AIEMA NEWS

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06/2022-23 | January 2023 www.aiema.net I www.acmee.in ACMEE 2023

SMEs - Active Participation in Industry Trade Shows is key yet (p.28)

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Inspirational Entrepreneur

Mr. Sriram Parthasarathy, MD, MK Autocomponents Group and Chairman, Chennai Institute of Technology (CIT)

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Industry

Self-powered, printable smart sensors created from emerging semiconductors could mean cheaper, greener Internet of Things

44

Industry

Next-generation wireless technology may leverage the human body for energy

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INSPIRATIONAL ENTREPRENEUR

Mr. Sriram Parthasarathy,
MD, MK Autocomponents Group and Chairman, Chennai Institute of Technology (CIT), Chennai

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BIO-DEGRADABLE WASTE

1. Food Waste
2. Vegetable Waste
3. Garden Waste or Garden Water

மக்கும் கழிவுகள்

1. உணவுக் கழிவுகள்
2. அனைத்து காய்கறி கழிவுகள்
3. அனைத்து இலை மற்றும் பூங்கா கழிவுகள்

NON-BIO DEGRADABLE WASTE

1. All types of Electrical Waste
2. Plastic Paper, Cups / Cover Waster
3. All types of Plastic / Rubber Waste
4. Glass Bottles

மக்காத கழிவுகள்

1. அனைத்து மின்சாதன கழிவுகள்
2. அனைத்து பிளாஸ்டிக்/ ரப்பர் கழிவுகள்
3. கண்ணாடி பாட்டில்கள்/ அனைத்து கண்ணாடி கழிவுகள்

HAZARDOUS WASTE

1. All types of Chemicals
2. Oil Soaked Cotton Waste
3. Grinding Dust
4. Oil / Grease
5. Paint Sludge

அபாயகரமான கழிவுகள்

1. அனைத்து வேதிக்கழிவுகள்
2. எண்ணெயில் நனைக்கப்பட்ட பருத்தி, துணிக் கழிவுகள்
3. அரைத்த உலோகத் துகள்கள்.
4. எண்ணெய் கழிவுகள்
5. சுண்ணாம்பு / பெயிண்ட் கழிவுகள்

Editor's Note

Dear Fellow Members,

Greetings!

With the government's budget for FY 2023-24 providing for a sustained focus on developing the country's infrastructure and advanced skill training and with the package of assistance announced for MSMEs, there is bound to be a much improved manufacturing activity. SMEs need to gear up to encash the opportunities. In this context, there may be a case for business owners to seriously review their budgets to showcase their competencies in more number of industrial trade fairs, both domestic and international, in order to increase their visibility and look for newer avenues. This month's cover story is on this subject (page 28).


T. PALANIAPPAN


AMIT TULSIAN


CJ VENKATESH


K.S. SUDHEER


D. UDAYAKUMAR

In the "Inspirational Entrepreneur" column this month, we are featuring the success story of Mr. Sriram Parthasarathy, MD, MK Autocomponents Group, who is also the Chairman of Chennai Institute of Technology. We are sure that you will find his experience shared through this article truly motivating.

This edition also features a number of industry-related articles plus the regular columns on 'Financial Tips', 'Health & Fitness through Yoga', and the Thamizh article on 'History of Chennai and Neighbouring Districts'. We believe that you find all of them interesting.

We count on your continued support. Please send your views to mail@aiema.net to add further value to AIEMA News.

All the Best.

Regards.

T. Palaniappan
Editor

THUS THEY ADVISED

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திருக்குறள்

செப்பம் உடையவன் ஆக்கஞ் சிதைவின்றி
எச்சத்திற் கேமாப்பு உடைத்து.

விளக்கம் 1: நடுவுநிலைமை உடையவனின் செல்வவளம் அழிவில்லாமல் அவனுடைய வழியில் உள்ளார்க்கும் உறுதியான நன்மை தருவதாகும்.

விளக்கம் 2: சிறப்பு பொருந்தியவன் செயல்கள் வீணாகாமல் வளரும் சந்ததிக்கும் தனிச்சிறப்பு உடையதாய் இருக்கும்.

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THIRUKKURAL

Couplet :
The just man's wealth unwasting shall endure,
And to his race a lasting joy ensure

Couplet Explanation:
The wealth of the man of rectitude will not perish, but will bring happiness also to his posterity

Transliteration(Tamil to English):
seppam udaiyavan aakkanhj sidhaivindri
echchaththiR kaemaappu udaiththu

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From The President's Desk

T. NALANGILLI
President

Dear Members,

Greetings to All !

It was a moment of pride for me to unfurl the national flag of India at AIEMA on the Republic Day, 26th January 2023. Earlier, the New Year had started on a good note with some positive developments.

A. Manufacturing technology upgradation and defence manufacturing:

(a) We had a meeting with TIDCO officials at their office, Egmore, on 3rd January, to discuss about the progress on the 'Centre of Excellence' project, which AIEMA wants to be accommodated in AIEMA Golden Jubilee Tower. On Defence Manufacturing,

(b) a team from TIIC visited AIEMA on 3rd January to discuss regarding the MoU between HVF, Avadi and AIEMA.

(c) Team AIEMA visited the Kochi Naval Ship Repair Yard (NSRY) on the 24th January and an MoU has been signed between NSRY and AIEMA for development of products for NSRY, by the unit members of AIEMA. The highlights of this agreement can be seen under 'AIEMA Activities' column (p.10).

(d) CPCL jointly with GeM Facilitation Training team conducted a Vendor Development Meet at AIEMA on 30th January, which benefited a number of industrial units in terms of their business development.

B. Visits to Trade Shows and Conferences:

(a) Mr. G. Aravind, Vice President - AIEMA and I participated in the Business Meet with the UK Automotive Delegation at Cottingley, Anderson Road, Chennai on 9th January.

(b) Team AIEMA and ACMEE attended IMTEX 2023 (International Machine Tool & Manufacturing Technology Exhibition) at Bengaluru on 19th January.

(c) As President of AIEMA, I was part of the MSME Delegation from India to attend the Cybertech Global Expo 2023 at Tel Aviv, Israel, followed by a visit to Israel Aerospace Industries between 30th January and 1st February.

As members would have noted from newspapers, the Central Government is taking steps to revamp the skilling framework in the country by making on-the-job-training (OJT) mandatory across all short term courses. Partly it is a response to AIEMA's repeated representations emphasizing the need for sandwich courses with OJT as part of the course curriculum in technical institutions to ensure ready employability of engineering students in MSMEs.

On 30th January, AIEMA in association with TNPCB, Lions Club International, District 324J and Virogreen India, an e-waste management company had organized 'E-waste Awareness & Collection' programme at AIEMA, with Dr. Vasudevan, Joint Chief Environmental Engineer, TNPCB, Chennai, as Chief Guest. The response received from the members was very encouraging.

I seek your continuous support in the future too.

Regards,
T. Nalangilli

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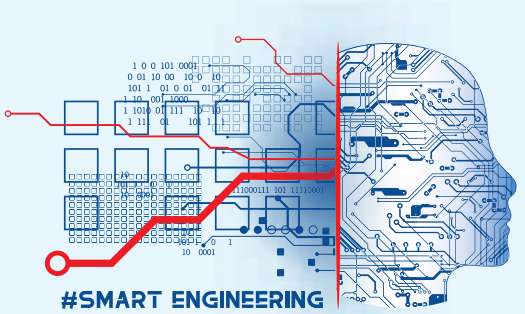

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*Taxes as applicable

What to expect

- CEO Forums, Bilateral Forums
- Subcontracting Shows with Buyers' Village, Global Sourcing Meets, Sessions on Manufacturing Start - Ups + Venture Capitals and Subcontracting Expositions
- Technology Sessions with Bureaucrats, Techpreneurs, Experts from world-class institutes and R&D institutions under the Ministry of Heavy Industries
- Smart Manufacturing Seminars
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From ACMEE 2023 Chairman's Desk

K. SAI SATHYA KUMAR
Chairman, ACMEE 2023

AIEMA has been organising ACMEE series of International Machine Tools Exhibitions once in two years since 1984. The Fifteenth edition in this biennial series, ACMEE 2023, India's Premier International Machine Tools Exhibition is scheduled to be held in Chennai Trade Centre, Chennai during 15-19 June 2023. ACMEE 2023 has already attracted excellent participation response from world leaders in machine tools. We are now focusing on promoting appropriate visitorship to the event.

At this stage, I feel it is important to recall the main intention of organising such an exhibition viz to bring the latest in machine tools at our door steps so that the local industry and entrepreneurs can see for themselves the latest in the field of manufacturing technology and machine tools for possible adoption in their production process. ACMEE series of events had succeeded in this noble objective and the forthcoming edition, ACMEE 2023, will feature the latest from all over the World.

I may also add that the Indian machine tools manufacturing industry as a whole has been trying to improve its position in the global ranking in spite of continuous challenges. According to the World Machine Tool Survey published by Gardner Intelligence highlights India holds 11th position in production and 8th in consumption in the global ranking. Machine tools production in India is estimated to be Rs 9,000 crores. Over all consumption in India is estimated to have reached around Rs 15,000 crores in 2021.

The rising industrial automation in India is a major factor driving the machine tools market share growth in India. The growing demand to increase productivity have fueled the adoption of automated technologies. Industrial automation is improving the bottom line, operational efficiency, and productivity of manufacturers. In turn, this factor is driving the demand for advanced machine tools to meet the complex machining needs associated with automated technologies.

ACMEE 2023 will see the leaders of India's machine tools manufacturers as well as those from overseas presenting their latest in automated technologies. This is a great opportunity and I would urge all the professionals engaged in manufacturing to mark their diary for visiting the event. Visitor Registration is open on event website: www.acmee.in

Best Regards,
K. Sai Sathya Kumar

AIEMA Diary

G. KRISHNAMOORTHY
Hon. Gen. Secretary

03.01.2023 – President Mr. T. Nalangilli attended the meeting with TIDCO to discuss regarding 'Centre of Excellence' project at TIDCO office, Egmore.

03.01.2023 – A team from 'Tamil Nadu Industrial Investment Corporation Ltd., (TIIC) visited AIEMA to discuss the enrolment of AIEMA members in HVF, Avadi.

04.01.2023 – MSME federation meeting was held at AIEMA with members from other SIDCO Industrial Estate Associations in and around Chennai.

06.01.2023 – The President and Vice President of AIEMA attended the interaction meeting with Industry Associations at CII, Chennai Office, Guindy.

07.01.2023 - President of AIEMA attended the inaugural function of the SIDBI Branch Office, Ambattur.

09.01.2023 – President and Vice President participated in the UK Automotive Delegation held at Cottingley, Anderson Road, Chennai.

09.01.2023 – EC members Mr. D. Udayakumar and Mr. SP Uthay Poongkundram attended the Roadshow on Investment Opportunities in Uttar Pradesh at Hotel ITC Grand Chola, Guindy.

12.01.2023 - A training session on "Essentials of Kaizen" was held at AIEMA conducted by a facilitator from APCRE.

12.01.2023 - Rotary Club of Madras organized a function at AIEMA for handing over 21 Pink Autos to underprivileged trained women drivers.

19.01.2023 - A team from AIEMA & ACMEE attended International Machine Tool & Manufacturing Technology Exhibition (IMTEX 2023) held at Bengaluru.

24.01.2023 – The President accompanied by a few EC members of AIEMA had signed an MoU with Indian Navy, Kochi, to get the business opportunity for AIEMA members.

26.01.2023 – Republic Day is celebrated at AIEMA. The President hoisted the national flag.

27.01.2023 – AIEMA organized a training session on 'Poka Yoke (Mistake / Error Proofing) for the benefit of our members.

30.01.2023 – AIEMA and Chennai Petroleum Corporation Limited (CPCL) organized a 'Vendor Development Meet with GeM Facilitation Training for the benefit of MSMEs in planning their production and product diversification.

30.01.2023 - AIEMA in association with TAMIL NADU POLLUTION CONTROL BOARD, LIONS CLUB INTERNATIONAL, District 324J & VIROGREEN E-Waste Recycler organized E-Waste Collection & Awareness Program in AIEMA.

Regards,
G. Krishnamoorthy

AIEMA Activities

MoU with Sri Sairam Group of Institutions

AIEMA signed an MoU with Sri Sairam Group of Institutions on 20th December 2022 at the campus of Sri Sairam College of Engineering (SSCE). The MoU will greatly assist the engineering students of SSCE to gain hands on experience in AIEMA's member industrial units, through internships and industrial visits, training for SSCE's faculty members, consultancy work, R & D collaboration, as per the National Education Policy. Workshops, seminars and project exhibitions can also be planned on both ends.

