEDs and seddLEDs (devices with smart embedded digital drivers)
1:00p-1:30p	**Texas Instruments: James Patterson** Scalable electronic solutions for adaptive LED headlamp systems
1:45p-2:15p	**ON Semiconductor: Paul Decloedt** LED drivers supporting integrated current calibration; advanced rear lighting solutions; platform evaluation kit for testing new headlamp concepts
2:30p-3:00p	**SL America: Robert Grantham** New technologies for OLED-look rear lighting using conventional LEDs; advanced illuminated badges and trim

TECHNICAL PRESENTATION IN 1V-G59 - OCTOBER 11, 2018

9:30a-10:30a	**Cybersecurity Deep Dive: Karl Heimer** In-depth discussion of cybersecurity topics from the October 11 guest address
10:45a-11:30a	**Rebo Lighting: Dale Chen, Denny Felsberg, and Steve McCarthy** Gesture control for interior lighting; 3D- and color-capable logo projector; and charge status indicator for BEV/PHEV charge connector doors
1:00p-1:30p	**Excellence Opto, Inc.: Bruce Reniger and Mike Dodds** A LED application for exterior lighting functions that delivers a homogeneous lit appearance and allows dynamic animation
1:45p-2:15p	**ANSYS OPTIS:** LiDAR modeling and its use in advanced lighting and AV related technologies

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PRIVACY BOOTHS ARE AVAILABLE TO VIEW EXHIBITOR PROPERTIES

Ford Employees: If you'd like to reserve a time to see confidential properties, email TEAM@FordALIE.com.

At the Expo, see an expo representative at the Front Welcome Desk.

Exhibitors: If you have properties you would like to show Ford in private, see an expo rep at the Front Welcome Desk to schedule. Admission is open to Ford Employees and by invitation from Exhibitor. Space inside each Privacy Booth is limited to no more than 6 people at a time.

Proper ID is required to enter.

TRAINING CLASSES

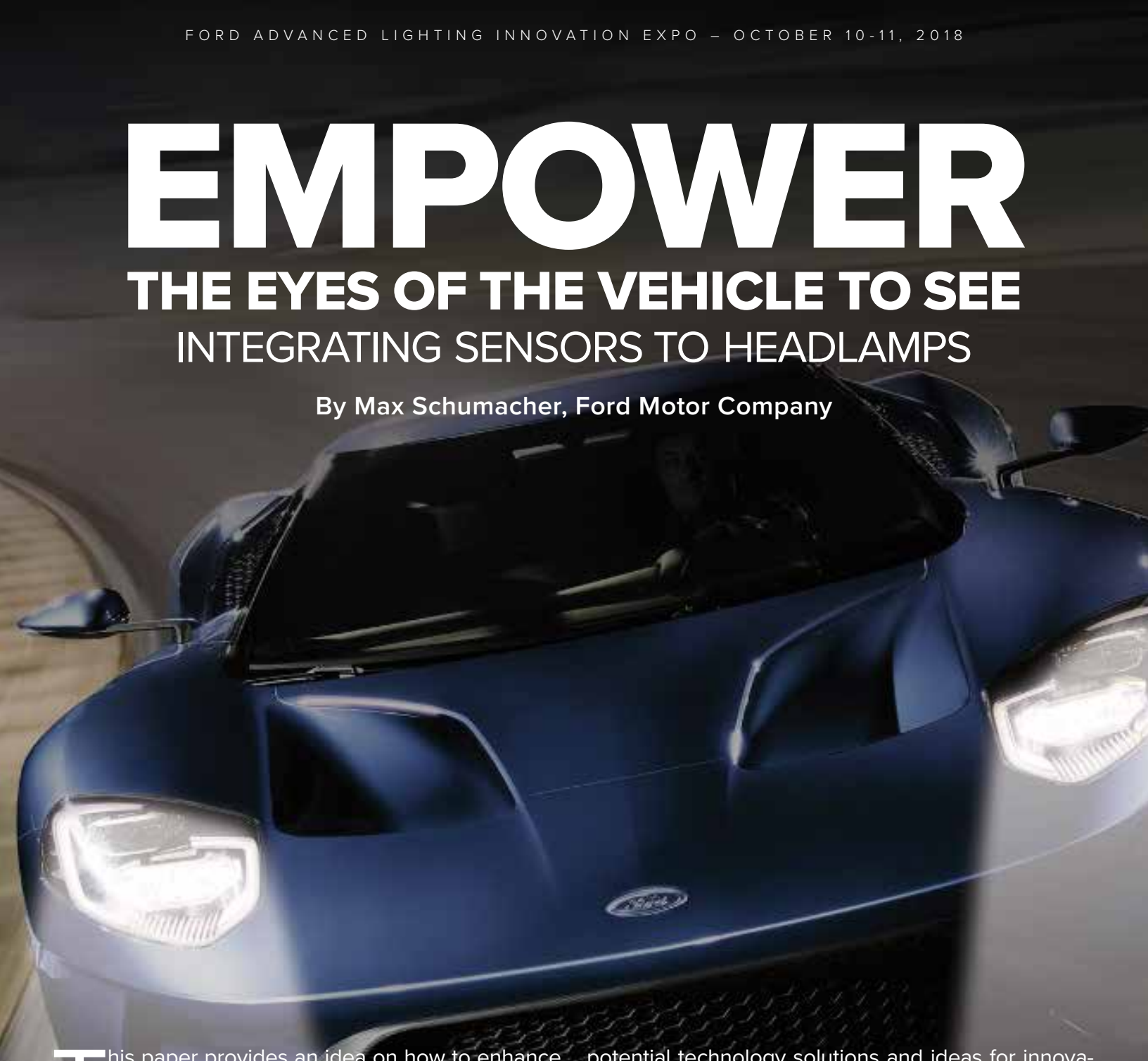
Admission Open to All Attendees

TRAINING CLASSES IN 1V-G59 – OCTOBER 10, 2018

1:00-1:50	Lighting Technologies and Network Architectures (Jay Chen)
2:00-2:30	Computer Simulation for Front Lighting (Arun Kumar)

EMPOWER
THE EYES OF THE VEHICLE TO SEE
INTEGRATING SENSORS TO HEADLAMPS

By Max Schumacher, Ford Motor Company



This paper provides an idea on how to enhance the "eyes" of our vehicles to go beyond shining passively and actually see. This idea is not new, but its execution is driven by several factors which I will outline before describing the concept.

The automotive industry is entering a period of rapid, disruptive change. The three main forces driving this disruption are electrification, customer demand for connectivity, and the desire for automated driving. While the paths to electrification and connectivity are relatively clear, the definitions and use cases for an autonomous vehicle are still rapidly evolving. For the exterior lighting business this evolution leads to many potential technology solutions and ideas for innovative customer features, some of which depend on the direction that the business case takes in the future.

The new technology solutions are a logical consequence of research, which enhances the technical capabilities of existing sensors and lamps, paired with the new use case of the autonomous vehicle. For the Ford lighting team this creates the need to combine a deep understanding of new sensor technologies with our expertise in engineering conventional lighting solutions. Our strong skill base in these areas will enable us to make smart choices today and in the future.

The historical transition of our product from a utilitarian item – a mass-market vehicle that safely transports the customer from point A to point B – to a lifestyle product that appeals to the customer's often unspoken wants requires another skill set in our portfolio. This skill is the ability to incorporate a customer focus in our design and development processes. The result is an integrated product package that performs multiple functions and can meet multiple customer needs. At Ford we call this feature development, using today's knowledge to predict, understand and develop customer-focused lighting features for the autonomous world of tomorrow.

To show the need for customer-focused feature development, please consider the following facts:

- Exterior lights have an important safety function, but they are also the eyes of the vehicle – a key appearance element during nighttime and daytime. They enable the vehicle to make an emotional connection to our customers through such features as the Lincoln Embrace welcome and farewell lighting.

- Our customers have sophisticated taste and want a vehicle that is as attractive and useful as it is comfortable and safe. Mounting a clumsy-looking LiDAR/radar/sensor array for surround detection on the roof is not a satisfactory solution. Not only does it detract from the appearance of the vehicle, but it also makes it impossible to mount a roof rack for a snowboard, skis, or other large objects. Therefore we need to put our efforts into finding a package solution that is both attractive and functional – preferably one that integrates the new sensors with other elements at the corners of the vehicle.

- Exterior lights have been located at the corners of the vehicle since automotive lighting systems were introduced more than a century ago. Automotive engineers and designers are experienced at creating lamps that direct light of the proper color and intensity where it needs to go and styling them to complement and enhance the vehicle's design presence. From a simplified automated vehicle perspective, the packaging of LiDAR/radar sensors at the vehicle corners is a similar task with light of a different wavelength. Today's headlamp housings also play a role in meeting pedestrian and occupant safety requirements. In many markets the headlamps are already required to have a cleaning system, which most AV sensors will also need for reliable operation in bad weather.

- Emerging high-resolution light technologies allow a high degree of vehicle personalization. The feature ideas and possibilities range from simple logo projections to path projections onto streets or sidewalks for communication.

With this background established, I'll share my thoughts on how to integrate sensors into headlamps.

In principle, there are two zones in the headlamp that will allow sensor integration without a significant loss of headlamp functionality. In Figure 1, the red middle zone shows the area of the headlamp that should not be used for sensor integration since this could negatively affect the function of the headlamp. A better package location for the sensor would be the orange zone at the top corner of the lamp. This offers room for a side radar or other sensor that monitors the space to the side of the vehicle. The downside of this location is that heat rejection may be more complicated here than it would be in another part of the lamp. Further, the package space behind that part of the lamp is quite limited.

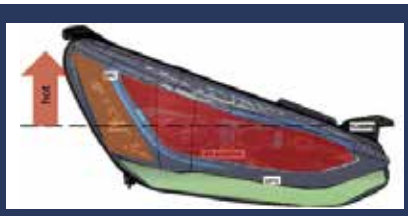


Figure 1 Zones for sensor integration

A better solution for packaging sensors within headlamps would be the green zone in Figure 1. The temperature is quite stable in this area. With some design adjustments to the fascia, the height of this zone can be increased to as much as 100 mm to provide space for the sensor below the light chamber (red zone in Figure 1). If optimally positioned, a sensor system in this location could theoretically command a 180-degree field of view in front of the vehicle.

Extending the classical headlamp concept with a sensor packaged below could also benefit the exterior light feature set. An adaptive driving beam or leveling system with the sensor below the lamp could adjust the beam pattern more quickly because of the direct connection between sensor and actuator. The result is improved feature performance and higher customer satisfaction.

Figure 2 shows a comparison between the appearance of a Ranger today and proposals with sensors applied to the recommended area, highlighted by the red boxes. Option one illustrates an invisible implementation; option two shows a proposal that integrates the sensor location into the overall vehicle appearance by using the same color for the sensor lens. These two proposals show how the path for sensor integration may look in the future. Depending on what the customer of tomorrow expects from us, we can choose between these implementations. Either way, the exterior lighting team is able to support the complete bandwidth.

Figure 2 Comparison of sensor applied sensor conventional idea vs. today

With these thoughts, I want to wish you a pleasant visit at the Advanced Lighting Innovation Expo 2018 and encourage you to reach out for these new innovative lighting technologies.

INTERIOR FOR HEALTH AND

By Jay Chen, Ford Motor Company

Properly designed interior lighting can have tremendous benefits to the health and wellbeing of a vehicle occupant and mobility user. Numerous studies have shown that the color, brightness intensity, duration of exposure, and wavelength spectrum of interior lighting can have a positive effect on a person's mood, wakefulness, and even health and wellness.

For example, several studies since the 1990s has shown that bright blue light can reinforce and phase-shift a person's circadian rhythm. The circadian rhythm is the body's "natural clock" and is responsible for important bodily functions, such as time of awakening, time of sleep onset, hunger patterns, and metabolism. Studies show that individuals who suffer from circadian rhythm disruptions are at higher risk for obesity, diabetes, and certain cancers. Hence, interior lighting that emits blue light in the morning and transitions to an amber red color at night can help synchronize the body's circadian rhythm and has the potential to provide long term health benefits. [1-6]

Not only is amber red light an ideal color to use at night, because of its minimally disruptive effect on the human circadian rhythm, it also increases night time visibility and alertness. Exposure to bright amber red light has been shown to increase a person's metabolism and cortisol level and decrease a person's subjective levels of sleepiness. In addition to bright white light and bright blue light, red amber light in the range of 630 nm has been shown to have alerting effects. For these reasons, circadian based interior lighting systems are currently in use in airliners, hospitals, hospices and nursing homes. [7-10]

Anyone who has sat in a darkened conference room knows that the lighting intensity and brightness can affect an occupant's level of wakefulness and sleepiness. However, few realize that bright white light is commonly used to treat Seasonally Affective Disorders (SAD) commonly called "wintertime blues." Seasonally Affective Disorder is a group of mood disorders that consists of recurrent depression occurring dur ing the wintertime. Numerous publications have shown that bright white light with illuminance flux between 7,000-10,000 lux has positive benefits in terms of mood elevation and mitigation SAD. One meta-analysis study found that bright white light is as effective at treating SAD as medications such as fluox-

LIGHTING WELLNESS BENEFITS

etine (a generic for Prozac). Hence, exposure to natural or artificial bright white light is now a recommended treatment option for individuals suffering from recurrent wintertime depression. [11-16]

Current Ford Research and Advanced Engineering (R&A) efforts are aimed at validating lab-based research studies and translating said research into applications for interior lighting systems. Studies aimed at exploring the effects of interior lighting on circadian biorhythms, user health, mood and alertness are currently in progress and will be implemented in future automated vehicle programs. In addition to supporting product development, Ford R&A is at the forefront in developing applications for automated vehicle user mobility, vehicle connectivity, and health and wellness.

