

Leading the

LED

revolution in 2-wheeler
automotive lighting!





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At Fiem Industries, we are respected as a two-wheeler lighting specialist.

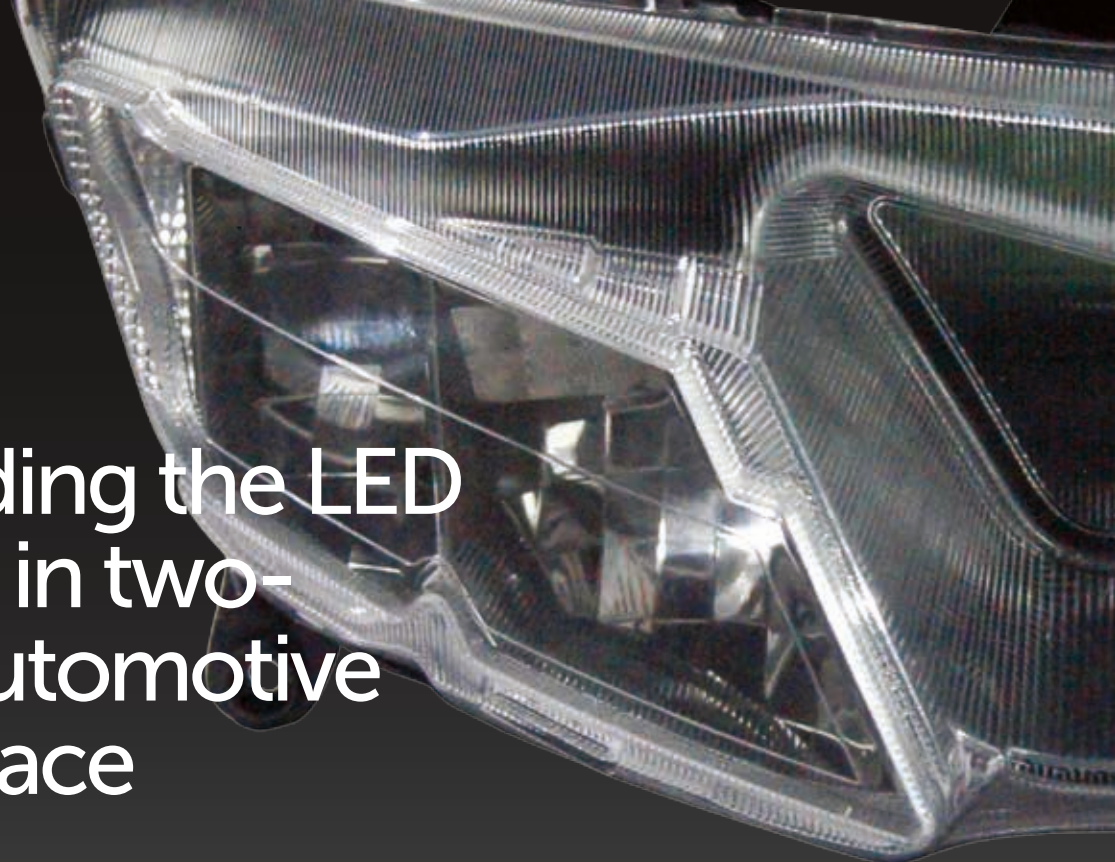
We don't just manufacture; we engage in the complete value chain from research to design to development to manufacture.

We don't just make light products, we pioneer them.

We don't just address emerging opportunities; we evangelize cutting-edge technologies and development.

We don't just sell products; we shrink time-to-market so that we can help customers strengthen their businesses.

Fiem Industries. Way ahead in India's two-wheeler LED lighting applications.



Fiem: Leading the LED revolution in two-wheeler automotive lighting space

Over the past decade, technological innovations in automobile lighting have not only improved product quality and fuel efficiency, but have also enhanced customer confidence. Buyers today want the best value for their money and manufacturers have responded with path-breaking product features at prices unimaginable a decade ago. A wide variety of lighting designs in cars and motorcycles indicate amazing research in this important aspect of vehicles.