Dr. A. Rajendra Prasad, Dean – Student Affairs addressed the gathering on this initiative. He highlighted that the industry ready autonomous curriculum will promote innovation, entrepreneurship and start up culture.

Mr. T. Nalangilli, President - AIEMA, emphasised the need for such collaborations to be adopted by all academic institutions.

MoU with Kochi Naval Ship Repair Yard

An MoU was signed between Naval Ship Repair Yard (NSRY) Kochi, and AIEMA at Kochi on 24th January 2023.

Here are the highlights of this agreement:

a. NSRY will provide AIEMA periodically with the details of products to be developed indigenously.
b. AIEMA and NSRY will jointly assess the specific requirements.
c. If mutually agreed to, AIEMA will undertake the research/innovation projects of NSRY by pooling resources (member units and other avenues).
d. If any startup needs to be incubated by AIEMA in the project, NSRY will nominate mentors/subject experts to guide them to become a potential defence supplier.
e. NSRY will handhold AIEMA as much as possible in the product development.
f. NSRY will provide assistance through timely feedback in fitment and functional testing of products de eloped through the industry.
g. AIEMA will the central agency, responsible for successful completion of the project.
h. NSRY will conduct workshops at least once a year at a mutually agreed location, by deputing officials, to enhance the understanding among the units on Defence Procurement Procedure.
i. The agreement will be in force unless terminated by either party with 6 months' written notice. Any project in progress shall be allowed to be completed.

AIEMA Activities

Members from Sri Sairam Engineering College visited AIEMA on 04.01.2023

The MSME Federation meeting was held on 04.01.2023 at AIEMA with members from other SIDCO Industrial Estate Associations in and around Chennai.

Rotary Club of Madras had organized a function at AIEMA on 12.01.2023 and handed over 21 Pink Autos to the under privileged trained women drivers.

A training session on “Essentials of Kaizen” was held at AIEMA on 12.01.2023 by a reputed facilitator from APCRE

Mr. B. Palaniappan, trainer from APCRE

The trainees for the session

AIEMA Activities

The team members from AIEMA & ACMEE attended the IMTEX 2023 exhibition held between 19th – 25th January at Bengaluru

A team from 'Tamil Nadu Industrial Investment Corporation Ltd., (TIIC) visited AIEMA to discuss the enrolment of AIEMA members in HVF, Avadi on 03.01.2023.

The Republic Day Celebration was held on 26.01.2023 at AIEMA

A training Session on 'Poka Yoke (Mistake / Error Proofing) was held at AIEMA on 27.01.2023 by facilitator Mr. T.G. Krishnan from APCRE

AIEMA Activities

AIEMA in association with TAMIL NADU POLLUTION CONTROL BOARD, LIONS CLUB INTERNATIONAL, District 324J & VIROGREEN, E-Waste Recycler had organized E-Waste Awareness & Collection Program in AIEMA on 30.01.2023 headed by Thiru. Dr. Vasudevan M.E., Ph.D., Joint Chief Environmental Engineer, TNPCB, Chennai.





AIEMA in association with Chennai Petroleum Corporation Limited (CPCL) has organized a 'Vendor Development Meet with GeM Facilitation Training to MSMEs of Ambattur Industrial Estate on 30th January 2023 at AIEMA Premises


Common Creche Acitivities

- Pest control of India visited the Crèche and disinfected the crèche with Rodent repellent for rat control and cockroach control at Creche area.
- Periodical cleaning of both the water storage tanks with chlorine has been done and Water filtration has been cleaned
- Successfully conducted training for Creche staff in Fire Safety, and Fire Evacuation, by Safety Officer
- Mrs. Thenmozhi and Ms. Uma Welfare officer - AFIPL along with Staff Nurse Ms. Sudha Meena
- Celebrated Thai Pongal (Harvest) Festival with children and thanking the Sun God for Agriculture.
- Decorated with Kolam (Floor artwork) in Creche.





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From CAAIIUC Chairman's Desk

V VIJAYAKUMARAN
CHAIRMAN

Dear Members,

We would like to share with you details of the works carried out by us in Jan. 2023 along with relevant photos..

For the easy movement of pedestrians we have provided zebra crossing and thermoplastic marking in both North and South Phases of Ambattur Industrial Estate, Fixed Bollard in Aavin Dairy Road.

Pooja performed towards refurbishment of roads of 6th street, Sector 2 and 1st Cross Main Road, Sector 2, NP and the work will get commenced soon. Refurbishment of 10th Street, Sector 2, NP also has been planned and pooja performed.

Centre median work has been done in 1st Main Road and 3rd Main Road, SP.

As informed all unit holders are advised to bring to our attention for non-illumination of any street lights in AIE and any damages caused to the roads, pot-holes to be filled in, restoration / refurbishment of roads, parking of vehicles in haphazard manner, causing hindrance for free movement of vehicles etc., so that same can get attended by us.

Each stakeholder is informed to maintain their surroundings neat and clean.

With regards

V Vijayakumaran
CHAIRMAN

CAAIIUC Activities


1


1


2


2

01. INSTALLED NEW VALMONT LAMP POST IN SOUTH AVENUE ROAD SECTOR-2, SOUTH PHASE FROM WAVIN SIGNAL TO 3RD MAIN ROAD.

02. INSTALLATION OF VALMONT LAMP POST COMPLETED IN SOUTH PHASE POST OFFICE ROAD & SECTOR-3, 7TH STREET.

CAAIIUC Activities


3


3


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8


8

03. REFURBISHMENT & REPLACEMENT OF OLD K-LITE LIGHT FITTINGS INTO NEW LED FITTINGS IN 2ND MAIN ROAD FROM ESTATE BUS TERMINUS TO SBI.

04. INSTALLATION OF EB METER PANEL FOR SEWAGE PUMPING WELLS IN NORTH PHASE 2NOS & SOUTH PHASE 1NO.

05. STREET LIGHT CABLE TERMINATION WORK CARRIED OUT IN NORTH PHASE SECTOR-2, 7TH, 8TH STREET & 2ND CROSS MAIN ROAD.

06. GROUTING OF NEW BASE FRAME OVER ISWD FOR STREET LIGHT PANEL BOARDS FIXED IN SOUTH PHASE SECTOR-1, POST OFFICE ROAD, 7TH STREET & SECTOR-1, 5TH STREET NORTH PHASE.

07. INSTALLED SUBMERSIBLE PUMP IN NEWLY CONSTRUCTED SEWAGE WELL IN 2ND CROSS MAIN ROAD NORTH PHASE SECTOR-3.

08. HDPE PIPE LAID IN CULVERT CROSSING FOR SEWAGE WELL IN 2ND CROSS MAIN ROAD NORTH PHASE SECTOR-3.

to be continued on page 52...

SIDBI – Inauguration of Branch Office at Ambattur, Chennai.

Shri Sivasubramanian Ramann, Chairman and Managing Director, Small Industries Development Bank of India (SIDBI) inaugurated new office premises of SIDBI very close to Ambattur Industrial Area at Central Avenue, Korattur to cater to the growing financial requirements of MSMEs in Industrial Areas of Ambattur, Athipet, Korattur, Pattravakkam, Kakkalur, Thirumullaivoyil and the neighbouring areas. S/Shri Ravindran A.L, SIDBI Chennai Regional Head, G. Rajeswara Reddy, Field General Manager, Indian Bank, T. Nalangilli, President, AIEMA, K. Sai Sathya Kumar, Chairman ACMEE 2023 participated in the Function..

Opening the branch, Shri Ramann mentioned that SIDBI Ambattur Branch Office has taken necessary steps for securing the Green Interior Certification by Indian Green Building Council (IGBC). SIDBI has been taking new initiatives to increase the flow of credit to MSMEs. Providing 'timely and adequate credit' is the mantra followed in SIDBI. SIDBI has fully digitized its lending processes to extend financial assistance in 48 hours. SIDBI has recently launched fully automated straight through process to sanction loans up to Rs. 50 lakh online within couple of hours. He informed that SIDBI has been involved in drafting policies for providing timely financial assistance and liquidity to MSMEs. He emphasized on switch over from fossil fuel to renewable energy like solar, wind etc., with a view to become more sustainable and remain competitive and be part of national commitment on energy independence and carbon neutrality. Ambattur Branch will continue to work closely with AIEMA to provide focused financial support (retail lending) to its member MSMEs located in the vicinity.

During the event, he distributed sanction letters to micro and small enterprise customers for term loans ranging from Rs.20 Lakh to Rs.75 Lakh towards purchase of plant and machinery as part of expansion/ modernisation projects under End-to-End Energy Efficiency (4E Scheme). The event was attended by members of various Industry Associations, bankers, Chartered Accountants and MSME entrepreneurs.

Shri Ramann also mentioned that as a part of its development intervention and with a view to support creation of hard infrastructure for MSMEs in the clusters, the Bank has set up SIDBI Cluster Development Fund (SCDF) with support from RBI. Under this programme, financial support is extended in the form of term loan at concessional rates to the State Governments for covering the projects involved in the development of MSME eco-system. SIDBI has sanctioned 12 proposals aggregating around Rs.400 crore to GoTN and disbursed Rs.84.38 crore so far under SCDF. He indicated that it is heartening to note that the two projects funded by SIDBI under SCDF in the Ambattur Industrial Estate for construction of Workers' Hostel (with 134 rooms to accommodate 800 industrial workers) and construction of 112 Plug & Play Flatted Factory Modules respectively have been progressing well at a faster pace and are almost nearing completion. He also indicated that these projects could be documented and presented as success stories for replicating in other States.

Mr K. Sai Sathya Kumar, Chairman, ACMEE 2023 congratulated SIDBI for opening a Branch near the Ambattur Industrial Estate so that the entrepreneurs here could have quick access to SIDBI for seeking any assistance. The schemes of SDBI, he acknowledged, are well suited to MSME units and many entrepreneurs are availing the facilities. Mr Sai Sathya Kumar also referred to the association of SIDBI with ACMEE 2023, India's Premier International Machine Tools Show, as a Platinum Sponsor. He hoped that the joint efforts of both the institutions will help in industrial growth.

About SIDBI:

Small Industries Development Bank of India (SIDBI) as the Principal Development Finance Institution for MSME sector has played a significant role in developing the financial services for MSME sector through various interventions including Refinance to Banks, Credit Guarantee programs, Development of the MFI sector, Contribution to Venture capital/AIF funds, MSME ratings, promoting digital lending ecosystem, etc. The Bank has proactively been working toward Energy Efficiency (EE) in MSMEs since 2005-06 as part of Direct Finance business using support of multilateral institutions like World Bank, ADB, GiZ, FCDO, JICA, AFD, KfW etc. for energy efficient projects. SIDBI has taken steps to promote Energy Efficiency and Cleaner production in the MSME sector and propose to accelerate its efforts for MSME sector for their survival, growth, and competitiveness in long run during prevailing climate related challenges.

SIDBI's Ambattur Branch office address: First Floor, Plot no H29, Raja Towers, Periyar Nagar, Central Avenue, Koratur, Chennai 600 080. Email: ambattur@sidbi.in Phone: 044-43800300

Shri Sivasubramanian Ramann, Chairman and Managing Director, Small Industries Development Bank of India (SIDBI) lighting the lamp at the Inaugural function of SIDBI Ambattur Branch office.

Others in the picture are (l to r) Shri G. Rajeswara Reddy, Field General Manager, Indian Bank; SIDBI Chennai Regional Head, Shri Ravindran A.L; Shri T. Nalangilli, President, AIEMA; Shri K. S. Chandra Sekar, AGM, SIDBI Ambattur Branch; Shri K. Sai Sathya Kumar, Chairman ACMEE 2023

Shri K. Sai Sathya Kumar, Chairman, ACMEE 2023 speaking on the occasion.