References Cited:

Figueiro, Mariana. (2013). An Overview of the Effects of Light on Human Circadian Rhythms: Implications for New Light Sources and Lighting Systems Design. Journal of Light & Visual Environment. 37. 51-61. 10.2150/jlve.IEIJ130000503.

1. Figueiro, Mariana & Nagare, Rohan & Price, Luke. (2018). Non-visual effects of light: How to use light to promote circadian entrainment and elicit alertness. Lighting Research & Technology. 50. 147715351772159. 10.1177/1477153517721598.
2. Fonken, L.K. & Nelson, R.J. (2014). The effects of light at night on circadian clocks and metabolism. Endocrine Reviews 35 (4): 648-670.
3. Fonken, L.K., Aubrecht, T.G., Melendez-Fernandez, O.H., Weil, Z.M., & Nelson, R.J. (2013). Dim light at night disrupts molecular circadian rhythms and increases body weight. Journal of Biological Rhythms 28(4): 262-71
4. Davis, Scott & Mirick, Dana. (2006). Circadian Disruption, Shift Work and the Risk of Cancer: A Summary of the Evidence and Studies in Seattle. Cancer causes & control : CCC. 17. 539-45. 10.1007/s10552-005-9010-9.
5. Salavaty, A. (2015). Carcinogenic effects of circadian disruption: an epigenetic viewpoint. Chinese Journal of Cancer, 34, 38.
6. Figueiro, Mariana & Sahin, Levent & Wood, Brittany & Plitnick, Barbara. (2015). Light at Night and Measures of Alertness and Performance: Implications for Shift Workers. Biological research for nursing. 18. 10.1177/1099800415572873.
7. Figueiro, Mariana & Rea, Mark. (2010). The Effects of Red and Blue Lights on Circadian Variations in Cortisol, Alpha Amylase, and Melatonin. International journal of endocrinology. 2010. 829351. 10.1155/2010/829351.
8. Sahin, Levent & Figueiro, Mariana. (2013). Alerting effects of short-wavelength (blue) and long-wavelength (red) lights in the afternoon. Physiology & behavior. 116. 10.1016/j.physbeh.2013.03.014.
9. Figueiro, Mariana & Nagare, Rohan & Price, Luke. (2018). Non-visual effects of light: How to use light to promote circadian entrainment and elicit alertness. Lighting Research & Technology. 50. 147715351772159. 10.1177/1477153517721598.
10. Sherri Melrose, "Seasonal Affective Disorder: An Overview of Assessment and Treatment Ap proaches," Depression Research and Treatment, vol. 2015, Article ID 178564, 6 pages, 2015.
11. Lam RW, Levitt AJ, Levitan RD, Enns MW, Morehouse R, Michalak EE, Tam EM. The Can-SAD study: a randomized controlled trial of the effectiveness of light therapy and fluoxetine in patients with winter seasonal affective disorder. Am J Psychiatry. 2006 May;163(5):805-12. PubMed PMID: 16648320.
12. Lam RW, Levitt AJ, Levitan RD, et al. Efficacy of Bright Light Treatment, Fluoxetine, and the Combination in Patients With Nonseasonal Major Depressive DisorderA Randomized Clinical Trial. JAMA Psychiatry. 2016;73(1):56–63. doi:10.1001/jamapsychiatry.2015.2235
13. Golden RN, Gaynes BN, Ekstrom RD, Hamer RM, Jacobsen FM, Suppes T, Wisner KL, Nemeroff CB. The efficacy of light therapy in the treatment of mood disorders: a review and meta-analysis of the evidence. Am J Psychiatry. 2005 Apr;162(4):656-62. PubMed PMID: 15800134.
14. Principles and Practice of Sleep Medicine, 5th Edition, by Meir H. Kryger, MD, FRCPC, Thomas Roth, PhD, and William C. Dement, MD, PhD
15. Kurlansik SL, Ibay AD. Seasonal affective disorder. Am Fam Physician. 2012 Dec 1;86(11):1037-41. Review. PubMed PMID: 23198671.

ADDITIVE MANUFACTURING
LIGHTING INNOVATION ENABLER

By Rick Wykoff, Barry Loucks, Maik Broda, and Ellen Lee, Ford Motor Company

Additive manufacturing (AM) has the ability to enable new and innovative lighting solutions not possible by traditional manufacturing processes. Also known as 3D printing, AM is a family of processes by which material (metals, plastics, and/or others) is added layer by layer from a digital model, to create a 3-dimensional object. Because a mold or form is not needed to grow parts from bulk materials including continuous filaments, liquid resins, or powders, it gives a high degree of design freedom. The combination of design freedom and "tool-less" manufacturing makes AM the perfect vehicle for bespoke and low volume applications including prototypes and customization. The elimination of tooling results in speed to market and reduced program investment and cost. It is the increased design freedoms gained by the layer by layer growth of parts, however, that can be exploited to allow the automotive design community to create exciting new styles not possible conventionally.

When developing components for lighting, the design of parts can be compromised because of conventional molding design guidelines including: draft angle, die lock conditions, and the need for lifter travel. With AM processes, these constraints can be eliminated, allowing the designer to focus on the function and aesthetics of the components without limitation. Many other typical molding defects such as rib read-through, molded-in stresses, and unsightly parting lines can also be avoided through 3D printing. In addition, AM can enable part consolidation, thereby allowing for a reduction in the number of parts and more robust performance.

Plastic based AM processes are most relevant to lighting components and applications. These include: extrusion based AM, also known as fused filament fabrication (FFF); powder bed AM, also called selective laser sintering (SLS); and vat polymerization, also commonly known as stereolithography (SLA) and digital light processing (DLP). In FFF, a continuous filament of thermoplastic material is extruded through a hot end and deposited layer upon layer. This process can utilize many of the same thermoplastic materials as for injection molding. The SLS process uses a laser rastering over a thin layer of thermoplastic powder, sintering the material a layer at a time. Because the unsintered powder surrounds and supports thin and complex geometries, this process has the highest level of design freedom. For transparent components with good surface finish, SLA and DLP are the best suited processes.

"...material is extruded through a hot end and deposited layer upon layer."

There are a number of challenges in using these AM processes for production lighting components. The most significant are the lack of materials and processes for manufacturing optically clear parts that meet lighting performance requirements and durability. Current processes such as SLA and FFF produce parts in layers that are visible in clear, transparent parts. SLS results in a rough surface finish, reminiscent of sandpaper. These drawbacks result in poor optics and appearance. Furthermore, AM resins needed for lighting are required to meet stringent appearance, weathering, temperature and impact performance requirements. Most of the current AM processes also have a limited build envelope that impacts size of the part that can be produced. Finally, the slow speed of most AM processes, coupled with high material costs, limit production applications to relatively low volume vehicles. Larger build size, improved cycle time, and low cost automotive grade materials are required to meet cost models for high volume, production use.

In the near term, many non-lens applications for lighting are feasible today and can utilize complex geometries and designs to enhance product innovation and differentiation. Current technologies in 3D printing, while not ready for mass production, can support low volume, specialty vehicles and customization for lighting.

As AM technologies progress, the future of lighting design will experience revolutionary changes. Imagine producing nearly completed lighting modules that come off the 3D printer, thus eliminating processes such as installing circuit boards, light sources, and attachments. Imagine the unique styles that become possible when traditional manufacturing limitations are removed. Imagine distributed manufacturing of lighting components that can be personalized to each unique customer in each unique region. The art of the possible is ours to imagine.

THE ABC'S OF AVs

By Don Bilger, Ford Motor Company

When I was very young, the film and TV world served up a series of spy movies and spy spoofs starting with the first James Bond film, "Dr. No," in 1962. The best-known TV spy spoof was "Get Smart," a prime-time series conceived by Mel Brooks and Buck Henry, but the Saturday morning cartoon lineup also found room for a clever spy spoof. The protagonist of "Cool McCool," a spy who some-


Ford
Vehiculo de Investigación

how managed to be both suave and bumbling, had a self-driving car, the Coolmobile, which would come when he whistled for it like an obedient pet dog. This was the first autonomous vehicle (AV) I encountered in the world of fiction.

Fast-forward fifty years, and what was fiction in 1968 is now becoming reality. Today's luxury vehicles already offer driver assistance technologies that automate parts of the driving task, and the world's leading automakers and their supplier-partners are working on even more advanced technologies that promise to automate the entire task. A combination of computational power, artificial intelligence (AI) algorithms, and advanced sensors is behind this revolution, and many of the sensors – including LiDAR and cameras – depend on light for their operation. Hence the emphasis of this year's Advanced Lighting Innovation Expo on autonomous vehicles.

The industry realized early on that there are different levels of automation. Some of them offer more automated-related features than others. To help engineers, product planners and marketers sort out the degree of automation that a given vehicle offers, the Society of Automotive Engineers published a Recommended Practice in 2014, J3016, that defined five levels of automation (plus a sixth category, Level 0, for vehicles without any driver assistance or automation features). Here, in a nutshell, is the SAE J3016 AV taxonomy.

LEVEL 0

Vehicles count on the driver to perform the entire dynamic driving task (DDT). These Vehicles may include active safety systems such as electronic stability control, traction control, collision warning, blind spot monitoring, and brake assist.

LEVEL 1

Vehicles can assist the driver in controlling either the lateral or longitudinal motion of the vehicle, though not both at once. The driver still needs to focus fully on the driving task. Driver assistance features that may be found on Level 1 vehicles include adaptive cruise control, lane-keeping assistance, and park aid systems.

LEVEL 2

Vehicles provide partial driving automation. They can control brakes, steering, and acceleration in a limited set of driving conditions. The driver still needs to be fully engaged in the driving task to recognize objects and events requiring manual intervention and to perform that intervention. Level 2 features include assist systems that steer the vehicle in addition to managing its speed. As of this writing, Level 2 is the highest level of autonomy available in a production vehicle.

LEVEL 3

Is the first level at which the automated system performs the entire dynamic driving task in a limited set of driving conditions. The system's sensors and AI detect objects and events and make the necessary corrections to the vehicle's speed and heading. The driver of a Level 3 vehicle must be prepared to take over the driving task at a moment's notice if driving demands transcend the automated driving system's capabilities.

LEVEL 4

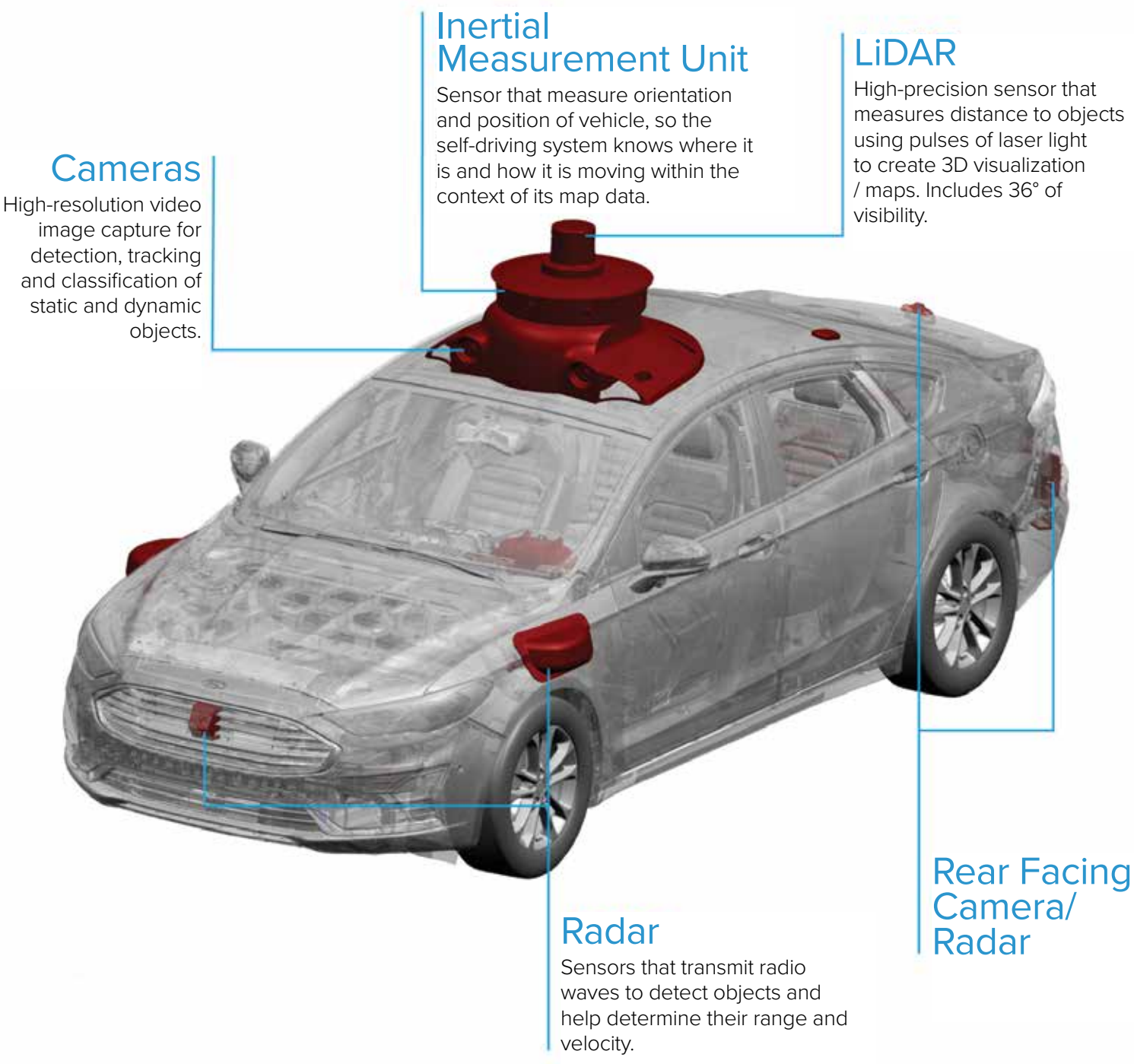
Is defined by SAE as High Driving Automation, is the lowest level at which the driver will not be called upon to assume control of the vehicle. The automated driving system handles the entire driving task. The difference between this level and Level 5 lies in the operating domain that the system supports. A Level 4 vehicle's domain is limited, perhaps by deliberate limitations in its map database. Level 4 vehicles will be well suited to jobs such as self-driving taxicabs, airport shuttles, and delivery vehicles in urban areas.