LED sources significantly differ from tungsten halogen (TH) or high intensity discharge (HID) lamps. Recent advances in white light LED technology, particularly in the total amount of light output and luminance per device, demand sustained development of vehicle forward lighting systems (head lamps). Vehicle lighting extended from a functional element into a styling element in today's vehicles. Not only do light system profiles enhance styling and aesthetics in total vehicle design,

but lights themselves have become brand-differentiating. Furthermore, LEDs hold possibilities in developing safety features because of distinctive features of spectral power distribution (SPD). The SPD of a lamp has a considerable impact on the driver's visual performance. LEDs can also provide more safety for the oncoming driver from the opposite side. Besides, light bending options with front lights provide drivers with a better view around corners.

It was a proud moment for Team FIEM, when the Company's in-house R&D developed LED head lamp launched by Yamaha India in the Indian market. It was the first LED head lamp homologated and launched in the Indian market. The R&D team took five years to develop a LED head lamp at its in-house R&D project to showcase its technological prowess and readiness for LED advancement. FIEM's cutting-edge research has demonstrated that the Company is way ahead in LED lighting adaption in two wheelers. It was a

humble beginning with manufacturing of LED marker lamp more than a decade ago; progress in LED product development made the Company in becoming a self-sufficient LED technologies. Today, FIEM has a large range of LED lighting products, from automotive lighting to LED luminaries to IPIS System with LED displays, developed by in-house R&D and manufacturing facilities, validating its knowledge.

The development of two-wheeler LED head lamp by FIEM was a natural result as FIEM had been a front runner in developing the two-wheeler LED tail lamp and other LED lighting adoptions in vehicles. From a styling point of view to making a way for brands to distinguish themselves, LEDs offer a new look to vehicles. LEDs also offer other advantages, i.e. longer life, less susceptibility to vibration than filament lamps, lower power requirements than halogen systems, and greater mechanical and optical design flexibility.



Comparison of automotive lighting technologies

Parameters	Halogen lamps	Xenon lamps	LED lights
Basic operating elements	Tungsten filament	Electrodes and xenon gas	Diodes
Average luminous efficacy	11-20 lm/W	70-100 lm/W	80-110 lm/W
Life span	Nearly 3,000 hours	Nearly 20,000 hours	Nearly 50,000 hours

The new safety regulations, AHO (Automatic Headlamp On), effective from 1st April, 2017 provided a shot in the arm for the Company's automotive lighting business and opened up new opportunities, as LED is the best compatible technology for AHO. It is a matter of pride that the industry is adopting the LED head lamps faster than anticipated. AHO regulations require that two-wheeler head lamp should remain switched on even during the day or should have a day running light option, providing visibility and helping avoid accidents.

Numerous technological advancements were observed in the automotive lighting segment over the past decade. It witnessed the advent of incandescent lamps, halogen lamps and xenon lamps. Currently, the LED lighting is gaining popularity worldwide. The above table on this page depicts a comparison of the various technologies across different parameters.

The current penetration of LED

lights in automobiles is lower than conventional halogen and xenon lamps. However, their use per vehicle will increase as the demand for vehicle design differentiation and introduction of new applications increase. LED lights provide designers excellent flexibility in creating new lighting styles, helping manufacturers command a significant price premium. LED solutions are significantly more effective and versatile than xenon lamps. New LED applications include enhanced night vision and head-up displays, with new features being constantly introduced.

What adds to the list of advantages is that LED lights are more efficient. A simple LED low-beam headlight requires only 18W as against 35W for its xenon counterpart. LED lights, moreover, are resistant to vibrations and require minimum maintenance, which is often an area of concern with conventional lighting. LED lighting modules use minimal power, augmenting vehicle's fuel efficiency and reducing CO2 emissions.

The LED revolution for automobiles has taken safety, efficiency and design versatility to a new level, offering something for everyone, e.g. manufacturers gain market credibility, designers get to experiment with this innovative technology and buyers get an affordable lighting option which not only livens up their expectations, but also makes commuting safer. These features combined with the substantial environment benefits, make LED lights an option the industry can adopt.