Shri. T. Nalangilli, President AIEMA, Presenting a Memento to Shri Sivasubramanian Ramann, Chairman and Managing Director, SIDBI

AGMEE 2023
15th International Machine Tools Exhibition
An AIEMA Initiative
15 - 19 June 2023
Chennai Trade Centre, Chennai, India

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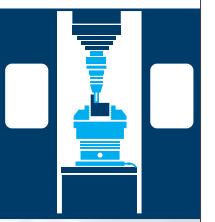

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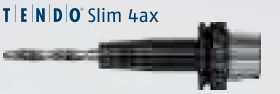

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Inspirational Entrepreneur

Mr. SRIRAM PARTHASARATHY,
MD, MK Autocomponents Group and Chairman, Chennai Institute of Technology (CIT), Chennai

Mr. Sriram, a first generation industrialist from Chennai, is well recognised for his creative engineering prowess. He is equally well known for the fully equipped and now autonomous technical education institution – Chennai Institute of Technology (CIT), established by him in Chennai, occupying No.2 position in the State as per the TNEA Admissions 2022 data released by the Government of Tamil Nadu. As he animatedly reminisces his eventful journey as a zealous businessperson over the past 27 years, his enthusiasm is contagious and his accomplishments are awe-inspiring.

In line with their corporate mission statement, MK Autocomponents group, with three well-appointed production bases in its group, occupying a total production space of 110,000 sft, TS16949 certified, has emerged as a leading supplier of cold forged parts, precision machined parts, high quality aluminium pressure die casting parts and assemblies to major OEMs and Tier 1 companies in automobile sector.

Early Days

Mr. Sriram's parents, basically agriculturists from a village near Sivakasi, Tamil Nadu, migrated to Chennai with their children during the late 1970s for better prospects, due to the prolonged drought conditions that prevailed in their native village then. Mr. Sriram says, "After I finished my 10th in the Government Higher Secondary School, Pallavaram, I opted for the diploma course in mechanical engineering from Central Polytechnic College (1985-88). Immediately after I completed the course in April 1988, I was selected by Flexible Machining Centre Pvt Ltd., Chennai, who were making critical components for BHEL."

"The big breakthrough came in 1990, when I joined the CNC division of Best & Crompton. I also joined the AMIE course, part time, and successfully completed the course by September 1993. Thereafter, I joined Suspa Pneumatics, an MNC, located near Thiruvanmiyur, and worked with them until January 1995."

The Genesis of MK Autocomponents

Mr. Sriram says, "Fundamentally, I am an engineer with a bias towards manufacturing technology and I love to spend my time in shop floors. The seven years of my work experience (1988 – 1995) provided me with a good exposure and confidence, be it managing the machining operation in a shop floor or the commercial part like purchase of machinery and consumables. I was happy that I could contribute to improving the units' productivity at several times that were well received by the CEOs of those companies. In the process, I also got to know some major client companies personally and their product needs."

"By mid-1995 I took the decision to branch out on my own. By early 1996, with my savings, I had rented a shed of 1,000 sft in the Tiny Sector, AIE, and I could find a partner who agreed to invest funds to meet the initial project outlay, on mutually acceptable terms. Thus MK Autocomponents was born in 1996 (Originally named MK Engineering and converted into a public limited company and renamed as MK Autocomponents India Ltd. in 2005), and, with increasing customer recognition, the business has been growing steadily over the years."

Emergence as a One Stop Source providing end to end solution to the customer

"In 1996, we started doing conversion job work for Enfield India for their 2-wheeler crankshafts. Gradually, more parts were added and we started supplying parts made out of our material. By 2000, they gave us the order for all the components for the crankshaft assembly. In 2002, they expressed their plan to offload one of their two crankshaft assembly lines to us and we grabbed this opportunity. We bought land and set up our unit near their factory in Thiruvottriyur in the name of Gokul Autotech Pvt Ltd (GAT). On a rough estimate, we would have supplied to them 1 million crankshaft assemblies to Royal Enfield two-wheelers.

In 1997, an economic slowdown occurred globally, causing a slight setback to us. We, however, took the opportunity to streamline the shop floor operations by reorganising the layout and optimising the uptime of each of our machines to achieve the desired output and sustain, with some cost saving.

In 1998, Hyundai gave us their first order. In 2000, our business relationship with Delphi TVS started. We produced fuel injection components for them. Our good relationship continues.

In 2000-01, I took over the business of MK Autocomponents after mutually sharing the assets of the company between the two partners. Soon after, we bought land in AIE and set up our own unit."

Unit 1 – MKA - SP 25-27 – AIE

"Another big breakthrough came through the Indian branch of Mitsubishi Electric, Japan. We supplied distributor shafts to them. They chose to help us with a loan of Rs. 50.00 lakhs for buying machine even before we started to supply any product to them. We worked together and developed parts required by them. This experience provided us with an in-depth knowledge of Japanese work culture and their quality standards. Their trust in us was overwhelming and I have high regards for them."

Unit 2 – MKA - NP 21C - 7th St – AIE

"In 2003, GAT established a fully equipped factory of 60,000 sft in the SIPCOT Industrial Park, Oragadam, Sriperumbudur, for manufacture of high quality aluminium pressure die casting parts and assemblies for leading OEMs and tier 1 industries. This unit also is ISO/IATF 16949 certified and SQ Mark achieved, with in-house powder coating plant and state of the art testing facilities."

Unit 3 - GAT – Oragadam

"In 2005, we diversified into cold forging and heat treatment as a measure of backward integration. Brakes India wanted to launch a critical part, a component of which we developed, using our cold forging facility, eliminating quality and volume constraints. We continue to be their single source supplier of this as well as some other parts to them."

"As for exports, at present its share is just about 5%. With the R&D facilities available in CIT, ours is a fully integrated manufacturing set-up that can provide end-to-end solutions to customers. We cherish our association with all our customers with whom we have had the privilege of sharing our experience and jointly developing automobile parts for them."

Products Portfolio

Machined Steel Parts

High Pressure Die castings

Precision Flywheel Assemblies

HPDC/GDC Parts for EV applications/ Braking systems

Employees / Talent Retention

"Our core asset is our employees, numbering around 500, all the units put together, with good options for in-house career growth. Many of them are with us for more than 15 years. We work 3 shifts a day. Women employees constitute about 50%. Apart from all statutory compliances in time, we support the education of the employees' children up to college studies, as a welfare measure."

Management and Succession Plan

"We have a team of professionals heading the operations. We constantly look for ways to be lean and efficient.

On succession planning, now, my brother, Mr. P. Janakiram is looking after the operations of MKA Units 1 & 2. We have a professional CEO heading GAT. His name is Mr. S. Venkatesan.

I have two sons. The elder son, Mr. Gokulakrishnan did B.E. (Mech. Engg.) in CIT and has just come back after finishing Masters in Advanced Manufacturing Technology in the University of Manchester, U.K. He will soon be inducted into our business. The younger son, Mr. Balakrishnan too has done B.E. (Mech. Engg.) and is going to the UK to do his Masters in the University of Manchester."

CIT

Established in 2010 and approved by AICTE, CIT ranks 125th in India now and they aim to move up to within the top 100 by end-2024.

With excellent R & D facility and 12 active Engineering Departments in the campus, viz., Computer Science, Electronics & Communication, Electrical & Electronics, Mechanical, Mechatronics, Civil, Information Technology, Bio-Med, Artificial Intelligence & Data Science, Computer Science & Business Systems, Computer Science (Cyber Security), Computer Science (AI & ML), CIT is the second top most engineering college in Tamil Nadu, preferred by students, academics and the industry.

Mr. Sriram says, “In 2008-09, I found that fresh engineers recruited by companies had little idea of working in a typical factory environment and they were not capable of starting any productive work immediately. When I consulted academicians as to whether a finishing school would help to train the freshers, they advised me to start an engineering College. I decided to use the land we had bought for factory expansion near Kunrathur, for the College.

We have many lab facilities like industrial automation, robotics, embedded solutions, IoT, image processing, machine learning, data centres, vibration monitoring systems, etc. Full time scientists are there. We help new entrepreneurs in our institute. We work with industries for training their employees and also in new product development / problem solving. We can join with the industry to approach the Government to avail of skill based incentive schemes.”

Future Plans

“Many start-ups have approached us. We are working with one, to made drones. This may grow fast.

In our College, we are also incubating a good number of companies.

Further, we are coming up with a good start-up ecosystem, which should commence operations by next year. We have 9 acres of land near AIE, wherein we are planning to set up a school with an innovation centre, incubation centre, with good attention to skilling people.”

Industry Issues that need attention

1. SMEs should be free from procedural hurdles, especially GST-related.

2. Ease of doing business: Exit of an SME is very difficult. The government should encourage SMEs with easy exit options. Special awareness programs supported by the government should be conducted.

CSR

“Both our company and the college have been taking up community support activities. Our work during the pandemic period was well appreciated. Now the focus is on tree plantation. We have so far planed around 25,000 trees near the college in Kundrathur. Also, we support local children in school and college education.”

Association with AIEMA/ ACMEE

“Our association has been very fruitful. We were one of the sponsors of ACMEE five years before. We would be interested to associate with AIEMA / ACMEE in areas such as technology/ entrepreneurial development and co-creation of clusters and common facilities, with funding support from government.”

Tips to aspiring entrepreneurs

- When you have done your homework, set bigger goals not smaller.
- Take care of employees – larger the support to them the better will be the returns.
- New tech adoption is key to grow in the changing scenario.
- Look for export markets – there is a huge potential.
- Learn to manage/balance your personal and business life.

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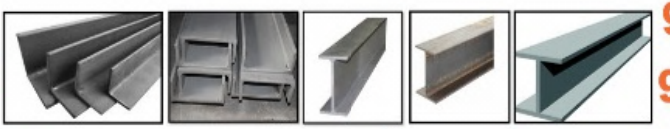

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ECONOMY

Outlook

India-US Collaborate to Bolster Supply Chains, Enhance Trade Ties

The India-US economic and strategic partnership has continued to consolidate in recent years, with the US emerging as India's largest trade partner for merchandise goods in FY 2022. This collaboration is anticipated to grow even stronger as India assumes the G20 presidency in 2023, with a focus on advancing technology, innovation, resilient supply chains, and attaining inclusive and sustainable growth goals. In this article, we summarise significant decisions made during the 13th Ministerial Meeting of the India-US Trade Policy Forum (TPF). We also explore significant developments in commercial ties between the US and India.

The trade relations between the two have expanded exponentially, with bilateral trade hitting a record US$157 billion in two-way goods and services trade in 2021 and the US emerging as the top destination for India's merchandise exports. In fact, 2022 witnessed the fulfilment of many tangible outcomes, including the resolution of existing market access issues, the Quad focus on STEM, the signing of an Investment Incentive Agreement, the launch of Technology Innovation Hubs as a collaboration of the respective science agencies, a record level of trade and investments, etc.

The year 2023 kicked off with the successful conclusion of the 13th Ministerial Meeting of the India-US Trade Policy Forum (TPF). It must be noted that this forum lay dormant for four years until a re-launch in November 2021. Experts and diplomats forecast that the future of India-US ties will determine the future of technology and innovation.

India-US TPF to focus on deepening trade and economic engagement

The India-US TPF aims to activate its working groups in the fields of agriculture, non-agriculture goods, services, investment, and intellectual property to address issues of mutual concern and deliver tangible benefits to both countries. Both nations have jointly established a new working group on "Resilient Trade" to improve the trade relationship, and strengthen supply chain resilience, particularly in the critical industries that underpin the two economies

Additionally, during the meeting, India also highlighted its interest in the restoration of its beneficiary status under the U.S. Generalized System of Preferences (GSP) program, which the US agreed to consider.

India-US bilateral trade: Trends and Outlook

The US is currently positioned as India's largest trading partner with respect to merchandise trade, accounting for 11.98% of India's total merchandise trade. As per US Census data, India-US merchandise trade in calendar year 2022 reached US$ 123.48 billion, up from US$ 113 billion in 2021.

As per data from the Indian Ministry of Commerce, India-US bilateral trade crossed US$ 119.42 billion in FY 2022. In the first eight months of FY 2023, the total bilateral trade has already reached US$ 87.33 billion, with exports from India dominating imports.

Going forward in 2023, India and the US are expected to materialize intensive collaboration in the defence, clean energy, tech, and space. The India-US partnership is expected to evolve multi-fold in the upcoming years, and the bilateral trade in goods and services between both countries is anticipated to reach $500–600 billion by 2030.

India-US Trade Statistics (2017-2022) (in US$ Billion)

	2017-2018	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023 (April-Nov)
India exports to US	47.87	52.40	53.08	51.62	76.11	53.13
India imports from US	26.61	35.54	35.82	28.88	43.31	34.2
Total trade between India and US	74.48	87.95	88.9	80.51	119.4	87.33
India-US trade balance	21.26	16.85	17.26	22.73	32.79	18.93

Major commodities traded between India and US

US has also emerged as India's fourth largest supplier of crude oil and second largest supplier of liquefied natural gas (LNG).