LEVEL 5

Which SAE defines as Full Driving Automation, handles the entire driving task anywhere in the world.

What does the coming revolution in automation mean for lighting? Some of the auto industry's best minds are working to answer that question. The cameras that help the automated system "see" road conditions ahead need not operate in the visible spectrum, so it's quite possible that the headlamps will put out most of their energy in the near infrared. Since automated vehicles will share the roads with pedestrians and with driver-guided vehicles including cars, trucks, motorcycles and bicycles, exterior lighting systems will need to alert other road users to their vehicles' operating states. Self-driving taxi, shuttle, and livery applications may also require information displays for the benefit of passengers who are waiting for rides. Finally, the lighting and seating inside a Level 4 or 5-capable vehicle may be much different than the accommodations in a Level 3 or lower vehicle. With the need to concentrate on the driving task eliminated, lighting for wellness, mood or conversations, or configurable task lighting for reading or personal computing, is likely to replace the interior lighting in today's vehicles.

These are exciting times for automotive lighting engineers and suppliers. We at Ford hope that the 2018 Advanced Lighting Innovation Expo will inform and inspire you, the reader, to be a part of the coming transportation revolution.



Spot**LIGHT ON ALIE18**

By Deborah Kanter

Show Ready Technologies, Inc.

Are you prepared to take full advantage of the innovative treasures showcased at the Advanced Lighting Innovation Expo (ALIE)? For a limited time, advanced technology leaders from around the world present their best and most innovative lighting and automated vehicle technologies directly to Ford.

Born five years ago, ALIE continues to bring the crème de la crème of technologies inside Ford. Conveniently located at the Product Development Center's Design Showroom, ALIE offers countless opportunities all ripe for the picking. Will you uncover solutions to your engineering challenges, discover new technologies to improve vehicle architecture, or be inspired to create exciting new designs? The opportunities await.

"This exciting exposition enables our collaboration for 'Now-Near-Far' opportunities to meet the experiences and needs that our automotive customers are seeking," Marcy Fisher, Director, Global Body Core Exterior and Interior Engineering.

The Advanced Lighting Innovation Expo creates win-win relationships between Ford and suppliers and produces numerous benefits for Ford:

Unfiltered information directly from all Tier sources

Improved understanding of cost and generation of TVM ideas

Advanced technical information shared in a rapidly advancing space

Industry trends highlighted

Increased supplier collaboration

Technology training for Ford engineers

For exhibitors, having direct contact with key engineers, designers, program managers, executives and buyers is just one benefit. Better understanding of Ford's vision and direction, the ability to present technical materials directly to Ford, the expo's targeted focus on advanced lighting technologies, and the contained number of participating exhibitors stand out as top benefits.

In an effort to keep the expo fresh and relevant, six areas of AV Lighting Technology are the focus of this year's event. They are as follows:

- Exterior Communication
- Perimeter Lighting
- Dead Front Technology / In-Mold Decoration
- Wellness Lighting
- Integrated Sensors
- Additive Manufacturing

"If you are a Ford engineer, designer or manager, I encourage you to immerse yourself in this incredible opportunity. Ask questions, use your imagination, seek to solve challenges, and most importantly plan to partner through productive collaboration with the suppliers and future suppliers in our midst,"

–Dean Stevenson, Chief Engineer, Global Design Engineering.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INNOVATION
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LIGHTING THE WAY

By LaRon Brown, Ford Motor Company

These are exciting times to be working in Ford's Body Exterior Core Engineering activity. The company's lighting systems are in a transformational stage driven by new technologies and new design concepts. Ford's lighting components for automated and battery electric vehicles will incorporate smart features, safety, and aesthetics in attractive streamlined designs.

Electric vehicle and automated vehicle trends are changing the design of the front-end system. Core Engineering and Research are working together on new materials that can transform or replace the traditional grille. Eliminating the grille on a battery-powered vehicle makes space for a seamless, integrated front-end system whose plastic panels will illuminate the road and communicate messages to pedestrians and ride share occupants.

There are multiple ways to design and manufacture light-displaying components. Potential light sources include small lasers, organic light-emitting diode (OLED) devices, and liquid crystal display (LCD) light sources. These sources can be combined with films, electroluminescent paint, two-shot injection molding, and integrated electronics to deliver a complete lighting or display solution. Although each of these technologies offers its own set of functional and aesthetic benefits, they all support the creation of new light functions to replace the grille, communicate with pedestrians, simplify the driving task, and/or improve functional safety. On the most highly automated vehicles, the main purpose of lighting may no longer be enhancing visibility for the driver. The focus may shift to communication between the vehicle and its surroundings. Ford's engineering team is working to understand how pedestrians and other drivers view automated vehicles and how these vehicles can most safely share the road with driver-guided vehicles and pedestrians. As the standards and regulations in this area evolve to encompass new technologies, automakers and their supplier-partners will work together to find the best ways of leveraging those technologies in lighting system designs.

> "simplify the driving task, and/or improve functional safety."

The Body Exterior team has started to engage its supplier-partners at all tiers to integrate automation sensors (LiDAR and radar) in lighting assemblies or conceal them behind exterior trim components without reducing their effectiveness. Addressing this challenge requires Ford and its suppliers to work at the cutting edge of material and coating technologies, seeking out the resins, films and coatings that best meet the demands of the new system designs. The material finish, which may be chrome, matte, gloss paint, or clear, can have a huge effect on light propagation, sensor operation, or display function. As the level of automation in vehicles increases over time, automakers and their supplier-partners will need to work together on the specifications and guidelines that define the new products.

ALIE18
Advanced Lighting Innovation Expo

Ford
Go Further

EXHIBITOR PROFILES

AN INSIDE LOOK AT THE ALIE EXHIBITORS

UP CLOSE

Booth 1 Radiant Vision Systems EXHIBITOR PROFILE

Business Type
Manufacturer of Photometric and Colorimetric Imaging Systems

Established Year
1992

Annual Sales (USD)
$50 Million

Number of Employees
150

Major Customers
Ford Motor Company

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Company Strengths & Specialization

Radiant Vision Systems engineers advanced imaging systems to evaluate lamps, illuminated components, and finishes. Calibrated to human perception of light and color, Radiant photometers and colorimeters ensure quality that accurately reflects customer experience.

- Lighting: Evaluation of headlamps, tail lights, and signals.
  – Illuminance distribution – Beam pattern cut-off gradients – Conversion to luminous intensity distribution
- Backlit Components: Instrument panel harmonization and cross-symbol uniformity
- Displays: Expertise in automotive displays in dashes, consoles, mirrors, and windshields (HUDs).
  – Light/color measurement – Pixel/line defects – Distortion – Mura (including DFF Black Mura standard)

Key Products with Features & Benefits

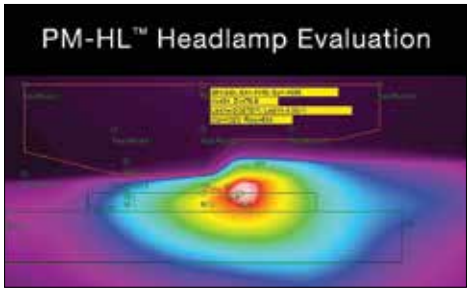
Radiant products for R&D and production include:

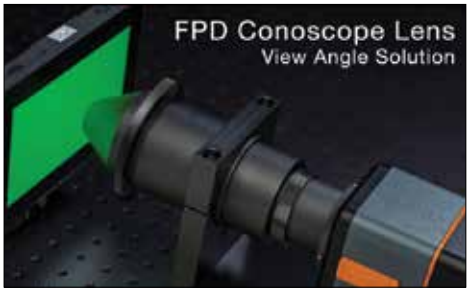
- ProMetric®: Calibrated to replicate human response to brightness, color, and contrast, ProMetric Imaging Colorimeters and Photometers are CCD-based systems designed to make precise, spatial measurements of luminance and chromaticity in devices and surfaces.
- TrueTest™: Test sequencing software with API for fully-automated, multi-step pass/fail analysis.
- Auto-POI (Automatic Points of Interest): Software tool that enables automatic selection of points of interest based on color/luminance values. Calculations can be run on a one or multiple symbols to ensure uniformity regardless of location, shape, or color.
- PM-HL™: ProMetric Software module for headlamp beam pattern measurement. Also converts headlamp beam patterns to roadway illumination distributions.

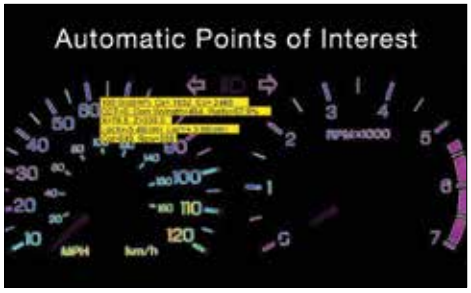
New Innovations & Technologies for 2018

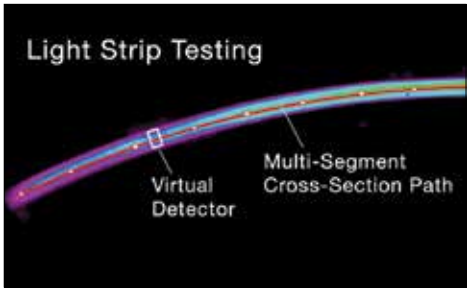
Radiant has released the below solutions to market as of 2018:

- FPD Conoscope Lens: Captures complete angular light data in a single measurement to ±70 degrees for evaluating display viewing angle performance.
- NIR Intensity Lens: Captures near-infrared angular emissions in a single measurement to ±70 degrees for radiant intensity of NIR emitters used for gesture recognition, eye tracking, and other 3D sensing.
- TT-HUD: Software module with test suite to perform light, color, and dimensional measurements specific to the evaluation of head-up display (HUD) systems against SAE standards.
- Light strip testing: Measure luminance and color along a multi-segment cross-section path drawn onto the image of the light strip within the software analysis window.
- Sparkle measurement: A defined method for accurate and repeatable testing of sparkle (caused by anti-glare coating on displays), correlated to human visual perception.









Booth 2 Dow Chemical Company - Dow Performance Silicones EXHIBITOR PROFILE

Business Type
Material Supplier

Established Year
1897

Annual Sales (USD)
$5 Billion

Number of Employees
8,000

Major Customers
Global Automotive OEMs
Tier 1: Full Assembly
Tier 2: Component Suppliers
Tier 3: Molders and Fabricators

Certifications
ISO 9001:2000
ISO 14001 TS2 Certified

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Company Strengths & Specialization

Dow Performance Silicones delivers a portfolio of performance-enhancing solutions to serve the diverse needs of customers and industries around the world.

- Global leader in innovation and silicon-based technology
- Over 70 years working with automotive system, module and component manufacturers
- Network of partners who have demonstrated expertise to support customers around the world with prototyping, preliminary testing and developing new and innovative designs

Key Products with Features & Benefits

- Broad portfolio of high-performance silicone materials for:
  - Protection and assembly, including adhering and sealing, component protection, and heat management
  - Injection molding of interior and exterior secondary optics, including adaptive driving beam optics
- The combination of innovative silicone protection and assembly and optical materials – and Dow's technical expertise – provides solutions that help you develop products offering end users longer product life cycles and greater efficiency.

New Innovations & Technologies for 2018

DOWSIL™ MS-40XX Moldable Silicone series of next-generation silicone materials for applications in vehicle lighting and exterior.

Booth 4 Melexis EXHIBITOR PROFILE

Business Type
Automotive Semiconductor Manufacturer

Established Year
1989

Annual Sales (USD)
$575 Million

Number of Employees
1400+

Major Customers
AGM, AISIN, ALPS, APTIV, Bosch, Brose, Continental, CTS, Curtiss-Wright, Delphi Technologies, Delta, DENSO, FLEX, GHSP, Grupo Antolin, Hartmann, HELLA, Hyundai Autron, Hyundai MOBIS, KOSTAL, LEM, LG Innetek, Methode Electronics, Magna, Nidec, Pacific Insight, Pierburg, Samsung, Sensata, Sonceboz, Stoneridge, TE Connectivity, TT Electronics, UAES, Valeo, Webasto, ZF

Certifications
ISO 9001, ISO 14001, ISO/TS 16949

Company Strengths & Specialization

Automotive Semiconductor Integrated Circuits, Sensors, Drivers, lighting control, underhood, body, chassis, interior autonomous and vehicle networking.