With strong domain knowledge in LED, in-house R&D and testing capabilities, technological prowess and state-of-the-art manufacturing facilities coupled with longstanding relationships with prestigious OEMs, FIEM is attractively placed. OEMs demand for two-wheeler LED head lamps and other LED applications are increasing. To capture this sustainable business opportunity, the Company investing to enhance LED automotive capabilities and capacities in R&D, designing, testing, development and manufacturing.



Chairman's **overview**

"The Company's business model continues to be robust marked by enduring customer relationships. The Company is likely to emerge as one of the principal beneficiaries of the LED revolution in the 2W automotive lighting segment unfolding in the country's two-wheeler space."

Through the year 2016-17 was one of the most challenging years in recent times, however the worst appears behind us as we move towards attractive growth period. Actually, this overview reconciles two contrasting emotions- optimism for our automotive business and disruption in our LED luminaire business that impacted us adversely during the year under review.

Despite impact of demonetization, our net sales in the automotive business grew by 11%. However, the performance of LED business was not favorable as along with low turnover during the year, a written-off of Rs. 19 Crore was also booked, being non-recoverable from Energy Efficiency Services Ltd. (EESL). This write-off happened because of discontinuance of maintenance by EESL, which was a part of the contract of supply and commissioning of over 1,18,000 street lights to South Delhi Municipal Corporation (SDMC). Further, some orders of LED bulbs were short-closed by EESL due to a steep price decline and other market reasons.

Our automotive business

The company's overall performance was affected by currency demonetization, which transpired during the third quarter

of the year under review, affecting the country, economy, automotive sector and the company. This impact was most visibly reflected in the country's two-wheeler segment as this segment is largely influenced by cash purchases and negligible external financing, making its purchase pattern completely different from the rest of the automotive sector.

With offtake extensively affected from November 2016 to February 2017, a number of intending two-wheeler buyers deferred purchases. The result was that most prominent OEMs in the country selected to temporarily discontinue operations. The cascade impact of this affected all two-wheeler brands in the country, a number of them being our prominent customers. As an extension, Fiem Industries was also affected by this slowdown.

One sigh of relief is that the impact of the demonetization began to recede by February-end and the country reported an attractive rebound in demand for two-wheelers starting March 2017, indicating that the worst indeed was over.

Besides, the introduction of new BS IV norms from April 2017 catalyzed the revival. Faced with the new stipulation that

made it mandatory for all sales in the new financial year to be benchmarked with the new upgraded norms, most two-wheeler trade intermediaries put a greater focus in liquidating their erstwhile inventories, which helped catalyze off take. The combination of a revival in pent-up demand that had remained bottled up for months on account of demonetization re-asserted; besides, the dealers who had proactively de-stocked on account of the BS-IV norms began to restock to address emerging demand.

It is indeed a matter of satisfaction that despite disruptions, Fiem Industries performed well in the automotive segment, the result of working with some of the largest and most popular two-wheeler brands in the country. The improvement in consumer sentiment translated into a stronger offtake of these brands, which accelerated our rebound.

The LED luminaire business

The reasons mentioned above coupled with demonetization, impacted the LED business. Though I believe that these are short-term obstacles and that in the long term, the LED business provides a large opportunity within India and abroad. In India, LED adoption is still in an initial phase and could take some time for the disruption to settle translating into attractive prospects for the product and the Company.

The AHO regulatory tailwind

My optimism for the automotive segment is derived for reasons that extend beyond a correction in market trends. A seminal moment in the country's automotive lighting segment transpired with the introduction of Automatic Headlight On (AHO) stipulation from 1 April 2017 along with the new BS IV norms. This stipulation made it imperative for the headlamps of two-wheelers to remain switched on while in use during the day. The headlight of the new two-wheeler turns on as soon as the engine is started; riders will not have the option of switching the head light off.

The stipulation could not have come a day too soon, as, two-wheelers accounts for being the single category of vehicles to have suffered the highest number of fatal road crashes. This subject is of increasing public importance; India has possibly the worst road safety record in the world. The Automatic Headlamp On is expected to help reduce crashes involving two-wheelers; it would help others recognize one's vehicle position in foggy / dusty environment; vehicles in front would be able to recognize one's vehicle through the reflection of the vehicle headlamp in the rear-view mirror.