The principle commodities exported by India to the US are precious and semi-precious stones, drugs and pharmaceuticals, petroleum products, cotton fabrics, garments, marine products, iron and steel products, electrical equipment, and auto components. Electronic component companies have moved production to India. For example, Apple now exports a million smartphones from India to the US every month.

India's import basket from the US primarily consists of crude oil, along with other items like pearls, precious and semi-precious stones, petroleum products, coal, coke, organic chemicals, gold, and paper and paper board.

Source: www.india-briefing.com

INDUSTRY

SMEs - Active Participation in Industry Trade Shows is key yet

The presence of SMEs in trade shows needs to be better planned to get the most out of these events. Exhibition industry research data shows that having a display table at exhibitions puts the exhibitor in an advantageous position to have a more cost-effective face-to-face conversation with potential prospects. The exhibits in the booth provides a perfect location for continuing the conversations.

It may be the era of technology-led disruption but can there be a better platform for in-person marketing and branding for a small and medium enterprise? SMEs will still find the recognised industry trade shows as one of the best options for B2B business growth. The pandemic-induced two year break may not be there for ever and such occasions where buyers and suppliers are in direct touch along with industry peers/ experts will continue to prosper in the future. *SME owners should evaluate ROI from such events and plan how to maximise the returns.*

Here is an attempt to inform AIEMA members of the market reviews on some of the recent trade shows which may be of interest.

Auto Expo 2023

The Indian auto industry is expected to record strong growth in 2022-23. The 16th edition of this show was held during January 12-15, 2023 at New Delhi after a gap of nearly 3 years, attracting a record 6.36.lakh visitors – the highest ever turnout since its first edition in the 1980s. A total of 82 vehicles made their global/India debut during the exhibition.

Focus on five initiatives viz., road safety, promotion of bio-fuel vehicles, popularising the EVs, attention to recycling of vehicles and a spotlight on gas mobility.

Key Highlights

Electric two-wheelers are likely to witness positive sales in 2023. There were numerous electric two wheeler makers which made their respective debut at Auto Expo. Among others, the likes of Matter, Ultravoilette, Liger, and LML drew in the crowds. There were several start-ups and two-wheeler EV players as well at the fair.

Auto Expo 2023 was as much about production-ready vehicles that are already out on Indian roads. Some popular launches that made headlines this year include the likes of the Maruti Suzuki Jimny, Tata Sierra, Safari EV, etc.

Maruti Suzuki unveiled the eVX concept electric SUV at the fair and it will be launched in 2025. The company also showcased the much-anticipated 5-door Jimny and a new crossover – Fronx.

TATA Altroz Racer

Tata Motors showcased the Sierra EV, Harrier EV, Altroz Racer edition, etc.

IMTEX 2023

The 20th edition of IMTEX, organised by IMTMA, focused on metal-cutting machine tools and manufacturing technologies. Concurrent shows 'Tooltech 2023' and 'Digital Manufacturing' were trendsetters in many ways. The show was a great platform for the machine tool and manufacturing fraternity to renew relationships, explore collaborations and partnerships. .

Held after four years, displays included technologies like smart and intelligent machines, high-precision, high-performance, multi-tasking, hybrid machines and special-purpose machines. Robots, Cobots, AGVs, tools, accessories, manufacturing software, 3D Printers, 3D printing solutions, evolving Industry 4.0 hardware, software, customised solutions, 5-axis, digital twin, advancements in tooling and measurement technology, solutions for new products, were also displayed.

To encourage young engineering talents, IMTEX 2023 organized a competition for young innovators through the i2 Academia Pavilion. The programme enabled twenty-two institutions from across India to connect with exhibitors and showcase the projects that they have undertaken.

The International Buyer Seller Meet had 38 representatives from 17 countries and was an apt platform for Indian machine tool manufacturers to interact with international buyers and enhance their export potential. Countries participated included Australia, Austria, China, Czech Republic, France, Germany, India,

Israel, Italy, Japan, Korea, Malaysia, Netherlands, Poland, Serbia, Singapore, Slovania, Spain, Sweden, Switzerland, Taiwan, UK, and USA.

Bauma CONEXPO INDIA 2023

The 6th International Trade Fair for Construction Machinery, Building Material Machines, Mining Machines and Construction Vehicles – the largest international fair on Construction industry in India post-COVID times, was held from January 31 to February 3, 2023 at India Expo Centre, Greater Noida.

Construction industry with emphasis on urban housing and infrastructure has become the corner stone to push the Indian economy to newer heights. Cities are the future driver of growth. A new World Bank report estimates that India will need to invest USD840 billion over the next 15 years—or an average of USD55 billion per annum—into urban infrastructure if it is to effectively meet the needs of its fast-growing urban population.

We are about to witness a construction boom with government and large corporates committing to huge capital investments. The construction industry market in India works across 250 sub-sectors with linkages across sectors. By end of 2023, India is expected to become the world's third largest construction market. The Real Estate Industry in India is expected to reach $1 trillion by 2030 and will contribute 13% to India's GDP.

The event, also featuring a Buyer Seller Forum, a fine platform to interact with top decision makers, create global connections was organized in association with the most successful international trade fair organizers - Messe München, organizer of bauma in Munich, and the Association of Equipment Manufacturers (AEM), organizer of CONEXPO-CON/AGG in Las Vegas.

We also list below a few Expos and Conventions that will take place in the next couple of months.

IMTOS 2023

The 9th edition of India Machine Tools Show (IMTOS) will take place during May 18 - 20, 2023 at New Delhi. It is a biennial event showcasing innovation in machine tools, engineering and factory automation.

Exhibitor Product Profile

Profile of exhibit includes Robotics & Automation, Energy Conservation, Air Compressor, Automation, Chemical & Pharma Machinery, Hydraulic & Pneumatics, Welding & Welding Consumables, Machine Tools, Testing & Measuring Equipment, Gears, Motors & Drive, Cutting Tools, Hydraulic Press Brakes, Water Treatment & Specialty Chemicals, Power Tools, CNC & SPM, Wires & Cables, Die & Mould, Hand Tools, Material Handling, Newly Launched & Specialized Industrial Products, Electrical, Electronics, Instrumentation, Metal Forming M/c., Casting & Forging, Cad/cam, Wood Working Machinery and Information Technology.

3rd Edition of International SME Convention 2023 – India

India SME Forum is organising the 3rd Edition of International SME Convention 2023 in association with the Ministry of Micro, Small and Medium Enterprises & the Ministry of External Affairs, Govt. of India, from 18 – 21 January 2023, in New Delhi, India.

This initiative promoted by the Government of India serves as a platform for intensive business discussions and interactions between progressive SMEs and fostering business partnerships and trade opportunities between Indian & global SMEs from around the world.

The themes of this edition of ISC 2023 would be:

- Make in India: Automating Indian SMEs in the 4th Industrial Revolution
- Technology Licensing & Collaborations: Key Enablers for Indian Enterprises
- Cleantech: Innovations for developing a New India
- SDG9: Strengthening Indian Industry, Innovation & Infrastructure
- Serviced in India: Empowering Partnerships with Service Enterprises

The Focus Sectors for the Convention are:

- Manufacturing
- Services
- Green Energy, Renewable Energy, Waste Management and Sanitation
- Agri, Food and Food Processing

The past two pre-COVID editions of ISC have seen over 337 SMEs from 44 countries, interact and build trade relations with over 2700 selected SMEs from India, with 50+ MOUs and 12 Joint Business Ventures already

functional. More info is available on https://internationalsmeconvention.com/

ACMEE 2023

The 15th edition of ACMEE, the pride of AIEMA will take place during 15 - 19 June 2023 at Chennai Trade Centre.

ACMEE is an UFI approved international event with extensive overseas participation that focusses on the latest in machine tools technology available in different parts of the world. As on 5th February, 83 stalls have been booked by overseas participants from 28 countries to exhibit their equipment/products in this expo

Trade Shows in the next few months

A list of exhibitions related to Machine Tools and Manufacturing Technologies taking place in India and abroad is given below for information.

Government Support

As members are aware, government subsidy is available to MSMEs for participation in industry shows, both domestic and international, through the Marketing Assistance schemes, through SIDBI/NSIC.

Hari Subramaniam
believe2achieve@gmail.com

Trade Shows and Conventions - 2023

A. Trade Shows - India

#	Show Title	Date	City	Venue	Related Industries	Cycle
1	Pune Machine Tool Show	April 27 - 29, 2023	**Pune**	Auto Cluster Exhibition Centre, Chinchwad	Machine Tools, Tools	Biennial
2	India Machine Tools 2023	May 18 - 21, 2023	**New Delhi**	Pragati Maidan	Machine Tools - Tools - Robotics - Metal Working Industries	Once a year
3	ACMEE 2023 (AIEMA Initiative)	June 15 - 19, 2023	**Chennai**	Chennai Trade Centre	CNC Machines, CNC & PLC Controls, Cutting Tools and Accessories, Special Purpose Machines, Industrial Robotics & Automation, Instrumentation, Machinery & Machine Tools, Material Handling Systems, Energy Saving Solutions, Cleaning Systems, Control Devices, Power Tools, Testing & Measurement Equipment, 3D Printing, Laser Cutting, Laser Marking, Related IT & Consultancy Services	Biennial
4	RAW MAT INDIA 2023 - Indian's Great Resource & Industry Expo	September 2023	**Coimbatore**	CODISSIA	Metal Working Industries - Wood Working Industries - Machines Tools - Chemical Process - Building & Construction - Automotive Engineering - Systems & Components - Subcontracting	Once a year

B. Trade Shows - Overseas (Region-wise)

1	Taipei International Machine Tool Show - TIMTOS 2023 (Organiser: TAITRA)	March 06 - 11, 2023	**Taipei (Taiwan)**	Taipei Nangang Exhibition Center	Machine Tools - Tools - Metal Working Industries	Biennial
2	Taipei International Industrial Automation Exhibition - Machine Tools, Industrial Robot Arms, Hardware & Factory Equipment, Automation Controlling System, Software for CAD/CAM/CAE, Testing & Measuring	Aug. 23 - 26, 2023	**Taipei (Taiwan)**	Taipei Nangang Exhibition Center	Industrial Controllers, Machines Tools, Tools, Applied Computer & Industrial Engineering CAD/CAM - Design - Modelisation Measurement, Control & Testing	Once a year