Key Products with Features & Benefits

MLX81113 LIN BUS RGB Lighting Driver
MLX81115 LIN BUS Dual RGB Lighting Driver
MLX81116 MELIBU enables RGB "Dynamic" lighting driver.
MLX81120 LIN RGB Gateway Architecture IC with driver.
MLX77127 VGA resolution Time of Flight (ToF) Chipset for Exterior and interior 3D imaging/sensing.

New Innovations & Technologies for 2018

MELIBU Dynamic Lighting Driver for exterior function lighting and Autonomous Vehicle to Pedestrian communication.
VGA Time of Flight (ToF) Chipset for Driver Monitoring and Pedestrian/Object sensing and classification.

Contact
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Booth 3 LumenFlow Corporation EXHIBITOR PROFILE

Business Type
Designers and Manufacturers of Photonics, Optics and Lighting Systems

Established Year
2000

Annual Sales (USD)
$1.5 Million

Number of Employees
6

Major Customers
OEMs and Tier One suppliers

Certifications
Laser Safety Officer on staff

Contact
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Sales Director
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lumenflow.com

Company Strengths & Specialization

1. High Performance Projection Optics using moldable optical silicone for vehicle brand identification. Designed and launched an image projection optical pill assembly using silicone for vehicles with hands-free automated lift gates. Supply to a tier and GM is their customer.
2. Silicone Molded Optics for task, area and accent lighting. These optics are low-profile, lightweight and cost-effective for interior and exterior applications.
3. Photonic Engineering Services with competence in laser-based optical systems, photon counting and high-resolution imaging. With our considerable experience in precision optics and photonics, we are able to deliver optical solutions for automotive camera and laser-based transmit as well as receive (sensing) and pixel-level forward lighting control and light shaping.

Key Products with Features & Benefits

LumenFlow is a leader in providing solutions using moldable optical silicone for automotive lighting applications and others. Our primary focus has been automotive and we work closely with Dow Performance Silicones on material optical characterization. We measure, model and generate the low-scatter material definition files for use in optical design software like SPEOS. This allows us to create predictive performance simulations with high correlation between our models and actual measured devices. LumenFlow uses SPEOS, Light Tools and ZEMAX software. We have many add-ins for SPEOS including the following: Photometry Package, Colorimetry Analyzer, Optical Design Package, 3D Textures Package, and Mass Fluorescent Materials Generator Options.

New Innovations & Technologies for 2018

1. Very low-profile interior CHMSL, targeting Ford Ranger (Concept Demonstration Phase)
2. Autonomous Vehicle Active Pedestrian Indicator Light "AVAPIL" with a low-profile interior windshield mount (Concept Demonstration Phase)
3. High resolution Color Image Projector (Development Phase)
4. Molded Optical Silicone Elements for Luminance and Illuminance Applications

LumenFlow Corp.

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Forest City Technologies

"Forest City Technologies manufactures customer designed optical components for automotive, aerospace and general lighting applications. A diversified manufacturer, headquartered in Wellington, Ohio, Forest City also serves the fastener industry as a provider of value-added coatings and products, provides sealing solutions for fasteners and electrical connection systems, and manufactures lightweight components using a variety of specialty materials and process technologies.

FOREST CITY TECHNOLOGIES

Booth 5 Integrated Silicon Solution, Inc (ISSI) EXHIBITOR PROFILE

Business Type
Automotive Semiconductor Supplier

Established Year
1988

Annual Sales (USD)
$500M

Number of Employees
700

Major Customers
Continental, Delphi, Valeo, Panasonic, Visteon, AGM, Kostal, SiriusXM

Certifications
ISO9001, ISO/ITS16949

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Company Strengths & Specialization

ISSI is an analog and memory technology supplier for the automotive industry. Our primary products are automotive grade high speed, low power SRAM, medium density DRAM, and NOR flash memory products. Our analog mixed signal division called 'AMS', designs and markets high performance LED drivers, capacitive sensors, and MCUs with AEC-Q100 certification. We have been a committed long-term semiconductor supplier to the automotive market, even through periods of tight manufacturing capacity. We will continue to provide excellent service, long-term support and latest technology to our valued automotive customers.

Key Products with Features & Benefits

Wide selection of Linear and Switching LED drivers such as, IS32LT3124 - Four Channel Linear driver with thermal offload, and independent channel control for exterior animation lighting effects such as tail lights, welcome lighting, etc. IS32FL3237 - 36 Channel driver with 16-bit PWM, EMI cancellation and accurate RGB color for cabin mood lighting effects. IS32LT3175/3128/3129 - Map/Dome light with integrated theatrical dimming (no micro required) self-driven by integrated state machine operation. Benefits are low BOM cost and high reliability since only one controller is needed for driving high brightness LEDs as well as switch back lighting. IS32LT3954/3956/3957 - high current switching drivers with spread spectrum technology to lower EMI and fault output for safety and notification.

New Innovations & Technologies for 2018

The automotive industry is moving to autonomous vehicle technology: the driver-less car is coming. Interior/exterior ambient lighting must meet the challenge of implementing the desired lighting for safety and pleasing visual effects. We have developed LED drivers which simplify the implementation of animation lighting and high color depth reproduction. We understand our customers' need for reliable low-cost semiconductor solutions while maintaining high quality and long-term availability. Our LED drivers integrate features such as adaptive thermal control, active noise reduction, RGB color accuracy, fault detection/reporting, and other features for best in class lighting performance. We listen to our customers and constantly develop new lighting solutions to address their requirements.

Booth 7 Aismalibar SA EXHIBITOR PROFILE

Business Type
Thermal Substrate Supplier to PCB Manufacturer

Established Year
1934

Annual Sales (USD)
(USD): N/A (Privately Held)

Number of Employees
75

Major Customers
EBW, Ventra FlexNgate
Aurora Circuits
American Standard Circuits
Saturn Electronics

Certifications
ISO 9001, ISO/TS 16949 RoHS

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Company Strengths & Specialization

Aismalibar is a manufacturer of copper clad laminates that produces high quality base materials for the PCB industry. With over 20 years of experience producing thermal management base materials, Aismalibar can provide industry leading solutions for automotive lighting.

Company Profile Video: www.youtube.com/watch?v=nfMGxAE7KqY

Key Products with Features & Benefits

COBRITHERM has been approved by top OEMs around the world with a focus on the automotive, lighting and power electronics industries. It has collected excellent results in endurance testing and has the UL Recognition as one of the best Insulated Metal Substrates after 60,000 hours.

FLEXTHERM is a flexible high technology thermal insulated metal substrate. The flexible properties of this material enable it to conform to both the negative and positive radii, allowing the product to adapt to the ever-changing demands of the automotive lighting industry.

HTC Ultra Thin is an innovative Ultra-Thin dielectric layer that provides higher thermal performance and excellent working temperature. With a thickness of only 35 microns, this new product reduces thermal resistance down to 0,10 Kcm/W (0,17 Kinch/W), which offers excellent thermal dissipation conditions for high power LED assembly. Proof tests (high pot test) in the Cobritherm Ultra-Thin 35 Micron are carried out at 1000 VDC.

New Innovations & Technologies for 2018

FASTHERM was developed by Aismalibar to achieve a faster thermal transition from the LED thermal pad to the heat sink. This superior thermal transition can be achieved by using the entire COBRITHERM HTC product range with either a Copper or Copper /Aluminium base. By using Aismalibar COBRITHERM HTC range together with FASTHERM technology LEDs operate at a temperature 30ºC to 50ºC lower due to the direct thermal transition from the thermal pad to the heat sink.

Booth 6 EXCELLENCE OPTO. INC (EOI) EXHIBITOR PROFILE

Business Type
Manufacturing/Design/Innovation

Established Year
1995

Number of Employees
1,000

Major Customers
Ford, FCA, GM

Certifications
IATF-16949: 2016, ISO 9000, US Car 33, AECQ101

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Company Strengths & Specialization

As a vertically integrated developer and manufacturer of LEDs, EOI has the expertise to design durable high-performance light systems

- Designer and manufacturer of LEDs & light modules
- Ford lighting supplier since 2007
- Experienced designing to Ford ELCOMP, EMC and Environmental performance requirements
- Global manufacturer with operations in Taiwan, China & Michigan

Key Products with Features & Benefits

- Full line of interior/exterior LEDs designed for automotive applications
- Quadra Dual Color (amber/red) LED. Allows two colors in single chamber. Ideal for taking advantage of IIHS Amber Turn Vehicle Safety Rating Bonus.
- Uniflex Plus: homogenous, low profile light source for tail

New Innovations & Technologies for 2018

- Uniflex Linear
  - Ideal light pipe replacement allowing dual colors in a single chamber
  - Meets DRL/Turn/Stop/Tail requirements
  - Dynamic/animation capabilities for Lincoln Embrace
  - Homogenous lit appearance
  - Sleek bendable design fits the vehicle contours
- PLCC 3014 Side View LEDs
  - Low profile and small footprint
  - 1/4W and 1/2W devices

WE COMMIT, WE IMPROVE, WE DELIVER

*EOI is a company **NOT** focused on competing with others, but goes on making ourselves a better company that exceeds **customer's expectations** all the time*

Booth 8 Stanley Electric Sales of America, Inc. EXHIBITOR PROFILE

Business Type
Manufacturer of Electrical & Electronic Equipment and Components

Established Year
1920

Annual Sales (USD)
$3.4 Billion

Number of Employees
16,700 (Global)

Major Customers
Alpine, Alps, Behr-Hella, Delphi, GM, Harman, Honda, Kostal, Mazda, Nissan, Omron, Panasonic, Subaru, Tokai Rika, Toyota, Visteon

Certifications
ISO 9001, ISO/TS 16949-IATF 16949, AEC Q101-Q102, USCAR-33

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http://www.stanley.co.jp/e/

Company Strengths & Specialization

Stanley is an industry leader in the design of automotive equipment, accessories, and components for both interior and exterior applications. We utilize our original technologies including advanced optical, thermal and phosphor expertise to design and deliver best-in-class products that contribute to the safety and customer satisfaction required by both OEM's and Tier 1's.

Key Products with Features & Benefits

For exterior lighting Stanley designs and manufactures LED headlamp assemblies, DRL's, rear combination lamps, LED high-mount stop lamps, and LED fog lamps. Headlamp configurations include standard LED H/L's with two eyes, multiple eye configurations and advanced optics solutions. On the component side, we offer hi-flux COB arrays that provide the light source for both low-beam and high-beam functions (luminous flux ranges from 1300~2250 lm typ.) along with ceramic package solutions designed for use in DRL's and position lamps. Additionally, LED component solutions for rear combination lamps and LED'S optimized for use with light guides in signal lamps. For interior, we specialize in offering custom colors including Ford Ice Blue and Lincoln White, LED'S covering a wide range of CCT with high CRI for domelights and maplights, and tunable tri-color RGB LED'S for ambient lighting applications.

New Innovations & Technologies for 2018

Our component group introduced a new line of high powered infrared LED'S designed for both interior and exterior applications for possible use in camera systems, sensor systems, and in gesture control interface panels. We're also offer single and dual-lens LED projector headlamp modules that can provide the core for headlight designs by Ford's present lighting suppliers. Another interesting new product are LED arrays designed for use in ADB headlamps. They combine high flux (315 lm in a 2 X 1.28 X .57 mm package) in a compact package design making them ideal for hi-density mounting in these lamps. New innovations also include a new line of UV-A and UV-C Leds for possible use in air purification systems in vehicle HVAC control units.

Booth 9 NKK Switches EXHIBITOR PROFILE

Business Type
Manufacturer of Electromechanical Switches

Established Year
1953

Annual Sales (USD)
$69M (consolidated)

Number of Employees
263

Major Customers
Ross Video, Rockwell Automation, Blackmagic Design, Top Union, Benchmark, L3 Communications

Certifications
ISO 9001, ISO 14001

Contact
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www.nkkswitches.com

Company Strengths & Specialization

- 65-year company history, specialized in the design and manufacture of electromechanical switches.
- Complete switch solution design services.

Key Products with Features & Benefits

- SmartSwitch OLED programmable pushbutton and display: fully programmable, multi-functional illuminated device.
- Wide range of illuminated toggles, rockers, pushbuttons.

New Innovations & Technologies for 2018

SmartSwitch technology display that facilitates ease of use for infotainment interface.