We believe that this regulatory transition will make the role of headlights central to the subject of safety in India. More

specifically, this new regulation will accelerate the adoption of LED in 2W Head Lamps, as LED is the most compatible technology. Fiem, as a frontrunner in adaptation of LED in 2 wheelers, is well positioned to make this opportunity, which appears quite sustainable across the foreseeable future.

Our competitive advantage

Fiem possesses a longstanding domain expertise in the research, design, development and large-scale manufacture of lighting products. The company is more than just a manufacturer of automotive LED products; it pioneered the use of some of these products in India. Besides, the company has achieved prudent backward integration, strengthened its value chain and developed its research led product understanding from source to solution.

This enduring competence has been manifested in various confidence enhancing realities encapsulated in the following 3Rs:

Respect: The company is respected as a go-to provider of comprehensive LED solutions

Research: The Company has successfully absorbed technology research to shrink its mind-to-market with the objective to accelerate product launches by customers; besides, its deep research insight

The Company's business model continues to be robust marked by enduring customer relationships. The Company is likely to emerge as one of the principal beneficiaries of the LED revolution unfolding in the country's two-wheeler space.



has enabled it to make continuous product enhancements and extend from automotive to non-automotive applications (luminaires).

Relationships: The company has been a trusted multi-year lighting solution provider to some of the most prominent two-wheeler automotive brands in India; the robustness of their brands (and related off take) provides Fiem with attractive revenue visibility across the foreseeable future.

This is not a story that will only play out in the future; it has already started happening. The company recently started supply of 2W LED head lamp to Yamaha India, developed through Fiem's in-house R&D capabilities, reinforcing the company's respect as a first-mover in the two-wheeler LED head lamp segment.

In view of these market-leading realities, the company is attractively placed to ride the LED revolution in India's two-wheeler automotive lighting segment.

Culture of competitiveness

At Fiem, we are optimistic of our prospects because of the culture that we bring to this unprecedented LED opportunity. Fiem possesses a long-term commitment to its business, manifested in a future-facing investment in state-of-the-art pan-India manufacturing assets that deliver the high operating efficiencies.

The company has been periodically conferred QCDDM and other awards by its prestigious OEM customers for its 360-degree commitment to operational excellence, strengthening overall sustainability.

Outlook

Much of our optimism related to the long-term sustainability of our business is also derived from the robustness of the India story. India is the fastest growing economy and the country is expected to retain this position between 2016 and 2020. The country's consumption story is being driven by the India's burgeoning middle-class. We believe that these realities are irreversible, hold out long-term prospects and should continue to reinforce the preference for the two-wheeler as one of the first item of purchase following increased prosperity.

Hence, on the automotive front, the outlook appears promising with demonetization impact behind us. New regulations of BS-IV and AHO represent positive prospects for the industry and Company. LED is being adopted rapidly in the area of automotive lighting applications, a positive development as the company is among frontrunner in development of LED head lamps on account of in-house R&D capabilities. Keeping in view attractive prospects, the company raised Rs. 120 crore through a Qualified Institutions Placement (QIP) in September 2016 to be opportunity-

ready. I am thankful to investors for their faith in our Company.

During the year under review, we have also signed a Technology License and Assistance Agreement (TAA) with Aisan Industry Co., Ltd., Japan, and Toyota Tsusho Corporation, Japan, for the manufacture of Canister in India, an emission control system product. Following the TAA, the Canister is being manufactured by Fiem Industries Ltd. with the technical support of Aisan Industry Co., Ltd. for Indian two-wheelers and three-wheelers.

Conclusion

The Company's business model continues to be robust marked by enduring customer relationships. The Company is likely to emerge as one of the principal beneficiaries of the LED revolution in the 2W automotive lighting segment unfolding in the country's two-wheeler space. We expect that these realities will widen our opportunity canvas and translate into attractive growth across the foreseeable future.

JK Jain

Chairman & Managing Director

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Consistent launch of new LED automotive products