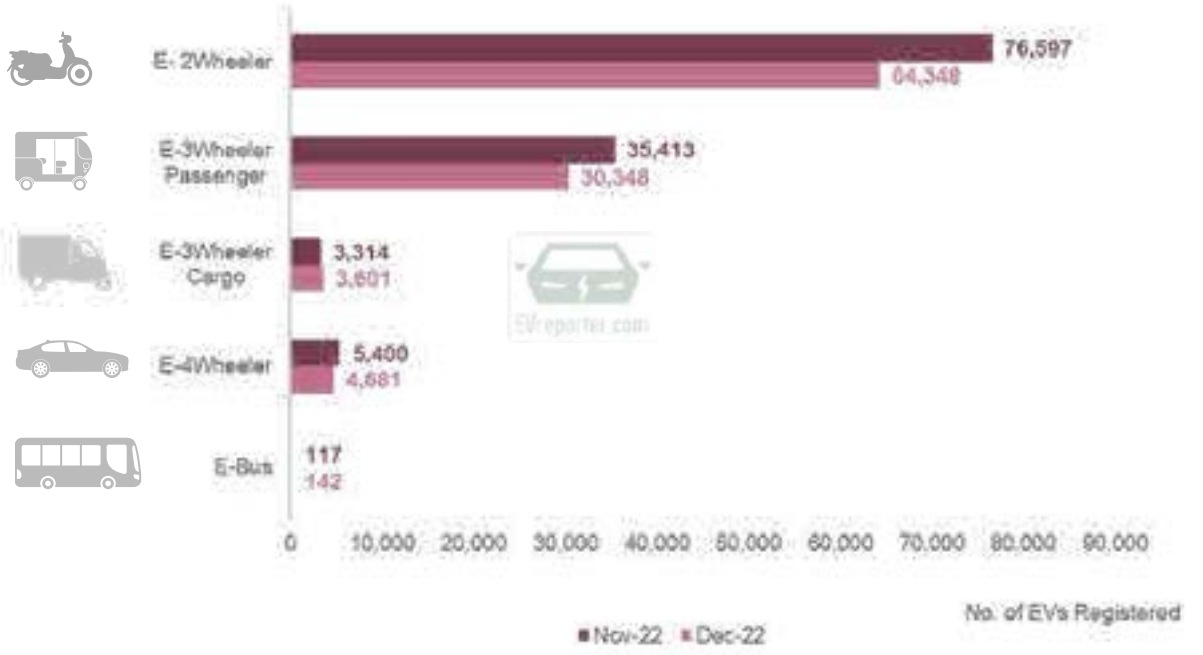
3	FMEX CHINA 2023 - China International Machine Tool Exhibition. CNC Machine Tools Exhibition, Laser Exhibition, Automation & Robotics Exhibition, Hardware & Electrical Exhibition	March 02 - 05, 2023	**Beijiao Town, Shunde Dt, Foshan, (China)**	Foshan Tanzhou International Exhibition Center	Machines Tools - Tools - Metal Working Industries - Applied Computer & Industrial Engineering - Robotics - Electrical & Electro technical Engineering - Measurement, Control & Testing	Once a year
4	ITES EXHIBITION (SIMM) 2023 - the largest advanced manufacturing technology & equipment exhibition in southern China.	March 29 - April 01, 2023	**Shenzhen (China)**	Shenzhen World Exhibition Center, Shenzhen	Metal Working Industries Plastics, Rubber, Composites Machines-tools - Tools Robotics Industrial Controllers Electronic Design & Components Equipments & Technologies for Medical and Surgery Wood Working Industries	Once a year
5	DMC 2023 - China International Exhibition on Die & Mould, Metal Processing and Forming Industry	June 12 - 14, 2023	**Shanghai (China)**	National Exhibition Center, Qingpu District Shanghai	Mould & Die - Metal Working Industries - Plastics, Rubber, Composites - Machines - Tools	Once a year
6	METFAL JAPAN - METAL EXPO 2023 - a specialised exhibition featuring processing machines, analysis/inspection equipment, recycling technologies	May 17 - 19, 2023	**Osaka, Japan**	Index Osaka -Osaka, Japan	Metal Working Industries - Machines - Tools - Advanced Materials (aluminum, copper, titanium, magnesium, noble metals, steel, etc.)	Twice a year
7	Japan Automotive Engineers and Researchers Congress & Expo	May 24 - 26, 2023	**Yokohama (Japan)**	Pacifico Yokohama, Nishi-ku, Yokohama	Automotive Engineering - Systems & Components - Sciences for Engineers - R & D - Advanced Materials - Machines-tools - Tools Plastics, Rubber, Composites	Once a year
8	AFRICA INDUSMACH - KENYA 2023. International Industrial Products, Equipment & Machinery Trade Exhibition	May 04 - 06, 2023	**Nairobi, Kenya**	Kenyatta Int'l Conference Center, Harambee Avenue, Nairobi	Machine Tools - Tools - Metal Working Industries - Plastics - Rubber - Composites - Subcontracting - Suppliers & Partners	Once a year
9	INTEC 2023 - Trade Fair for Manufacturing, Tool and Special-Purpose Machine Construction	March 07 - 10, 2023	**Leipzig (Germany)**	Exhibition Centre Leipzig Messe-Allee 1 D-04356 Leipzig	Machines Tools - Tools - Metal Working Industries -Applied Computer & Industrial Engineering	Biennial
10	International Fair of Welding Technology and Equipment - Welding - KIELCE 2023	March 28 - 31, 2023	**Kielce (Poland)**	Kielce Fairground Zakladowa 1 25-672 Kielce	Welding - Metal Working Industries - Machine Tools - Tools	Once a year
11	Sheet Metal Processing and Cutting Fair - STOM-BLECH & CUTTING 2023	March 28 - 31, 2023	**Kielce (Poland)**	Kielce Fairground Zakladowa 1 25-672 Kielce	Metal Working Industries - Machines Tools - Tools - Industrial Controllers - Robotics	Once a year
12	International Trade Fair. Welding, Cutting and Coating - WELDING - SVARKA 2023	April 25 - 28, 2023	**St. Petersburg (Russia)**	ExpoForum Convention and Exhibition Centre 64/1, Peterburgskoye Shosse St. Petersburg	Welding - Metal Working Industries - Machines Tools - Tools - Surface Treatment Technologies - Coatings	Biennial

INDUSTRY

EV Market

Category wise Electric Vehicle sales, Dec 2022

Total Registered Electric Vehicle Sales - **Dec '22 - 1,03,154** | Nov '22 - 1,20,883



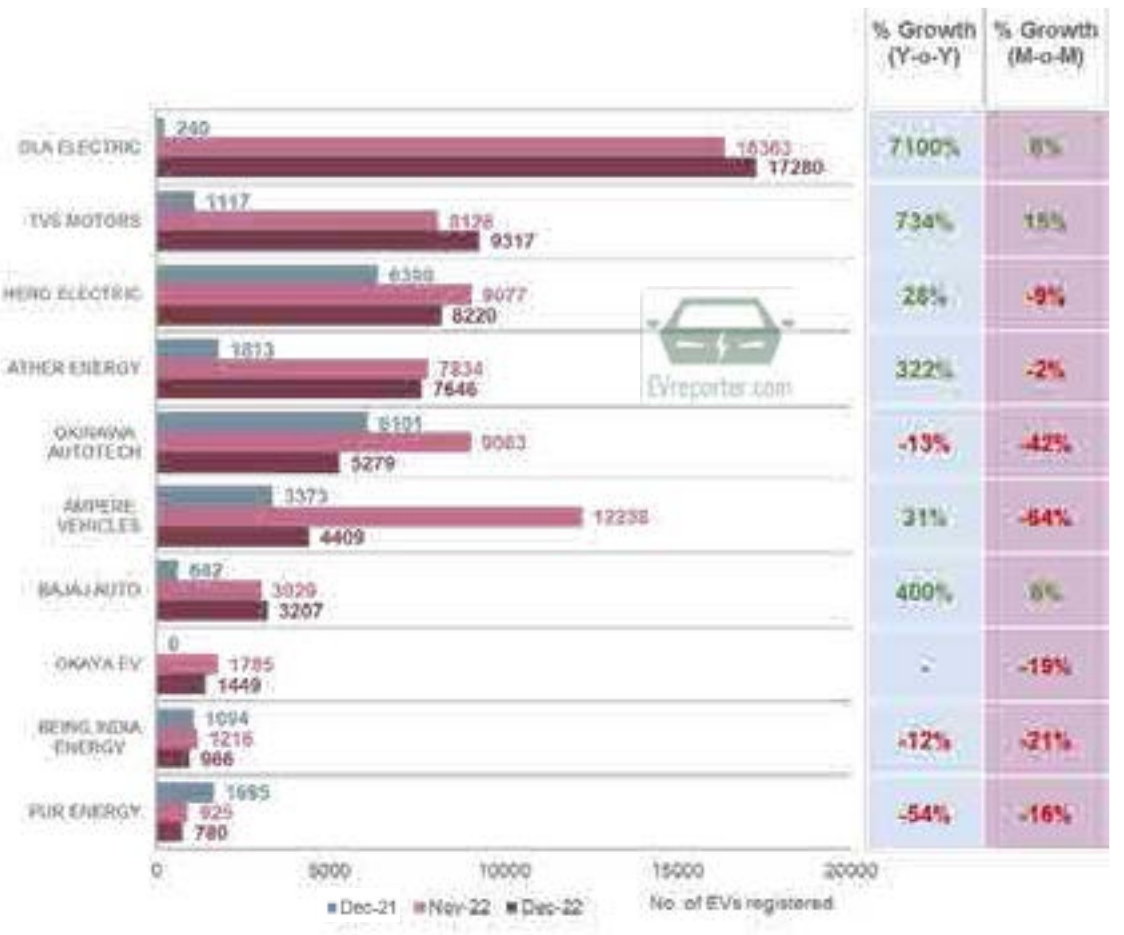
Category wise-Sales Trend from Dec 2021 to Dec 2022

10,13,169 EVs sold in last 12 months from Jan 2022 to Dec 2022

Source: Vahan Dashboard. Data as per 1341 out of 1428 RTOs across 34 out of 36 state/UTs.
Low speed 2Ws not included.

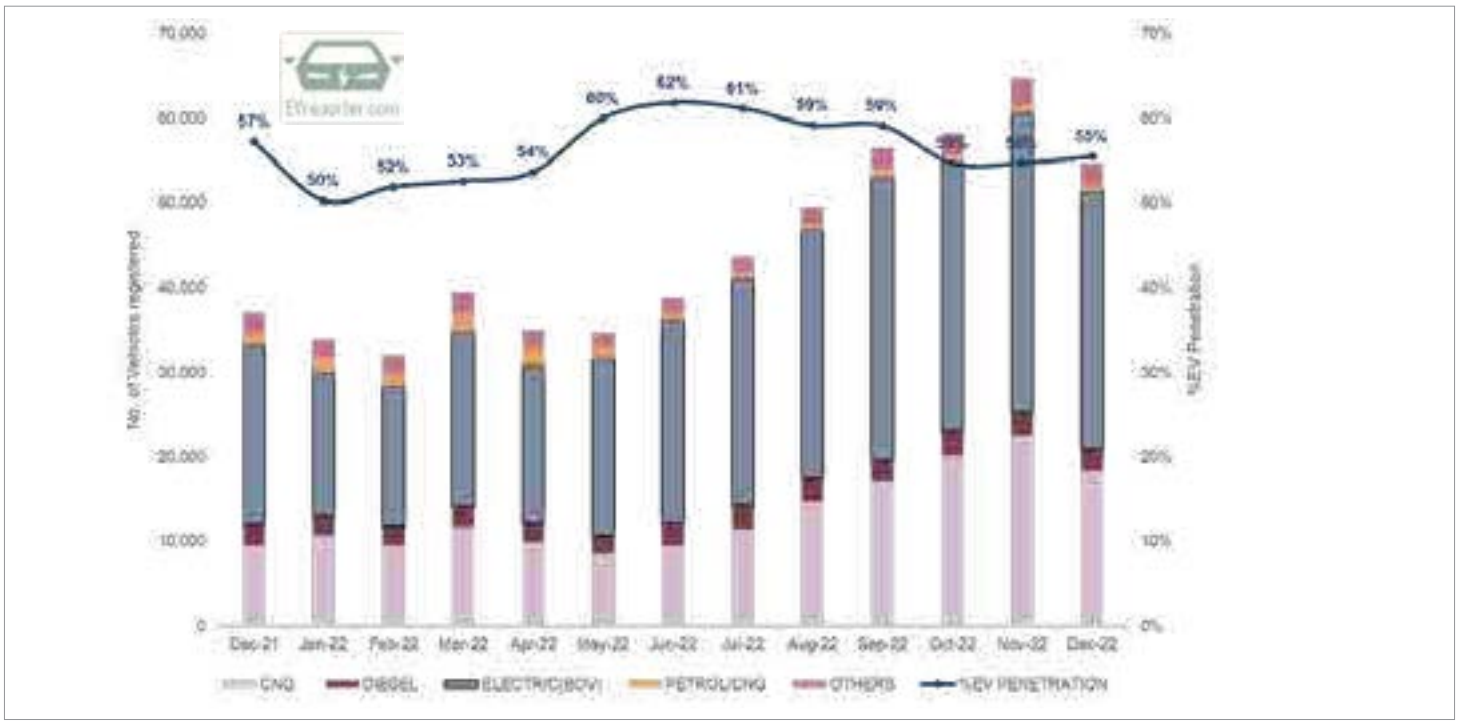
Fuel wise 2W Sales Trend, Dec 2021 - Dec 2022