Booth 10 Rebo Lighting & Electronics EXHIBITOR PROFILE

Business Type
Automotive Interior and Specialty Exterior Lighting & Electronics Supplier

Established Year
2011

Annual Sales (USD)
$121 Million (2017)

Number of Employees
680

Major Customers
NA-Ford, Honda, FCA, GM
China-Ford, Suzuki, BAIC, Geely
Germany-VW, BMW, Audi, Porsche

Certifications
TS16949
Ford Q1
IATF 16949
ISO 9001
ISO14001
ISO 50001

Contact
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Company Strengths & Specialization

Rebo Lighting & Electronics is located in Chongqing, China. We are a public company listed in China. With the 2017 acquisitions of FER in Germany and Federal-Mogul Lighting in North America, Rebo has become a true global supplier, with engineering and manufacturing in all three regions. Total global sales revenue of $121M USD in 2017 and forecasted sales revenue of $140M USD in 2018. We provide design, development, manufacturing and delivery of automotive lighting and electronics products. With our global footprint, we are able to supply OEMs and Tier1 customers with competitive pricing on automotive interior and exterior lighting, control units and wire harnesses, etc. As an innovative manufacturer of LED lighting products, Rebo connects innovative ideas from our three regional technical centers to meet customers' objectives, while meeting product performance requirements.

Key Products with Features & Benefits

Interior Ambient Lighting with advanced optics. Overhead consoles, including capacitive touch and chrome un-lit appearance. LIN RGB EV charge status indicators, 3D logo projectors, reading lamps, wire harnesses, illuminated sill plates, illuminated cup holders, CHMSL's, license plate lamps, mirror mounted turn indicators, illuminated exterior badges, truck bed lamps, trailer backup assist lamps, running board lamps, telematics control units, GT8 and cartridge incandescent bulbs

Product line 98% LED with in-house Ford-approved SMT lines
Optics and electronics capabilities on 3 continents for robust function to all OEM specifications and uniform/homogenous lit appearance

New Innovations & Technologies for 2018

- 3D logo projector lamp
- LIN RGB charge status indicator lamp (9 Ford EV programs)
- Telematics control unit

Booth 11 Ventec International Group EXHIBITOR PROFILE

Business Type
Manufacturer/Distributor

Established Year
2000

Annual Sales (USD)
$150 Million

Number of Employees
1,100

Major Customers
Automotive, LED, Mil/Aero

Certifications
AS9100 Rev D, UL, TS16949, ISO14001, OHSAS18001, GSV, 3C, REACH, ROHS Compliant

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Company Strengths & Specialization

Ventec International Group is a world leader in the production of high-quality, high-performance copper clad laminates and prepregs used in a wide range of PCB and associated applications. Ventec is a global company with an extensive foot print of manufacturing, distribution, technical service and sales centers throughout USA, Asia and Europe. Our global distribution allows us to readily supply our products to all markets in all geographic areas.

Key Products with Features & Benefits

Insulated metal substrate (VT-4-series, VT-4B3, VT-4B5, VT-4B7, VT-4B9) specialty materials used in LED manufacturing with superior heat dissipation. Typically bonded to aluminum. Used in commercial lighting, residential lighting, headlight and tail light applications. High-speed / low-loss materials specifically for signal integrity (tec-speed line of materials).

New Innovations & Technologies for 2018

tec-thermal (VT-5A2): a next generation best-in-class, high Tg thin-core and prepreg material designed for the world's most thermally demanding PCB applications, for example in electric vehicles for items such as engine control units or motor control units.

tec-speed 20.0 (VT-870): Our latest tec-speed 20.0 material with Dk 3.48 and Df 0.0035 enhances signal integrity and reliability in challenging applications like automotive radar, broadcast satellites, cellular base station antennas and RFID.

Free E-book: Want to know how to design multilayered PCB's with integrated thin thermal layers? For tips, download our micro eBook "The Printed Circuit Designer's Guide to... Thermal Management with Insulated Metal Substrates
http://i-007ebooks.com/my-i-connect007/books/printed-circuit-designers-guide-thermal-management-insulated-metal-substrates/

Booth 12 Covestro LLC EXHIBITOR PROFILE

Business Type
Polymer material supplier (polycarbonate, polyurethane, raw materials for coatings and adhesives)

Established Year
1863 as Bayer, 2015 Covestro created (upon divestiture) by Bayer

Annual Sales (USD)
$16 billion global

Number of Employees
16,000 global

Major Customers
Ford, GM, FCA, Daimler, BMW, Hyundai, Nissan, Toyota, Audi, Honda, Tesla

Certifications
Ford Approved Source List, ISO, AMECA, REACH

Contact
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Company Strengths & Specialization

- World-class manufacture, supply & development of polycarbonate and polycarbonate blends, polyurethane and polyurethane raw materials for coatings and adhesives
- Support component conception, design, development, manufacturing for OEMs and Tiers via proof-of-principle prototypes, FEA simulation, analysis, manufacturing trials, etc.
- On-site manufacturing support to Tier manufacturing operations
- Technologies include: polycarbonate development, design, engineering and process support, e.g. injection molding, welding, computer simulation & analysis, color & lighting-effects technologies, etc.

Key Products with Features & Benefits

Makrolon® polycarbonate resin offering very high impact strength, heat resistance, transparency – can be unfilled or filled – which can be blended with ABS or ASA (Bayblend®) or Polyester (Makroblend®). Widely used in lighting components (lenses, reflectors and bezels for headlamps, turn signals, tail lamps and CHMLS), interior components (instrument panel, center console, illumination components), exterior components (mirror housings, spoilers, decorative trim)

New Innovations & Technologies for 2018

- Resins for black appearance dead-front controls and displays which transmit light without color-shifting – available as transparent (displays covers) or translucent/diffusion (printed HMI features).
- Resins for LiDAR transmission and seamless integration into exterior and interior surfaces
- Thermally conductive Makrolon® polycarbonate resin (heat-sink integration into housings)
- Two-step in-mold assembly of electronics via injection molding and direct-encapsulation

Booth 13 Nichia America Corporation EXHIBITOR PROFILE

Business Type
LED Manufacturer

Established Year
1956

Annual Sales (USD)
N/A (Privately Held Company)

Number of Employees
9,000+ Globally

Major Customers
All Major Tier 1 Exterior and Interior Automotive Suppliers to OEMs

Certifications
ISO/TS Certifications; AEC / USCAR-33 Testing Facilities

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Company Strengths & Specialization

Nichia America Corporation is the founder of the high brightness white LED. Today, in mass production, Nichia is supplying both exterior and interior grade LEDs for all major OEMs (including numerous Ford vehicle lines in mass production and on the road today). Nichia is the leader in overall quality, based upon the vertically integrated manufacturing process and testing 100% of the finished LED products. Nichia automotive-grade LED products all satisfy OEM requirements, as Nichia is fully connected within the global automotive markets.

Key Products with Features & Benefits

High Brightness white and amber exterior-grade LEDs; market-leading interior-grade 146-series LEDs (full color spectrum)

New Innovations & Technologies for 2018

As the exterior lighting market continues to rapidly adopt LEDs for all functions, Nichia continues to develop the best next generation exterior-grade LED products. All areas are being focused, from mid-to-high power, High Luminance (for IIHS design-ease), ADB (with multiple array options) and Laser Diode (which Nichia is the #1 supplier in the world in terms of sales and volume for both LED and Laser Diode).

Nichia's 146-series interior LED line-up is industry-leading. The products are smaller than mini-TopLEDs in the market today, with the light output capabilities all the way up to a TopLED product, and all for an extremely aggressive price point. Single color bin color control is second to none in this automotive interior space.

Booth 14 SL AMERICA - Auburn Hills, MI. EXHIBITOR PROFILE

Business Type
Automotive Lighting, Electronics and Optics

Established Year
1954

Annual Sales (USD)
$3.9 Billion

Number of Employees
10,000+

Major Customers
FORD, GM, HYUNDAI, KIA, FCA

Certifications
ISO26262, A2LA, AEMCLRP, CMMI,

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Company Strengths & Specialization

SL has offered auto parts such as auto lighting assemblies, chassis products, mirror, and FEM (Front End Module) for over half a century since its inception in 1954.

SL is accelerating technology exchange with advanced companies and new technology development, keeping pace with the trends of next generation automobiles: technological advancement, sophistication, modularization and expanded application of electrical parts and systems. SL possesses world-class R&D capabilities for new products and new technologies, equipped with advanced systems that cover all the phases of new program development: product design, mock-up, test, analysis, simulation, S/W development, and certification.

Key Products with Features & Benefits

Lighting: Headlamps, Tail Lamps, Fog Lamps, Badges, CHMSL and Optics.

Chassis: Manual Shifter, Automatic Shifter, E-Shifter and Wireless Charging Systems.

ADAS: Sensors, Cameras, H/W, S/W, Electronics Manufacturing.

FEM: Complete Front End Module/s capable for our OEMs.

Mirrors: Interior/Exterior Mirrors, Cameras, Sensors, Displays and Systems.

New Innovations & Technologies for 2018

3D LED, Badges, Interior Lighting, Exterior Vehicle Visual Communication Systems, PIXEL/MATRIX Lighting, Autonomous Centric Lighting Solutions, Low Profile Projectors, Optics and Smart Systems.

Booth 15 HELLA EXHIBITOR PROFILE

Business Type
Automotive Supplier

Established Year
1899

Annual Sales (USD)
$8.3 Billion FY 2017/2018

Number of Employees
40,200

Major Customers
Nearly all reputable automobile manufacturers throughout the world.

Certifications
ISO 14001
ISO 9001

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Company Strengths & Specialization

HELLA is a global, family-owned company, listed on the stock exchange, with more than 40,000 employees at over 125 locations in some 35 countries. The HELLA Group develops and manufactures products for lighting technology and electronics for automobile manufacturers and other automotive suppliers throughout the world. The core competencies play an important role in driving forward the major automotive market trends such as autonomous driving, electrification and digitalization and individualization. HELLA also has one of the largest retail organizations for automotive parts, accessories, diagnostics, and services within Europe. With more than 7,000 people working in research and development, HELLA is one of the most important innovation drivers on the market. Furthermore, with sales of $8.3 billion in the fiscal year of 2017/2018, the HELLA Group is one of the top 40 automotive parts suppliers in the world and one of the 100 largest German industrial companies.

Key Products with Features & Benefits

HELLA's core competencies include innovative lighting systems and high-performance electronics. For lighting, HELLA develops innovative lighting systems that offer a high level of driving comfort while also providing optimum illumination of the road ahead such as headlamps, rear combination lamps, interior lighting, and car body lighting. For our high-performance electronics, HELLA offers comprehensive expert vehicle electronics solutions that focus on critical issues in the automotive industry: developing driver assistance solutions, increasing energy efficiency, minimizing CO2 emissions, and enhancing safety and comfort.

New Innovations & Technologies for 2018

In partnership with renowned OEMs, HELLA has launched new Matrix LED headlamps and laser high beams for enhanced safety as well as ambient lighting and Matrix LED reading lamps for interiors. Additionally, in collaboration with a European OEM, HELLA has also for the first time produced rear combination lamps with OLED technology (OLED: organic light emitting diode) for a large-scale series. By combining the competencies in lighting and electronics under one roof, HELLA is also in a leading technological position in lighting electronics and recently has developed, in collaboration with a premium OEM, a new single control unit which takes care of all headlamp functions.

Booth 16 Phillips-Medisize, a Molex company EXHIBITOR PROFILE

Business Type
Outsource provider of design, development, electronics, assembly and manufacturing

Established Year
1964

Number of Employees
5,400

Certifications
IATF/TS 16949, ISO 9001, ISO 14001, ISO 13485

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Company Strengths & Specialization

As Phillips-Medisize is now a Molex company, together we are able to provide an efficient, lightweight, heat dissipative, complete plug-in LED lighting solution to the automotive market. Leveraging 40+ years of experience together in the automotive industry, the company provides electronics, mechanical and thermal design, testing, printed circuit assemblies, magnesium injection molding, plastic injection molding and manufacturing expertise.

Key Products with Features & Benefits

Our combined capabilities can solve your LED design problems. Molex specializes in complete product design, including electrical, mechanical, thermal, overmolding, and reliability testing of complex LED, printed circuit, and wire harness assemblies. Phillips-Medisize provides expertise in plastic injection molding, LSR and testing, as well as magnesium Thixomolding, which achieves better performance, thermal conductivity, and lightweighting options, along with thin walls, complex designs, part consolidation and improved strength/weight ratio – an ideal solution for LED lighting components. Our knowledge and expertise ensures shorter design cycles, allowing your product to move quickly into volume production. We have automotive manufacturing sites in Asia, North America and Europe with TS16949 and ISO certifications. Our combined experience in the above technologies makes us a leader in cost-effective, weight-optimized, energy efficient, thermal-managed, LED and wire harness assemblies for the transportation market.

New Innovations & Technologies for 2018

Implementation of liquid silicone rubber (LSR) for optic applications and overmolding (2-shot).

Booth 17 Myotek North America, Inc. EXHIBITOR PROFILE

Business Type
Exterior Lighting

Established Year
1997

Annual Sales (USD)
$70+ Million

Number of Employees
250+

Major Customers
FCA, General Motors, Harley Davidson

Certifications
TS-16949, ISO-9001, ISO/TS 16949

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Company Strengths & Specialization

Myotek is a Tier 1 manufacturer and supplier driven by a relentless focus on innovation, creativity, performance & quality. With a Tech Center located in Orange County, CA, we are committed to be the technology expert in vehicle lamp design to inspire the evolution of more efficient LED lighting solutions.

Our OEM customers are paramount to us and that's why we invest heavily in top-notch people, equipment and customer service.

Key Products with Features & Benefits

Superior Optical Design with optimized electronics and thermal management, Myotek products support customer goals for lumens on the road, beam pattern spread, and lower electrical consumption with reduced mass for LED lighting. For speed to market, Myotek offers fully-certified, ready to go, off-the-shelf fog lamps to save time and thousands of dollars in development and tooling costs.