High Speed E-2W Sales Trend by OEM

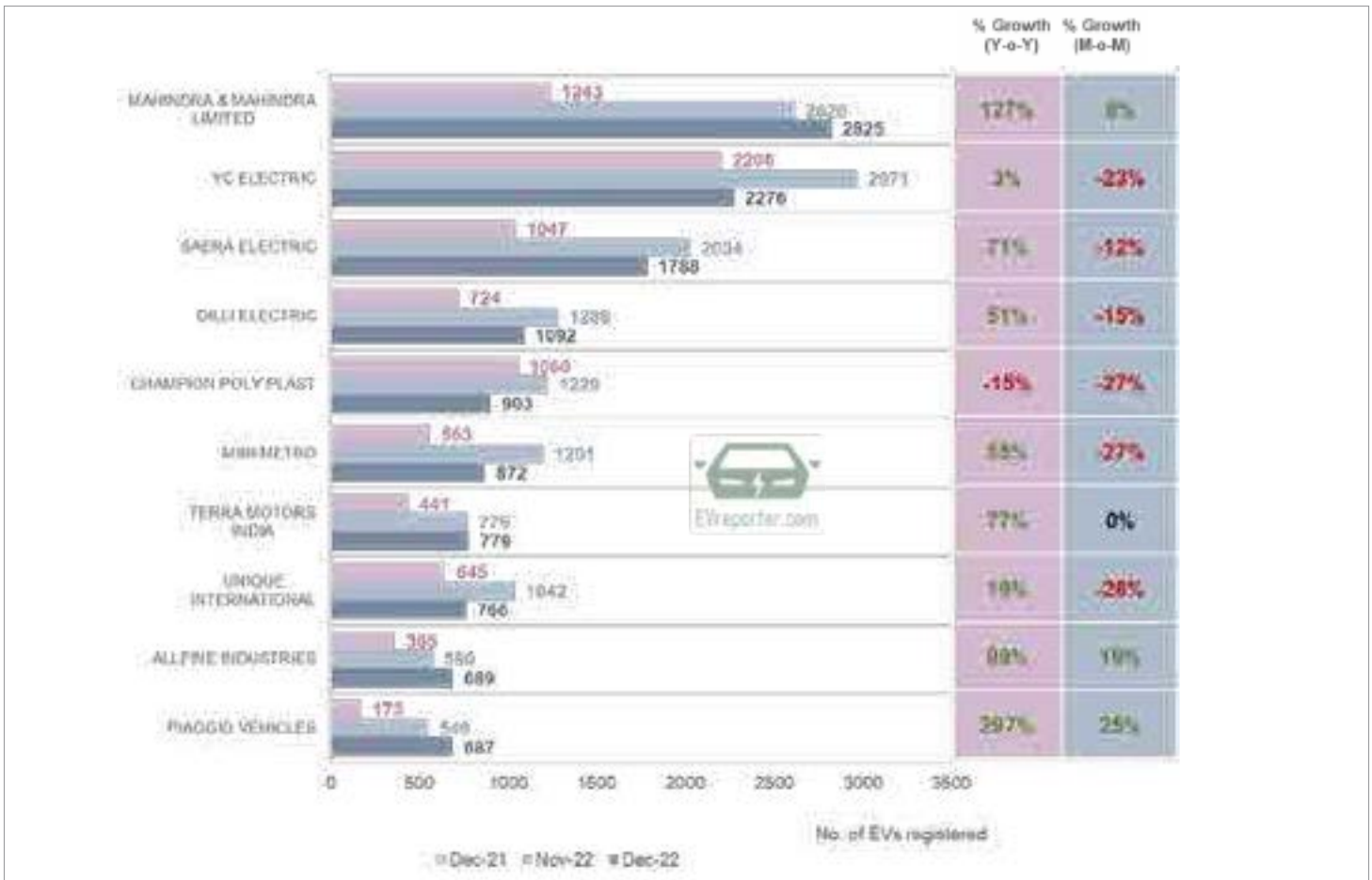


Source: Vahan Dashboard. Data as per 1341 out of 1428 RTOs across 34 out of 36 state/UTs
Note: Low speed Electric 2 Wheelers data is not included

3W Passenger Sales Trend by Fuel Type, Dec 2021 - Dec 2022

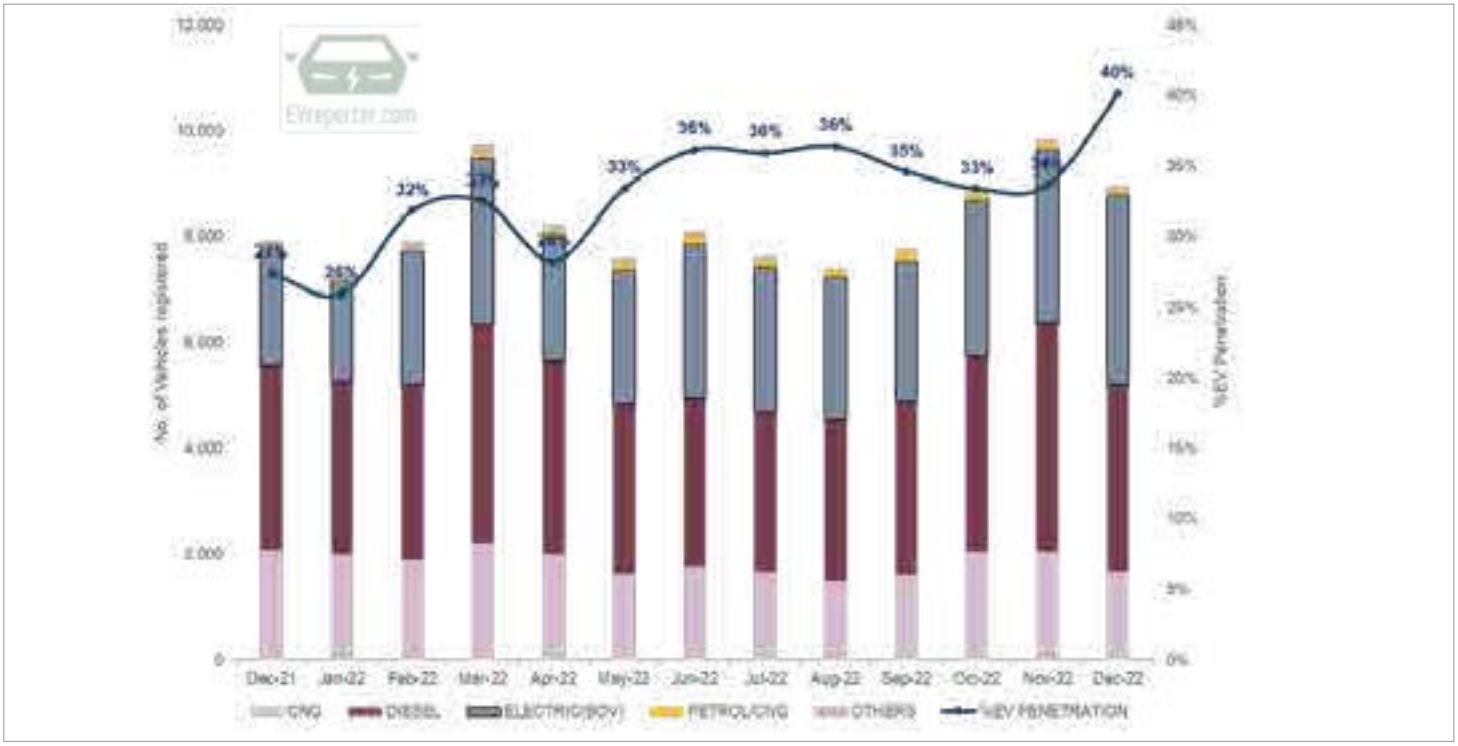


E-3W Passenger Sales Trend by OEM

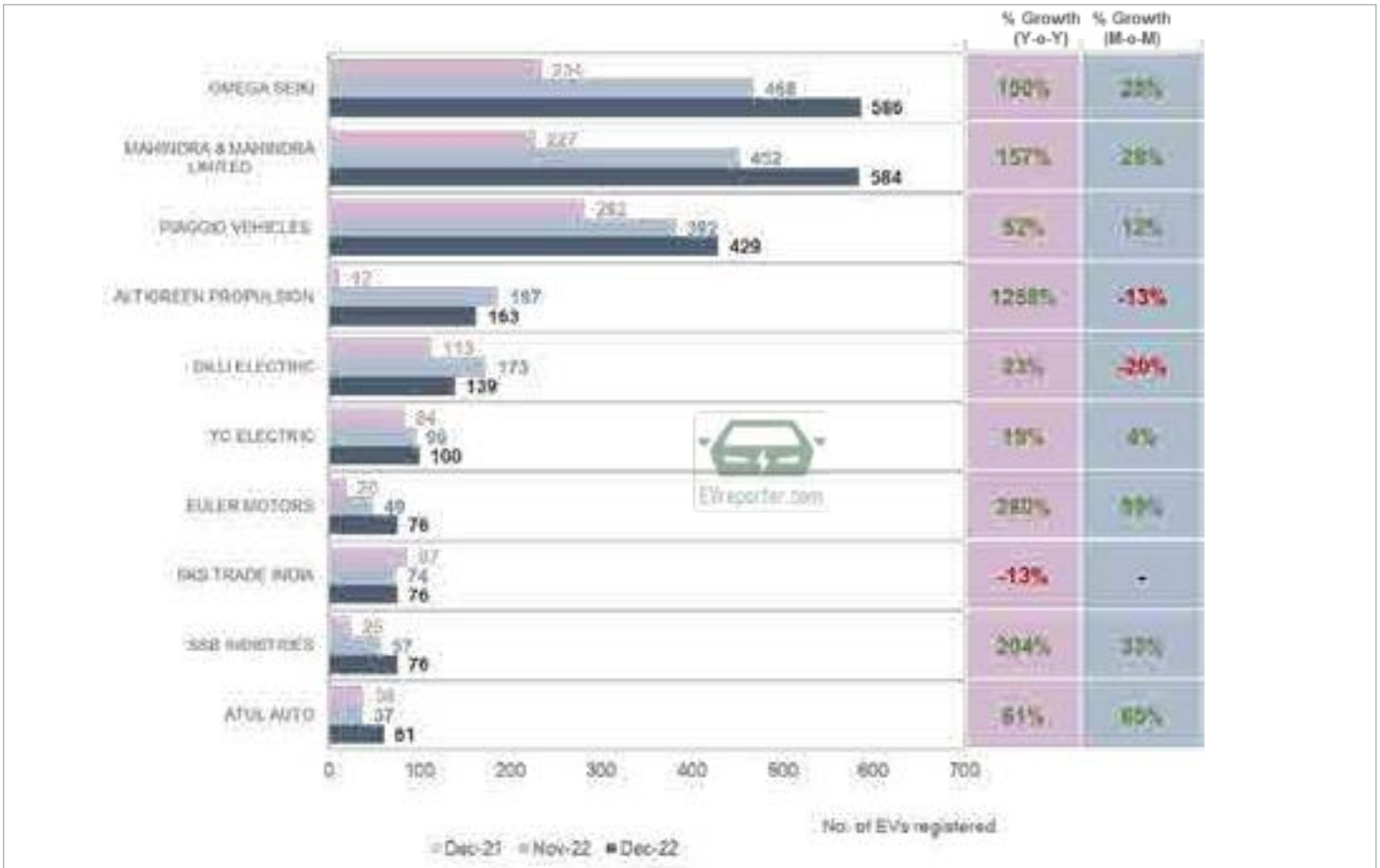


Source: Vahan Dashboard. Data as per 1341 out of 1428 RTOs across 34 out of 36 state/UTs. The aim of these graphs is to represent an overall trend of the new EV registrations in India.

3W Cargo Sales Trend by Fuel Type, Dec 2021 - Dec 2022



E-3W Cargo Sales Trend by OEM



Source: Vahan Dashboard. Data as per 1341 out of 1428 RTOs across 34 out of 36 state/UTs. The aim of these graphs is to represent an overall trend of the new EV registrations in India.

OEM wise E- 4Wheeler Sales Dec 2022

S.No.	OEMs	Nov-22	Dec-22	Difference	% Change	DEC 2022 Market Share
1	TATA MOTORS	4451	3868	-583	-13%	82.6%
2	MG MOTORS	644	486	-158	-25%	10.4%
3	HYUNDAI MOTORS	81	91	10	12%	1.9%
4	KIA MOTORS	84	86	2	2%	1.8%
5	BYD	54	50	-4	-7%	1.1%
6	MERCEDES-BENZ	43	31	-12	-28%	0.7%
7	BMW	19	29	10	53%	0.6%
8	VOLVO	7	23	16	229%	0.5%
	Others	17	17	0	0%	0.4%
	Total	5,400	4,681	-719	-13%	100%

Others include JLR, Porsche, Volvo, etc.

OEM wise Electric Bus Sales, Dec 2022

S.No.	OEMs	Nov-22	Dec-22	Difference	% Change	DEC 2022 Market Share
1	PMI ELECTRO MOBILITY	27	63	36	133%	44.4%
2	OLECTRA GREENTECH	44	31	-13	-42%	21.8%
3	SWITCH MOBILITY	29	27	-2	-7%	19.0%
4	TATA MOTORS	0	15	15	-	10.6%
5	MYTRAH MOBILITY	1	4	3	75%	2.8%
6	JBM AUTO	15	2	-13	-650%	1.4%
7	ASHOK LEYLAND	0	0	0	-	0.0%
8	VE COMMERCIAL VEHICLES	1	0	-1	-	0.0%
	TOTAL	117	142	25	21%	100.0%

Source: Vahan Dashboard and Official company releases. Vahan data as per 1341 out of 1428 RTOs across 34 out of 36 state/UTs. The aim of these graphs is to represent an overall trend of the new EV registrations in India.

Stay tuned for Annual Report on 2022 EV sales and industry showcase

Source: evreporter.com

INDUSTRY

Auto Expo 2023: Ashok Leyland showcases future of commercial vehicle industry

The Company exhibited its robust portfolio of sustainable mobility solutions.

Delhi: Ashok Leyland, the country's leading commercial vehicle manufacturer, showcased seven advanced mobility solutions at the Auto Expo 2023. The Company, which has been a forerunner in introducing cutting edge technologies, demonstrated its futuristic vehicle range, powered by electric and hydrogen options.

The products showcased at the Auto Expo 2023 are:

1. Battery Electric Vehicle
2. Fuel Cell Electric Vehicle
3. Hydrogen Internal Combustion Engine (ICE) Vehicle
4. Liquefied Natural Gas Vehicle
5. Intercity CNG Bus
6. A mini passenger bus

Mr. Dheeraj Hinduja, Executive Chairman of Ashok Leyland, said, "Ashok Leyland has always been a pioneer in introducing state-of-the-art technologies in the commercial vehicle space. Through this futuristic and innovative product portfolio, we have once again demonstrated our technological leadership, and more importantly our commitment to the Clean Mobility Mission. The range of our new clean-energy products, covering both the truck and bus segments, underscores our capability and readiness to lead the transformation in the road transportation sector. We will remain deeply invested in the cause of sustainability, aspiring to lead the market with our new-generation commercial vehicles."

Shenu Agarwal, MD & CEO, Ashok Leyland, said, "The automotive sector has seen a wave of technological upgrade in the last two years with green fuel being the future of the industry. Having one of the best R&D teams in the country, we want to continue our path to innovate and leverage new technology to be a leader in sustainable and environment friendly mobility."

With 75 years of experience in India, a pan-India service network with 24x7 support, and in-house development capabilities, Ashok Leyland plans to expand product lines and expand its presence in the fast-increasing alternate fuel segment.

Details of Ashok Leyland showcase at the Auto Expo 2023:

* Battery Electric Vehicle (BEV): Ashok Leyland's BOSS Battery Electric Vehicle, designed for a green, sustainable world. It runs on a battery that powers the motor that drives the vehicle. This vehicle uses a Lithium-ion battery, which is charged externally. To provide payload advantage, this vehicle comes with a lightweight design.

* Fuel Cell Electric Vehicle (FCEV): This truck is powered by Hydrogen. In the fuel cell, atmospheric oxygen along with hydrogen produce electricity that powers the power electronics and further the motor that drives the vehicle. This vehicle uses a Lithium-ion battery, with an external charging provision, to run as a limited battery vehicle. For maximum safety, this vehicle comes with a Leak Detection System.

* Hydrogen Internal Combustion Engine Vehicle (H2-ICE): This vehicle is powered by a renewable, clean energy source – Hydrogen. The sustainable vehicle, coupled with advanced technology, is powering a safer and smarter future. H2-ICEs are similar to conventional combustion engines and only a few tweaks are made to convert them to run on hydrogen. This vehicle is equipped with ADAS (Advanced Driver Assistant System) for enhanced vehicle and road safety.

* Liquefied Natural Gas Vehicle (LNG): Ashok Leyland leads the curve by introducing the unique dual-fuel vehicle, Liquefied Natural Gas Vehicle that runs on LNG and CNG. It's smart and sustainable fuel system propels us toward a greener future. LNG vehicles work similar to gasoline powered vehicles with a spark-ignited internal combustion engine. The natural gas is super-cooled and cryogenically stored in liquid form in a tank mounted on the truck. LNG is typically preferred in heavy-duty vehicles to meet longer range requirements.

FCEV, H2-ICE, and LNG are built on AVTR Modular Vehicle Platform and incorporate the majority of the sub-aggregates from successfully running current diesel vehicles that are proven for performance.

* Intercity Compressed natural gas bus (13.5 CNG bus): This 13.5 m intercity CNG Bus (4X2), the longest bus in the segment, runs on India's most powerful turbo-charged CNG Engine. In this vehicle 1500 Litres (255 kg) of CNG fuel is stored in light weight composite cylinders which are safely mounted over the frame and has a range of approximately 1000 km. The 13.5 m bus comes with a maximized luggage space of 11 cubic meters, highest among the CNG buses, and also offers 20% higher passenger capacity with 36 berths, highest in the segment.

* Bada Dost Xpress by CNG: Bada Dost Xpress, a mini passenger bus that prioritizes environment, comfort and performance. Powered by the next generation engine, this vehicle is ideal for both city & highway driving. Designed ergonomically to seat 12 passengers, Bada Dost Xpress redefines passenger comfort with easy entry and exit. The grab rails, safety handles, and anti-skidding flooring make walking inside the passenger saloon safe and easier. Optional features include AC. and Vehicle Tracking System (VTS).

Source: The Economic Times

INDUSTRY

Materials Characterization & Non-destructive Testing

How Rockwell Hardness Testing Supports Modern Material Evaluations

By **Zwick Roell**

Rockwell testing is the most commonly conducted hardness testing, offers an attractive alternative to uniaxial testing in some metals applications where sample geometry would make test preparations overly cumbersome. The testing procedure is simple, and the readings can be directly attained from the testing machine.

Many new products entering the market are based on new materials and are manufactured using novel processes. These new materials are playing increasingly important roles – supporting innovation and boosting competitiveness in technology-driven industries. Identifying the potential for material failure has never been more essential, and modern testing capabilities deliver the insights quality managers need to assess material performance.

Exposure to loads, pressures and extreme temperatures in manufacturing has the potential to affect the performance of parts made of metals and metal alloys. Due to complex sample geometry and linear correlation between hardness and tensile strength in metals, hardness testing is often the best way to establish that such parts will survive and perform in their intended applications. *Hardness testing is also applicable to evaluations of ceramic and plastic materials.* The relative simplicity of hardness tests, in combination with the ease in which results may be obtained and reviewed, makes them an essential component of the quality control process.

Hardness is the mechanical resistance of a material to the indentation of another harder specimen. Hardness testing is typically undertaken to assess resistance to plastic deformation, a value of tremendous importance to the determination of part quality in a wide range of industries and applications.

Rockwell Hardness Testing

Accurately determining the hardness of a material for any given application involves several factors, including the type of material, specimen geometry, surface conditions, exposure to heat-treatment processes and production requirements. A range of different hardness tests may be applied to determine different hardness values for the same test specimen. Selection of the type of hardness test is often influenced by end-customer requirements because hardness measurements are commonly reported values on spec sheets accompanying the delivery of manufactured goods.

The Rockwell hardness test is a measurement based on the net increase in depth of impression as a load is applied. In the Rockwell method of hardness testing, the depth of penetration of an indenter following application of a minor load and a major load is measured. The indenter may either be a tungsten carbide ball of some specified diameter or a spherical diamond-tipped cone of 120° angle and 0.2-mm tip radius, called a Brale indenter. The type of indenter and the test load determine the hardness scale, which is expressed in letters such as A, B, C and so forth.

High throughput testing environments call for solutions that deliver value beyond standard expectations of testing system performance. Depth-sensing test procedures offer additional insights into material behaviour that support predictive failure analyses. New universal Rockwell hardness testing systems deliver depth-sensing capabilities across more than 30 measurement applications.

The Rockwell hardness testing system incorporates closed-loop force application and supports test forces between 0.5 kgf and 250 kgf. As a result, quality managers and test lab staff can conduct both Rockwell and Rockwell Superficial tests on a single test machine. The latest technology guarantees a high level of test point repeatability and re-producibility for result output of the highest integrity. The testing system is also capable of performing Brinell tests, where a portable microscope measures the remaining indentation.

A nose-mounted indenter enables access to and visibility of awkward test points, eliminating the need for time-consuming and expensive test sample sectioning. Overall, sample preparation is minimal. A nose-mounted indenter enables access to and visibility of test points that would conventionally pose a challenge or require test sample sectioning. The sectioning adds time and cost; however, the unique positioning of the indenter in the testing system streamlines the testing process.

A nose-mounted indenter on this Rockwell hardness testing system accommodates a wide range of sample geometries and offers visibility of test points, eliminating the need for test sample sectioning.

A colour touchscreen user interface simplifies the selection of test methods, test configuration and result output, minimizing the potential for operator error. The user interface also supports selection of the testing mode – from manual tests to user-defined automatic cyclic testing functions. User-defined testing functions provide the opportunity to define the number of tests as well as the interval between tests such that the time required for testing is held to a minimum.

An intuitive touchscreen allows operators to rapidly set up Rockwell hardness tests and review results. Results may also be retrieved via a serial port for further analysis and statistical reporting.

The introduction of a modern user interface that minimizes eye strain and enables operators to rapidly and intuitively review test results supports throughput and subsequently enhances ergonomics in the testing environment. The latter is essential because high volumes of testing often call for completion of repetitive tasks that, over the course of a manufacturing shift, can cause operator fatigue, which leads to sources of error. As error sources are minimized, accuracy in measurement increases and reliable test results may be achieved.

Measured values determined on the hardness tester can be transferred to testing software via a serial port for logging, data archiving and processing.

Source: industrialheating.com

INDUSTRY

Computers that power self-driving cars could be a huge driver of global carbon emissions

Source: Massachusetts Institute of Technology

Study shows that if autonomous vehicles are widely adopted, hardware efficiency will need to advance rapidly to keep computing-related emissions in check

A new model quantifies emissions that will be generated by computers on fully autonomous vehicles. If self-driving cars are widely adopted, their emissions will rival those generated by all the data centres in the world today. *Keeping emissions at or below those levels would require hardware efficiency to improve more rapidly than its current pace.*

In the future, the energy needed to run the powerful computers on board a global fleet of autonomous vehicles could generate as many greenhouse gas emissions as all the data centres in the world today. That is one key finding of a new study from MIT researchers that explored the potential energy consumption and related carbon emissions if autonomous vehicles are widely adopted.

The data centres that house the physical computing infrastructure used for running applications are widely known for their large carbon footprint: They currently account for about 0.3 percent of global greenhouse gas emissions, or about as much carbon as the country of Argentina produces annually, according to the International Energy Agency. Realizing that less attention has been paid to the potential footprint of autonomous vehicles, the MIT researchers built a statistical model to study the problem. They determined that 1 billion autonomous vehicles, each driving for one hour per day with a computer consuming 840 watts, would consume enough energy to generate about the same amount of emissions as data centres now do.

The researchers also found that in over 90 percent of modelled scenarios, to keep autonomous vehicle emissions from zooming past current data centre emissions, each vehicle must use less than 1.2 kilowatts of power for computing, which would require more efficient hardware. In one scenario -- where 95 percent of the global fleet of vehicles is autonomous in 2050, computational workloads double every three years, and the world continues to decarbonise at the current rate -- they found that hardware efficiency would need to double faster than every 1.1 years to keep emissions under those levels.

"If we just keep the business-as-usual trends in decarbonisation and the current rate of hardware efficiency improvements, it doesn't seem like it is going to be enough to constrain the emissions from computing on-board autonomous vehicles. This has the potential to become an enormous problem. But if we get ahead of it, we could design more efficient autonomous vehicles that have a

smaller carbon footprint from the start," says first author Soumya Sudhakar, a graduate student in aeronautics and astronautics. Her co-advisors on this research are Vivienne Sze, associate professor in the Department of Electrical Engineering and Computer Science (EECS) and a member of the Research Laboratory of Electronics (RLE); and Sertac Karaman, associate professor of aeronautics and astronautics and director of the Laboratory for Information and Decision Systems (LIDS). The research appears in the January-February issue of IEEE Micro.