New Innovations & Technologies for 2018

Ask us about our DirectFIRE™ Optics and Signature Light Blade Designs...

Booth 18 Pioneer EXHIBITOR PROFILE

Business Type
Audio/Lighting

Established Year
1938

Annual Sales (USD)
$4 Billion

Number of Employees
17,000

Major Customers
Ford, Toyota, Honda, GM, Mazda, PSA,

Certifications
ISO, TS, IATF,

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Company Strengths & Specialization

Pioneer specializes in car electronics. Our position as number one aftermarket audio system supplier in the US allows Pioneer to bring new technology quickly to market. We can leverage our aftermarket portfolio and quickly adapt to OEM requirements.

In 2017 a JV was formed with Konica Minolta to accelerate the launch of our automotive Flexible OLED lighting business.

Key Products with Features & Benefits

Navigation - Pioneer was 1st to Market with Navigation in 1990, created mapping database for Japan Car Audio Systems & Speakers

High Quality Sound, Excellent Picture Quality, and Advanced designs Carplay and Android Auto Compatible - 1st to market, wired and wireless

"Smart Loop" information network linking Navigation, Network Systems, and User information to provide a personalized experience

Flexible OLED Lighting - Leveraging Pioneer OLED display (1998 - 1st to market) and lighting experience with Konica Minolta manufacturing expertise for flexible OLED, a JV (KOMPO) was formed in 2017.

New Innovations & Technologies for 2018

- Flexible OLED Panels for Tail Lamp Applications and Interior lighting
- 1st to Market Wireless Android Auto and Apple CarPlay
- Compact, High Performance, Lightweight 3D LiDAR
- Laser Picture Generating Unit for AR-HUD

Booth 19 | Cree, Inc. | EXHIBITOR PROFILE

Business Type
Manufacturer, LED Chips and Components

Established Year
1987

Annual Sales (USD)
$1.6 Billion

Number of Employees
6,000+

Certifications
ISO 9001, ISO 14001, IATF 16949

Contact
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Company Strengths & Specialization

Company Strengths

North American manufacturer of Silicon Carbide (SiC) wafers and GaN/InGaN epitaxy, LED Chips, LED Components, LED Lighting and SiC-based Power & RF components

Specialization

World's largest supplier of Silicon Carbide (SiC) wafers and SiC-based products for the LED, Power and RF markets

Key Products with Features & Benefits

High Power LED Chips and Components for Automotive Exterior

- EZ™ LED Chips - top-emitting, Lambertian radiation pattern simplifies headlamp optics
- SA™ LED Chips - latest generation of high-power, Direct Attach, no wire-bond chips ideal for dense arrays and addressable designs

Low Power LED Chips for Automotive Interior

- Indicators, Meter Cluster, Center Console and Ambient Lighting
- Long-running and widely used, these popular Cree LEDs are small, thin, bright and reliable
- Mini LED single wire-bond chips in sizes down to 130 um and 50 um thick, offering design options not available from other suppliers

New Innovations & Technologies for 2018

- White and Amber packaged components for DRL and Turn applications
- Small, 500 µm SA LED chips, ideal for ADB and other matrix Headlamp designs
- IATF 16949 Certification for Durham, NC, RTP, NC and Huizhou, China sites

Booth 20 Mektec International Corporation EXHIBITOR PROFILE

Business Type
Flexible Printed Circuit and Assembly Manufacturer

Established Year
1969

Annual Sales (USD)
$3.2 Billion

Number of Employees
27,000

Major Customers
GM, FCA, Volvo, BMW, Daimler, VW, Nissan, Honda, Tesla, Audi

ZF TRW, HELLA, Continental, BCS, Valeo, NAL, Sensata, Flex-N-Gate, ALPS, Carlex, PGW/Vitro, Kostal, Magna,Varroc, Koito, Marquardt, Bosch, Panasonic, Sharp, Fuba, Gentex, Stanley Electric

Certifications
ISO 9001, ISO/TS 16949-IATF 16949

Contact
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Company Strengths & Specialization

Mektec provides flexible printed circuits (FPC) with the most advanced technology and the highest level of integration to the global automotive industry. We are a wholly owned subsidiary of Nippon Mektron, the world's leading manufacturer of FPC. With 20 production locations worldwide, we are truly a global partner for our customers. For over 31 years, Mektec has focused on the manufacture and sale of FPC. This consists of component and module assembly including precision molded components and sealing. Our product range includes FPC, FPC with assembly and FPC with components, plastic and/or sealing products (FPC Modules). Main market segments supported are: Lighting, Infotainment, Sensors, Switches, Powertrain, Antenna, Battery and Heaters. Mektec covers the entire VA-chain of FPC production from tailor-made materials to mechatronic components using FPC. With this supply model, Mektec has established itself as the market leader in Technology, Innovation, Quality and Cost. It is this level of innovation that places Mektec at the crossroad of innovation and electronics in the automotive marketplace. We support our customers from advanced development through mass production with extensive knowledge, utilizing best in class global design and production standards.

Key Products with Features & Benefits

FlexBoard = Multi-layer flexible printed circuit board with nearly unlimited design possibilities.
- 100% Polyimide material construction provides greater thermal reliability
- This functional integration of the flex cable and rigid board eliminates connectors and saves valuable space

Double-Sided FPC = Standard FPC with 2 Copper Layers on both sides of the Polyimide film
- Allow for more intricate circuit design than a single-sided FPC
- Further space savings are realized by mounting components on both sides of the FPC

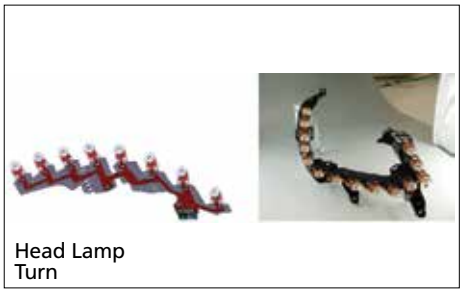
Component Assembly FPC
- In order to meet our customers' needs for FPC module units, Mektec Group not only provides FPC themselves, but also mount surface parts, flip chips and other components directly onto the FPC
- We supply more than 1Million FPCA (Flexible Printed Circuit Assemblies) to our customers world wide everyday

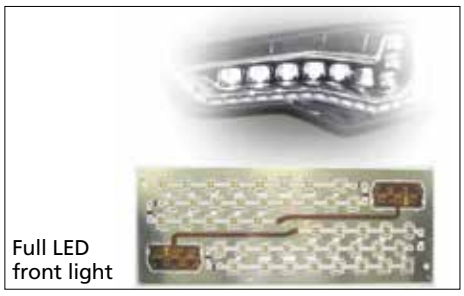
New Innovations & Technologies for 2018

- Development of material dedicated to Lighting applications to optimize cost and performance of materials which are rated for up to 150° C
- High Precision mounting of hybrid FPC onto aluminum heat sink for OEM of EV's
- Development of an Improved Thermal FPC Stack-Up to replace IMS (Aluminum)
- Development of High Accuracy positioning of LED's (+/-50 um under development)

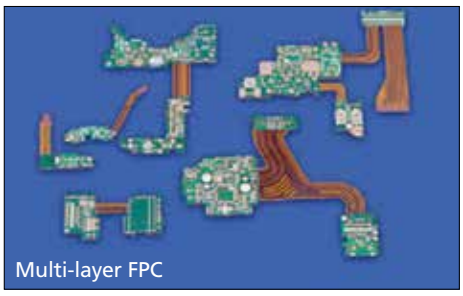
Mektec Product Portfolio


LED turn indicator


Head Lamp Turn


Full LED front light


Light Pipe


Multi-layer FPC

Booth 21 Lumileds EXHIBITOR PROFILE

Business Type
Global Light Engine Manufacturer

Established Year
1914

Annual Sales (USD)
Over $2 Billion

Number of Employees
9,000

Major Customers
Major automotive exterior lighting setmakers/Tier 1s worldwide

Certifications
ISO/TS 16949, ISO 14001, ISO 9001, OHSAS 18001

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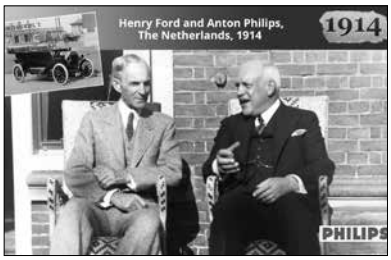
Company Strengths & Specialization



- Over 100 years of history shaping the automotive lighting industry through innovations and product "firsts".
- Operates in diverse segments in LED: automotive (OEM and Aftermarket), besides general illumination and consumer specialty.
- In-house design and manufacture of our light sources.
- Global footprint with proximity to key customers.
- Continued track record of technology leadership.
- Design, develop, and manufacture a broad spectrum of light sources (including LEDs, signaling bulbs, halogen bulbs, HID bulbs) for use in automotive front and rear lighting applications.
- Design, develop, and manufacture LED-based subassemblies (including circuit designs, optical designs, substrates, wiring, connectors, plastic components, inner lenses) for use in automotive front and rear lighting applications.
- Design, develop, and manufacture LED Bulbs for automotive front and rear signaling.
- Enable our customers, through the application of our extensive automotive and light source competencies, to design in our products and create breakthrough lighting products.
- Developing next generation dynamic signal lighting that addresses the needs of autonomous driving.
- Enabling new light source solutions for future exterior lighting applications around the car, such as welcome scenario lighting, ambient carpet light and signal projection.

Key Products with Features & Benefits

3D LED

- Bi-directional, bendable and compact light source achieves full freestanding 3D sculptures and extended linear lighting profiles.
- Embedded optical, thermal and mechanical interface allows for easy handling and assembling into a lamp.
- Enables future lighting designs in an attractive and cost-effective manner.
- Creates new differentiation value for styling-driven market segments.

LUXEON Matrix Modules

- Customizable matrix solutions for AFS/ADB front lighting systems.
- Superior tolerances for increased optical efficiency.
- Complete module solutions available (including electronics and optics delivery) to reduce development time and effort.
- Optimized system performance and guaranteed quality.

LUXEON Versat LED Family

- Portfolio range of colors and light outputs suitable for multiple front and rear lighting applications.
- Industry standard footprint(s) enables simple integration and high-volume assembly.
- Package optimized for light extraction, achieving industry-leading efficacy.
- Low package height simplifies optical design and minimizes design space.
- Superior thermal management due to large anode pad design.

LED Bulbs

- Standardized and regulated LED-based solutions for cost-effective turn, stop, tail, rear fog, DRL, backup and front fog lighting applications.
- Integrated heat sink and driver enables compact luminaire design.
- Standard interface allows for minimal effort in product proliferation.
- Integrated automotive industry standard connector.
- Powerful light from a small source provides design freedom for meeting various styling needs compared to conventional solutions.

LED Modules

- Standardized LED-based solutions for cost-effective rear fog and backup lighting applications.
- Integrated primary optic provides direct beam shaping.
- Easy mechanical integration into rear combination lights or bumper units.
- Integrated heat sink and driver provides compact luminaire design.
- Integrated automotive industry standard connector.

New Innovations & Technologies for 2018

LUXEON Altilon Intense

- Pioneering high luminance, featuring miniaturized die design in multi-chip package proliferations.
- Enabling compact optical systems for slim headlamp design and/or superior beam performance.
- Lighting applications include low/high beam and matrix headlighting.
- Superior tolerance levels and contrast enable smaller-size luminaires.

LED Headlamp Bulbs

- Modular LED main beam functionality for mainstream cars.
- Serviceability and long term support provide an optimized total cost of ownership.
- Easy design in across platform because of standard interfaces (mechanical, optical, electrical), which enables fast time to market and reduces engineering effort.
- Integrated heat sink enables compact luminaire design.

Booth 22 ANSYS OPTIS EXHIBITOR PROFILE

Business Type
Software Company

Established Year
1970

Annual Sales (USD)
$1.095 Billion

Number of Employees
2900+

Certifications
ISO26262
CIE 171:2006
ISO/ASTM 52900:2015

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Company Strengths & Specialization

Founded in 1970, ANSYS employs more than 2,900 professionals, and many of them are engineers expert in fields such as finite element analysis, computational fluid dynamics, electronics and electromagnetics, optics and design optimization.

ANSYS is passionate about pushing the limits of world-class technology, all so our customers can turn their design concepts into successful, innovative products.

Key Products with Features & Benefits

ANSYS SPEOS - CAD integrated optical simulation & visualization understanding lighting & materials interactions and the sensor perception (Human Eye, LiDAR, camera)

ANSYS VRXPERIENCE - Real Time, closed loop, simulation of all sensors (LiDAR, camera, radar), the multiphysics simulaiton of physical and electronic components, analysis of systems functional safety, as well as the automated development of safety-certified embedded software.

ANSYS SCADE Suite - Model based development environment for critical embedded software

ANSYS medini analyze - Implement key safety analysis methods (HAZOP, FTA, FMEA, FMEDA) all in one integrated tool

New Innovations & Technologies for 2018

2018With the purchase of OPTIS in 2018, ANSYS' comprehensive simulation platform provides broad and deep capabilities for simulating autonomous vehicles and advanced driver assistance systems — everything from high-fidelity, physics-based sensor modeling to ISO26262 and AUTOSAR compliant embedded software and human-machine interface development tools.

Booth 23 ON Semiconductor EXHIBITOR PROFILE

Business Type
Design & Manufacturer of Semiconductor Components

Established Year
1999

Annual Sales (USD)
$5.3888 Billion

Number of Employees
30,000

Major Customers
Ford, Continental, Hella, LG Electronics, Panasonic Corporation, Valeo, Keboda, Flextronics, North Automotive Lighting

Certifications
ANSI/ESD S20.20-2007/2014, AS 9100 Rev. C, C-TPAT, ISO 13485:2003, ISO 14001:2004, ISO 9001:2008, ISO / TS 16949:2009, ITAR Registration, MIL-PRF-38535, OHSAS 18001:2007, STACK ,Category 1A Trusted Broker, Trusted Design & Trusted Foundry

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Company Strengths & Specialization

ON Semiconductor is a top 10 global semiconductor supplier to the automotive industry with more than two decades of success delivering innovative, automotive-grade semiconductor solutions addressing key vehicle electronics systems. Today we provide comprehensive solutions for active safety, fuel economy and emissions control, powertrain and body electronics applications. ON Semiconductor is the #1 supplier of image sensors for viewing and ADAS systems, and integrated circuits for Advanced Front Lighting Systems. We have an industry-leading portfolio of more than 4,000 automotive grade products. ON Semiconductor is committed to rigorous quality standards that address the demands of the automotive industry.

Key Products with Features & Benefits

ON Semiconductor provides integrated LED drivers and power supply products for interior, exterior and front lighting, including stepper motor control. Additionally, the company has a full line of standard products including power transistors, constant current regulators, MosFets and SmartFets. In conjunction with lighting products, the company supports In-Vehicle Networking protocols including; LIN, CAN and System Basis Chips. ON Semiconductor's portfolio also includes CMOS image sensors, allowing for advanced front lighting systems in support of the growing Advanced Driver Assistance System (ADAS) market. Newly acquired RADAR and LiDAR technologies round out the Sensor portfolio.

New Innovations & Technologies for 2018

In 2018, ON Semiconductor will complete the integration of two acquisitions; the Radar Innovation and Design center in Haifa, Israel acquired from IBM, and SensL, a leader in the emerging field of automotive LiDAR. With the expanded capabilities in imaging, radar and LiDAR enabled by these acquisitions, ON Semiconductor is uniquely positioned to provide a comprehensive set of sensor solutions for next generation, highly autonomous vehicles and to solidify its position as a leader in automotive image sensing and ultrasonic park assist.

In addition, with the completed acquisition of Fairchild Semiconductor, ON Semiconductor is now the #2 power semiconductor supplier to the automotive industry.

Booth 24 EBW Electronics EXHIBITOR PROFILE

Business Type
Contract Manufacturer of Electronic printed circuit board assemblies

Established Year
1992

Annual Sales (USD)
$50,000

Number of Employees
250

Major Customers
Magna, Flex N Gate (Ventra), Muth Mirror

Certifications
ISO 9001, TS 1994

Contact
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Company Strengths & Specialization

EBW Electronics provides creative design and manufacturing solutions for the automotive market. Our team has a proven track record of engineered solutions that not only improve DFM in its own processes, but also in the manufacturing processes within its Tier One customers. Our 10 fully automated SMT assembly lines and numerous product specific work cells are supported on 3 shifts by a knowledgeable technical staff. EBWE's supply chain team is second to none in developing strong supply partners; working with component manufacturers throughout the world.

Key Products with Features & Benefits

- Veteran designer and manufacturer of forward & rearward automotive exterior lighting modules to the latest TS and functional safety requirements
- Highly precise location of LEDs to Front Lamp Projector Optics enabling compliance to IIHS's new front lamp testing
- Proven LDM engineering solutions successfully managing today's high power and thermally constrained lamp designs
- Microcontroller based systems suitable for the expanding feature-set of tomorrow's forward lighting
- Innovative 3 dimensional flexible lighting
- Lincoln Embrace Fade control
- Hardware, software, mechanisms & thermal design CAE capabilities

Booth 25 Valeo EXHIBITOR PROFILE

Business Type
Automotive Supplier

Established Year
1923 (1989 in North America)

Annual Sales (USD)
$21.6 Billion (18.6 Billion Euro), o.w 20% in North America

Number of Employees
111,600 Worldwide (16, 433 in North America)

Major Customers
Ford, Volkswagen Group, Toyota, General Motors, Renault-Nissan, Hyundai, Fiat-Chrysler

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Company Strengths & Specialization

Valeo, and its alliance with Japanese lighting specialist Ichikoh, designs interior and exterior lighting solutions tailored to meet all automaker model requirements. From the latest adaptive lighting technologies to intuitive interior lighting solutions to stylish and design-centric external lighting, Valeo constantly innovates to improve comfort and safety for drivers and passengers alike.

Key Products with Features & Benefits

From innovative interior and exterior lighting solutions (headlamps and lights), to LED lights and non-blinding "road" beams, each solution addresses the needs and market trends of cars, while ensuring clear visibility and the safety of drivers.

New Innovations & Technologies for 2018

- Surround Lighting for Communication with other road users, in autonomous mode or driving mode
- Illuminated Front or Rear Fascia with holographic aspect, welcome scenarios & communication functions
- Stripe of LED: a modular architecture for dynamic and HD lighting functions onboard which comprises the light source and the electronics

Booth 26 Magna International EXHIBITOR PROFILE

Business Type
Tier One Supplier

Established Year
1957

Annual Sales (USD)
$38.9 Billion

Number of Employees
173,000+

Major Customers
58 OEM customers globally

Contact
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Company Strengths & Specialization

Magna makes the impossible possible by solving some of the automotive industry's most complex problems. Our agility, complete systems expertise, global reach and disruptive thinking allow us to bring the best technology to market and lead the industry into the future.

Through the recent acquisition of lighting supplier OLSA and by forming a joint venture with early-stage company Rohinni, Magna has recently expanded its ability to provide innovative lighting solutions and help automakers differentiate vehicles through styling.

Key Products with Features & Benefits

Magna is a leader in the lighting industry by providing Innovative Solutions and incorporating New Technologies. Our mission is to provide customers with the latest technology that meets the demands of today while also showcasing new technology that addresses their future needs. We have created a portfolio of offerings ranging from high technology systems to entry level systems, for both book shelved technologies as well as customized design. Each of our designs is optimized for cost, weight, and power consumption so that we provide our customers with the most design and cost-efficient system.

New Innovations & Technologies for 2018

- iNViSiON Scalable Glare Free High Beam performance with a modular Adaptive Driving Beam system approach, with optional integration of Magna's EYERISTM camera technology
- PURESIGHT LED projector system series with Mono and Bi function modules including Mini Projectors
- FLECSFORM technology with all benefits of OLED without the high cost, yield, performance and robustness issues
- Radar Transparent Decorative covers
- IR Illumination lamps
- LiDAR system integration
- IR Lighting integration with Interior Facial and Gesture Recognition system

Lighting the path to innovation

From LED to ADAS sensor integration, Magna offers numerous advanced lighting solutions that provide flexible styling, enhanced safety and improved visibility. These technologies enable us to meet today's needs while illuminating the path towards future mobility.

Innovation is what drives us.
And we drive innovation.

MAGNA
DRIVING **EXCELLENCE.**
INSPIRING **INNOVATION.**

Booth 27 Seoul Semiconductor, Inc. EXHIBITOR PROFILE

Business Type
LED Manufacturer

Established Year
1992

Annual Sales (USD)
$1.1 Billion

Number of Employees
3,000

Major Customers
Major OEM / Tier 1, Tier 2 and Tier 3 Ford Supplier

Certifications
ISO TS16949 / ISO 14001 / ISO 18001 / KS Q ISO IEC 17025

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www.seoulsemicon.com

Company Strengths & Specialization

Company Strengths
- Technology / quality driven
- Provide full-packaged automotive LED lighting solutions
- High quality / performance with competitive cost
- Patent power by IEEE (12,000 IP & No.1)
- Manufacturing Process and Scale

Specialization
- WICOP Series Technology for Front Lighting
- Wide range of interior LED product solutions
- Vertical Integration (LED die through Packaging)
- Proven reliability in Automotive Market for last 10 years (For JEDEC, AEC-Q101, IEC60810, USCAR33)

Key Products with Features & Benefits

- WICOP Platform offers uniform and high luminance for exterior lighting
- Innovative Optical Solution for Signal and Forward Lighting with Homogeneous look
- Broad color range, providing flexibility for automobile interior solutions

Booth 28 Taiwan Color Optics, Inc. EXHIBITOR PROFILE

Business Type
Lighting Module Systems, Optical Systems, Optical Material, Optical Design

Established Year
2009

Annual Sales (USD)
$15 Million

Number of Employees
100

Major Customers
Casio, Coretronic, Osram, Barco, Delta Electronics, BenQ

Certifications
ISO9001
ASPA (Asia Science Park Association) Awards Grand Prize;
CTSP Innovative Product Awards

Contact
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Company Strengths & Specialization

TCO is a high volume manufacturer with expertise in lighting and optical devices uniquely established with vertical integration from design and customization, to production with core competence in high precision, room-size, high capacity coating chambers and inorganic glass phosphor and crystal phosphor fabrication equipment for laser excited lighting devices. TCO has developed optical filter modules and laser phosphor modules, which have been successfully integrated into laser projectors, LED projectors, and intelligent auto lighting systems.

Key Products with Features & Benefits

TCO's technical teams have developed an exclusive and proprietary phosphor hybrid mixing and sintering technology, which has been used in the phosphor wheel product line. These phosphor wheels have been successfully used in projectors manufactured by major DLP and 3LCD brands such as Casio, Coretronic, Barco, Delta Electronics and BenQ. They are also used in laser and LED light sources by major companies including Osram. Combined with TCO's opto-mechanical design capabilities, TCO becomes one of the very few leading-edge optical and illumination manufacturers. The manufactured optical modules are highly reliable and efficient, and are becoming indispensable components for laser headlights and projectors for high power operations. The TCO products are also environmentally friendly that are mercury-free.

New Innovations & Technologies for 2018

With its advance developments in thin film coating techniques, TCO has fabricated a "crystal phosphor" chip with highly reflective multi-layer coating on the backside of the chip, which can be die-bonded on heat sinks made with Cu or Al using traditional die-bonding machines. Such die-bonded crystal phosphor chips have both high efficiency and thermal dissipation, increasing the output of the lighting system. They are especially suitable for applications in car headlights and tail light systems where the traditional rotating phosphor wheels are not suitable.

For very high power light source applications, TCO has developed and fabricated a single crystal phosphor structure with higher thermal stability and optical efficiency when compared to conventional glass phosphor or ceramic phosphor structures used in laser phosphor lighting devices. A lighting module is being developed for applications that require high intensity arc lamps such as spot lights and projectors.

Booth 29 DBM Reflex Enterprises, Inc. EXHIBITOR PROFILE

Business Type
Toolmaker and Plastic part Injector for optical components

Established Year
1971

Annual Sales (USD)
$45 Million

Number of Employees
400

Major Customers
Automotive Lighting, Koito, Valeo, Osram, NAL, Stanley, Magna

Certifications
IATF - 16949: 2016

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Company Strengths & Specialization

DBM Group is a one-stop shop optical solutions provider for the automotive lighting industry. We can leverage our expertise across many different state-of-the-art technologies and equipment to create the optimal solution for you. We can become your R&D partner to turn your most complex optical concepts into reality. From R&D to after-sales support, DBM is a customer-centric company working around its customers' needs and satisfaction.

Key Products with Features & Benefits

Electroform: The highest level of expertise in electroforms to allow customers to develop their reflex-reflectors according to the latest innovative trends

Optical inserts: Inserts are manufactured by highly experienced employees using the most advanced machines, materials, and technologies.

Molds: Our experienced engineering team will design and build molds to the highest standards of quality, always considering our customers' needs

Moldings: DBM OPTIX has developed technologies for the molding of optical lenses dedicated to the automotive lighting industry.

New Innovations & Technologies for 2018

DBM Group has developed a variety of solutions to achieve light diffusion through a surface. These solutions can be used to provide more uniformity to lighted components such as light pipes, to create homogeneous diffusive surface or light curtains. Different technologies are available : Micro Mirror Optics (MMO) for light guides, Micro pillow optics, Micro diffusing texture.

Silicone Lenses: DBM has developed an expertise and acquires state of the art equipment to produce silicone lenses.

Booth 30 Flex EXHIBITOR PROFILE

Business Type
Design & build of electronics, lighting, and more

Established Year
1969

Annual Sales (USD)
$3 billion (Automotive-only)

Number of Employees
14,000 (Automotive-only)

Major Customers
Ford, Nexteer, Automotive Lighting, General Motors, Varroc, FCA, Magna, and many more

Certifications
AS 91001C, Automotive SPICE Level 3, BABT340, CSA WMT, C-TPAT, ESD 20.20, Ford Q1, GM BIQS, IPC Recognized, ISO 14001, ISO 17025, ISO 9001, ISO/TS16949, ISO13485, ISO15504, ISO17025, J-STD-001, NADCAP, OSHAS 18001, TL 9000, Verizon ITL, and more

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Company Strengths & Specialization

Autonomy - See, Sense, Scan, Fuse, Compute
- AV Compute, Sensors, Sensor Fusion

Connectivity - Connect, Inform, Maintain, Protect
- Telematics, V2X, Gateways, Infotainment

Electrification - Manage, Distribute, Convert, Recover, Charge, Control
- Power Management, High Voltage, Wiring, Solenoids, EPS

Smart Tech - Touch, See, Hear, Move
- Interiors, Exterior Lighting, Actuators, Displays

Key Products with Features & Benefits

Flex Overhead Consoles integrate lighting, communications, electronic controls, displays, and switches to create a harmonized, cost effective product. Because our Overhead Consoles are integrated, we are able to incorporate more technology, storage, and lighting into other parts of the vehicle. For example, our Gen 1 iOHC-developed with an EV OEM features an integrated camera, which implements functions such as driver and child recognition, automatically activating child locks, and security monitoring.

New Innovations & Technologies for 2018

The Flex External Mirror Projector emits a projected logo that shines on the ground from the side mirror. This provides a wow factor, lights the area, and provides a new opportunity for branding and messaging. The projector could be used for something as simple as displaying a logo as the vehicle is turned on and off, or something as complex as displaying identifying information for an autonomous taxi service user.

From our Driving Computer (an in-vehicle server that acts as the brain of an autonomous vehicle) to Sensor Fusion (which consolidates various vision sensor outputs into verified object targets), Flex is a perfect intersection of Autonomy and Lighting technologies. In addition, we are excited to share new, innovative lighting opportunities such as exterior RGB badge lighting and interior comfort lighting.

Booth 31 Varroc Lighting Systems EXHIBITOR PROFILE

Business Type
Automotive Exterior Lighting Supplier (Design/Engineer/Manufacture)

Established Year
2012

Annual Sales (USD)
$1.1 Billion

Number of Employees
7,200

Major Customers
Ford Motor Company, Jaguar Land Rover, Fiat Chrysler, Tesla Motors, Volkswagen, Peugeot Citroen, Renault-Nissan

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Company Strengths & Specialization

Varroc Lighting Systems, a wholly-owned entity of the Varroc Group, is a leading Tier 1 global automotive supplier specializing in concept design, research & development and manufacturing of exterior lighting products such as headlamps, signal lamps, auxiliary lamps, projector systems, and electronic control modules.

Key Products with Features & Benefits

Varroc Lighting Systems is on the road every day, making them safer for drivers and pedestrians, and partnering with the world's top automobile manufacturers to ensure their vehicles also embody the technology, look and feel today's buyers expect. As a leading global developer and manufacturer of exterior automotive lighting, Varroc Lighting Systems brings over a century of experience and flexibility to know what it takes to light up a successful journey ahead. Varroc Lighting Systems specializes in producing high-performance headlamps, rear lamps, and auxiliary lamps with a focus on delivering market-leading technologies, flexible service and value. Varroc Lighting Systems operates ten technical and sales centers in Europe, Asia, North America, and South America to deliver local needs on a global scale. Additionally, Varroc Lighting Systems offers manufacturing plants in the Czech Republic, India, Mexico, Brazil, and Morocco along with services in China through its joint venture. Varroc Lighting Systems also services 2-wheel lighting with facilities in Italy, India, and Vietnam.

New Innovations & Technologies for 2018

Production Adaptive Driving Beam Matrix Modules. Illuminated Laser-Etched Headlamp Personalization Elements. LED Projector Systems. Production Laser High-Beam Booster Modules. Low cost Surface LED modules that replicate OLED appearance.

Booth 32 Evonik Cyro LLC EXHIBITOR PROFILE

Business Type
Thermoplastic Material Supplier

Established Year
2007

Annual Sales (USD)
$16.8 Billion

Number of Employees
36,000

Major Customers
Windsor Mold Flex-N-Gate / Ventra

Certifications
ISO 9001:2015
ISO 14001:2015

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Company Strengths & Specialization

As the global leader in the supply of ACRYLITE® acrylic thermoplastics products for the automotive industry, Evonik is continually expanding its product line for automotive lighting applications. As highlighted in Evonik's "We manage light" program, Evonik develops materials that enable advanced lighting technologies for the ultimate in performance and safety as well as ensuring passenger comfort and design.

Key Products with Features & Benefits

- ACRYLITE® Satinice df 23 which offers headlamp and tail light engineers a light diffusion product that provides homogeneous light distribution, no visible LEDs and improved light scattering
- ACRYLITE® Acrymid TT50 and TT70 designed for light pipe applications which require excellent optical performance and a high vicat temperature while maintaining good surface hardness
- ACRYLITE® Resist AG 100 for automotive lens applications which provides excellent long-term weathering while meeting the required impact strength requirements

New Innovations & Technologies for 2018

Noting the recent inclusion by AMECA in May 2018 for high haze materials which are now suitable for inner lens applications for headlamps as defined per FMVSS 108 S14.4.2.2.4.1, Evonik offers its line of light diffusing ACRYLITE® Satinice df 23 which offers headlamp and tail light engineers a product that provides homogeneous light distribution, no visible LEDs and improved light scattering. Evonik's ACRYLITE® Satinice df 23 is ideally suited for light diffusion applications which is critical as AMECA states that following completion of outdoor exposure testing, the haze and loss of surface luster as measured by ASTM D1003-92 must not be greater than 30% for materials used for outer lenses other than those incorporating reflex reflectors.

Booth 33 DOMINANT Opto Technologies North America Inc. EXHIBITOR PROFILE

Business Type
Light Emitting Diodes

Established Year
2001

Annual Sales (USD)
$125 Million

Number of Employees
2,400

Major Customers
All Major Global OEM and their supporting Tier Suppliers

Certifications
IATF 16949:2016, ISO 14001

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Company Strengths & Specialization
High Technology Visible and IR LEDs for the Automotive Industry

Key Products with Features & Benefits
Variety of RGB LEDs for ambient and dynamic lighting products and high power LEDs for Headlamp / Exterior applications and LED with integrated Driver.

New Innovations & Technologies for 2018
- Single Color/Single IV bin White LEDs.
- Headlamp LED arrays.
- LED with Integrated Driver - seddLED (Smart Embedded Digital Driver)

Booth 34 Texas Instruments (TI) EXHIBITOR PROFILE

Business Type
Semiconductor supplier

Established Year
1951

Annual Sales (USD)
$14 billion

Number of Employees
31,000 worldwide

Major Customers
OEMs and Tier 1s

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Company Strengths & Specialization
Texas Instruments (TI) is a global semiconductor design and manufacturing company that operates in 35 countries and serves more than 100,000 customers worldwide. TI offers more than 100,000 analog ICs and embedded processors along with software and tools. TI develops automotive semiconductor products and provides systems-based resources and technical support in four sectors: ADAS, infotainment, body electronics and lighting, and Hybrid/electric vehicle and powertrain.

Key Products with Features & Benefits
TI provides a legacy of automotive interior and exterior lighting expertise to improve reliability and longevity, prevent overheating, and quickly anticipate and overcome design. Products include smart high-side switches, a broad portfolio of linear and matrix LED drivers, and high-resolution DLP headlight systems.

New Innovations & Technologies for 2018
Next generation DLP chips, which are considered for future HUD and Adaptive Headlight technology. Next generation LED drivers targeted for interior and exterior applications, matrix driver for dynamic headlights, exterior and interior sensing technologies, etc.

Honoring a Legend

We are proud to create an exhibit at the Inventor's Hall of Fame honoring Ford inventor, engineer, mentor, and visionary Dr. Haren Gandhi, whose catalytic converter improvements dramatically improved the world's fragile air supply.

Finding a Cure

We are proud to help JDRF, for the past 14 years, raise millions to find a cure for Type 1 Diabetes, an incurable, non-preventable autoimmune disease that can strike anyone at any age.

Driving Innovation

We are proud to develop innovation-creating opportunities and cost-saving solutions for Ford, including the Advanced Lighting Innovation Expo since 2014, and the Seating Expo Advanced Technology Showcase.

Let Us Help You Innovate, Raise Millions, Honor Excellence, and Celebrate in Style.
Show Ready Technologies is an event production company and T1 Ford Supplier.

SHOW READY TECHNOLOGIES

888-651-5411
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ALIE18
Advanced Lighting Innovation Expo

Ford Go Further

Special thanks to all of our committees and in-kind sponsors for their assistance in helping make the Advanced Lighting Innovation Expo a success. We sincerely appreciate all your help and support.

MICH auto – Michigan's Automotive Accelerator
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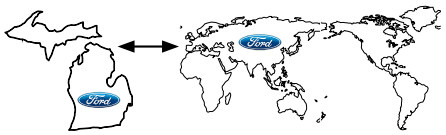
FORD CHINESE ASSOCIATION 1983 福特华人协会

Chinese New Year
Skip Level Meetings
Business Seminars
Mentoring Programs
Community Outreach Programs
Summer Picnics
Social Networking
Golf Outings
Sports Tournaments

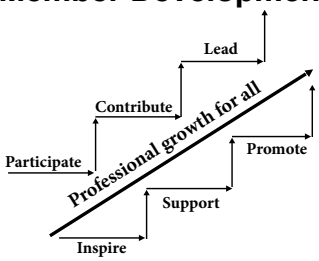
Register today on the Ford intranet at http://x.ford.com/FCA. to receive future event notifications

Corporate Business Support



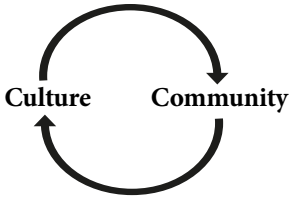
Proactively support the Company's diversity and business objectives to achieve "Brand of Choice" and "Employer of Choice"

Member Development



Effectively promote professional and managerial growth of our members

Community Outreach



Proudly promote our cultural heritage and build strong community relationships

ALIE18
Advanced Lighting Innovation Expo

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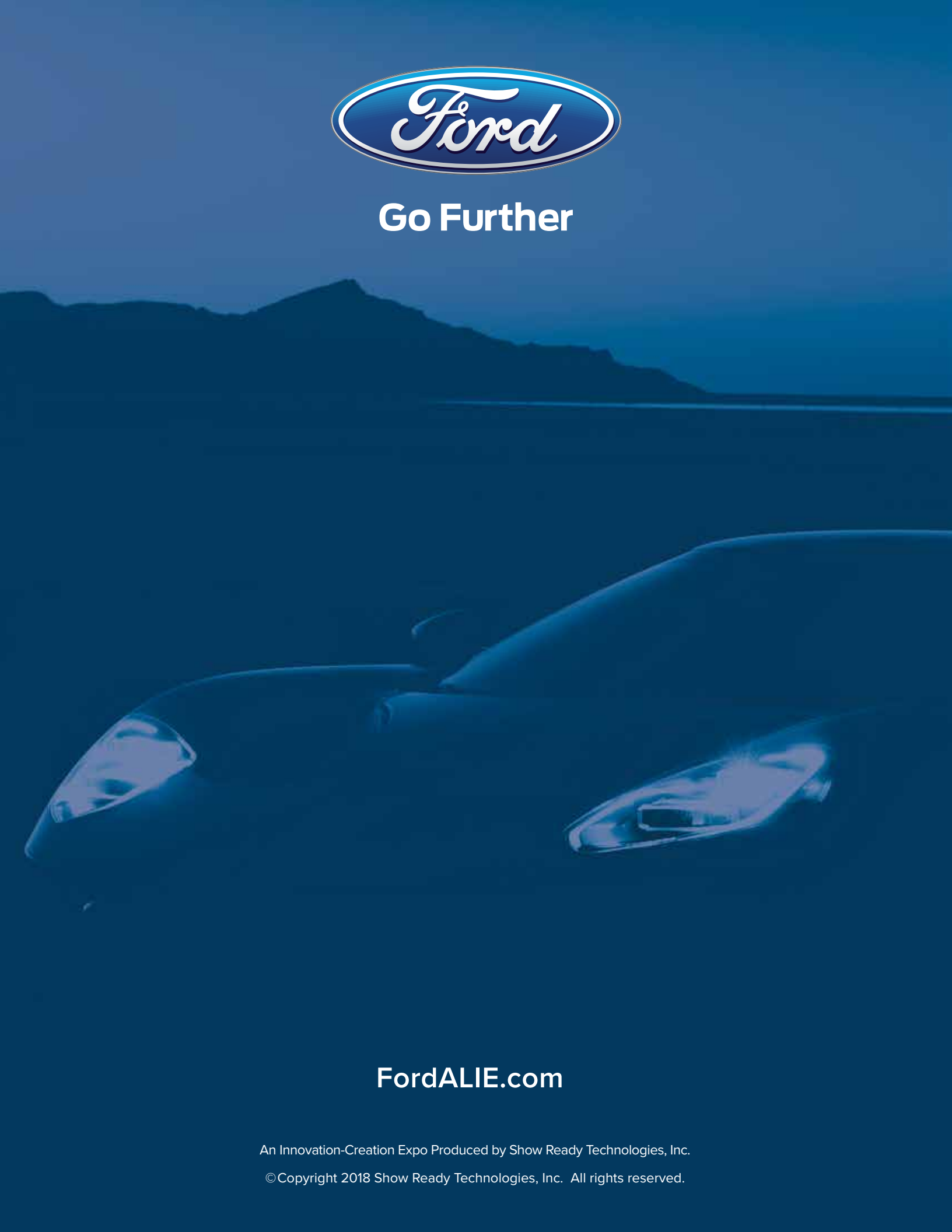

An Innovation-Creation Expo Produced by Show Ready Technologies, Inc.