Modelling emissions

The researchers built a framework to explore the operational emissions from computers on board a global fleet of electric vehicles that are fully autonomous, meaning they don't require a back-up human driver. The model is a function of the number of vehicles in the global fleet, the power of each computer on each vehicle, the hours driven by each vehicle, and the carbon intensity of the electricity powering each computer.

On its own, that looks like a deceptively simple equation. But each of those variables contains a lot of uncertainty because we are considering an emerging application that is not here yet. For instance, some research suggests that the amount of time driven in autonomous vehicles might increase because people can multitask while driving and the young and the elderly could drive more. But other research suggests that time spent driving might decrease because algorithms could find optimal routes that get people to their destinations faster. In addition to considering these uncertainties, the researchers also needed to model advanced computing hardware and software that doesn't exist yet.

To accomplish that, they modelled the workload of a popular algorithm for autonomous vehicles, known as a multitask-deep-neural-network because it can perform many tasks at once. They explored how much energy this deep neural network would consume if it were processing many high-resolution inputs from many cameras with high frame rates, simultaneously.

When they used the probabilistic model to explore different scenarios, *they were surprised by how quickly the algorithms' workload added up.* For example, if an autonomous vehicle has 10 deep neural networks processing images from 10 cameras, and that vehicle drives for one hour a day, it will make 21.6 million inferences each day. One billion vehicles would make 21.6 quadrillion inferences. To put that into perspective, all of Facebook's data centres worldwide make a few trillion inferences each day (1 quadrillion is 1,000 trillion).

"After seeing the results, this makes a lot of sense, but it is not something that is on a lot of people's radar. These vehicles could actually be using a ton of computer power. They have a 360-degree view of the world, so while we have two eyes, they may have 20 eyes, looking all over the place and trying to understand all the things that are happening at the same time," Karaman says.

Autonomous vehicles would be used for moving goods, as well as people, so there could be a massive amount of computing power distributed along global supply chains. And the research model only considers computing -- it doesn't take into account the energy consumed by vehicle sensors or the emissions generated during manufacturing.

Keeping emissions in check

To keep emissions from spiralling out of control, the researchers found that each autonomous vehicle needs to consume less than 1.2 kilowatts of energy for computing. For that to be possible, computing hardware must become more efficient at a significantly faster pace, doubling in efficiency about every 1.1 years.

One way to boost that efficiency could be to use more specialized hardware, which is designed to run specific driving algorithms. Because researchers know the navigation and perception tasks required for autonomous driving, it could be easier to design specialized hardware for those tasks, Sudhakar says. But vehicles tend to have 10- or 20-year lifespans, so one challenge in developing specialized hardware would be to "future-proof" it so it can run new algorithms.

In the future, researchers could also make the algorithms more efficient, so they would need less computing power. However, this is also challenging because trading off some accuracy for more efficiency could hamper vehicle safety.

Now that they have demonstrated this framework, the researchers want to continue exploring hardware efficiency and algorithm improvements. In addition, they say their model can be enhanced by characterizing embodied carbon from autonomous vehicles -- the carbon emissions generated when a car is manufactured -- and emissions from a vehicle's sensors.

While there are still many scenarios to explore, the researchers hope that this work sheds light on a potential problem people may not have considered. "We are hoping that people will think of emissions and carbon efficiency as important metrics to consider in their designs. The energy consumption of an autonomous vehicle is really critical, not just for extending the battery life, but also for sustainability," says Sze.

[This research was funded, in part, by the National Science Foundation and the MIT-Accenture Fellowship.]

Source: sciencedaily.com

INDUSTRY

Self-powered, printable smart sensors created from emerging semiconductors could mean cheaper, greener Internet of Things

Source: Simon Fraser University

Creating smart sensors to embed in our everyday objects and environments for the Internet of Things (IoT) would vastly improve daily life -- but requires trillions of such small devices. Simon Fraser University (Canada) professor Vincenzo Pecunia believes that emerging alternative semiconductors that are printable, low-cost and eco-friendly could lead the way to a cheaper and more sustainable IoT.

Leading a multinational team of top experts in various areas of printable electronics, Pecunia has identified key priorities and promising avenues for printable electronics to enable self-powered, eco-friendly smart sensors. His forward-looking insights are outlined in his paper published in Nature Electronics.

"Equipping everyday objects and environments with intelligence via smart sensors would allow us to make more informed decisions as we go about in our daily lives," says Pecunia. "Conventional semiconductor technologies require complex, energy-intensity, and expensive processing, but printable semiconductors can deliver electronics with a much lower carbon footprint and cost, since they can be processed by printing or coating, which require much lower energy and materials consumption."

Pecunia says making printable electronics that can work using energy harvested from the environment -- from ambient light or ubiquitous radiofrequency signals, for example -- could be the answer.

"Our analysis reveals that a key priority is to realize printable electronics with as small a material set as possible to streamline their fabrication process, thus ensuring the straightforward scale-up and low cost of the technology," says Pecunia.

His article outlines a vision of printed electronics that could also be powered by ubiquitous mobile signals through innovative low-power approaches -- essentially allowing smart sensors to charge out of thin air.

"Based on recent breakthroughs, we anticipate that printable semiconductors could play a key role in realizing the full sustainability potential of the IoT by delivering self-powered sensors for smart homes, smart buildings and smart cities, as well as for manufacturing and industry."

The research team has already achieved numerous breakthroughs towards self-powered printable smart sensors, demonstrating printed electronics with record-low power dissipation and the first-ever printable devices powered by ambient light via tiny printable solar cells. They focus on the development of innovative approaches to eco-friendly, printable solar cells and electronics for use in next-generation smart devices.

Pecunia notes that the semiconductor technologies being developed by his group could potentially allow the seamless integration of electronics, sensors, and energy harvesters at the touch of a 'print' button at single production sites -- *thereby reducing the carbon footprint, supply chain issues and energetic costs associated with long-distance transport in conventional electronics manufacturing*.

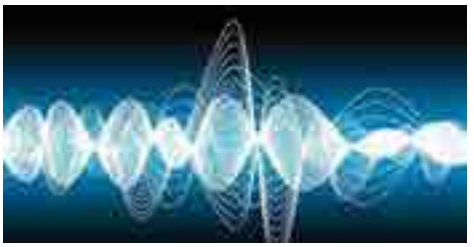
"Our hope is that these semiconductors will deliver eco-friendly technologies for a future of clean energy generation and sustainable living, which are key to achieving Canada's net-zero goal."

Source: sciencedaily.com

INDUSTRY

Blocking radio waves and electromagnetic interference with the flip of a switch

Source: Drexel University



Researchers in Drexel University's College of Engineering have developed a thin film device, fabricated by spray coating that can block electromagnetic radiation with the flip of a switch. The breakthrough, enabled by versatile two-dimensional materials called MXenes, could adjust the performance of electronic devices, strengthen wireless connections and secure mobile transmissions against intrusion.

The research team, led by Yury Gogotsi, PhD, Drexel's College of Engineering, had demonstrated that the two-dimensional layered MXene materials, found over a decade ago, when combined with an electrolyte solution, could be turned into a potent active shield against electro-magnetic waves. This latest discovery, reported in Nature Nanotechnology, shows how this shielding can be tuned when a small voltage -- less than that produced by an alkaline battery -- is applied.

"Dynamic control of electro-magnetic wave jamming has been a significant technological task for protecting electronic devices working at gigahertz frequencies and a variety of other transmission technologies. As the number of wireless devices being used in industrial and private sectors has increased vastly over the past decade, the urgency of this challenge has grown accordingly. This is why our discovery -- which would dynamically mitigate the effect of electromagnetic intrusion on these devices -- could have a broad impact", Gogotsi said.

MXene is a unique material in that it is highly conductive -- making it perfectly suited for reflecting microwave radiation that could cause static, feedback or diminish the performance of transmission devices -- but its internal chemical structure can also be temporarily altered to allow these electro-magnetic waves to pass through.

This means that a thin coating on a device or electrical components prevents them from both emitting electro-magnetic waves, and from being penetrated by those emitted by other electronics. Eliminating the possibility of interference from both internal and external sources can ensure the performance of the device, but some waves must be allowed to exit and enter when it is being used for communication.

"Without being able to control the ebb and flow of electro-magnetic waves within and around a device, it's a bit like a leaky faucet – the constant dripping is no good. Our shielding ensures that no electro-magnetic radiation is leaking out or getting in until we want to use the device" Gogotsi said.

The key to eliciting bi-directional tunability of MXene's shielding property is using the flow and expulsion of ions to alternately expand and compress the space between material's layers, like an accordion, as well as to change the surface chemistry of MXenes.

With a small voltage applied to the film, ions enter -- or intercalate -- between the MXene layers altering the charge of their surface and inducing electrostatic attraction, which serves to change the layer spacing, the conductivity and shielding efficiency of the material. When the ions are de-intercalated, as the current is switched off, the MXene layers return to their original state.

They tested 10 different MXene-electrolyte combinations, applying each via paint sprayer in a layer about 30 to 100 times thinner than a human hair. The materials consistently demonstrated the dynamic tunability of shielding efficiency in blocking microwave radiation, which is impossible for traditional metals like copper and steel. And the device sustained the performance through more than 500 charge-discharge cycles.

"These results indicate that the MXene films can convert from electro-magnetic interference shielding to quasi-electromagnetic wave transmission by electro-chemical oxidation of MXenes," Gogotsi and his co-authors wrote. "The MXene film can potentially serve as a dynamic EMI shielding switch."

For security applications, the MXene shielding could hide devices from detection by radar or other tracing systems. The team also tested the potential of a one-way shielding switch. This would allow a device to remain undetectable and protected from unauthorized access until it is deployed for use.

"A one-way switch could open the protection and allow a signal to be sent or communication to be opened in an emergency or at the required moment," Gogotsi said. "This means it could protect communications equipment from being influenced or tampered with until it is in use. For example, it could encase the device during transportation or storage and then activate only when it is ready to be used."

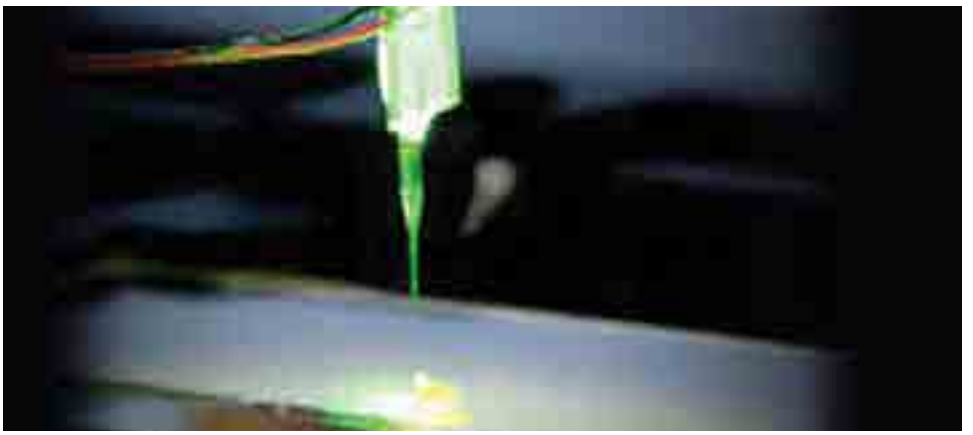
The next step is to explore additional MXene-electrolyte combinations and mechanisms to fine-tune the shielding to achieve a stronger modulation of electro-magnetic wave transmission and dynamic adjustment to block radiation at a variety of bandwidths.

Source: sciencedaily.com

INDUSTRY

A precision arm for miniature robots

Source: ETH Zurich



Until now, microscopic robotic systems have had to make do without arms. Now researchers have developed an ultrasonically actuated glass needle that can be attached to a robotic arm. This lets them pump and mix minuscule amounts of liquid and trap particles.

We are all familiar with robots equipped with moving arms. They stand in factory halls, perform mechanical work and can be programmed. A single robot can be used to carry out a variety of tasks.

Miniature systems that transport miniscule amounts of liquid through fine capillaries have had little association with such robots. Developed by researchers as an aid for laboratory analysis, such systems are known as microfluidics or lab-on-a-chip and generally make use of external pumps to move the liquid through the chips. To date, such systems have been difficult to automate, and the chips have had to be custom-designed and manufactured for each specific application.

Ultrasound needle oscillations

Scientists led by ETH Professor Daniel Ahmed are now combining conventional robotics and microfluidics. They have developed a device that uses ultrasound and can be attached to a robotic arm. It is suitable for performing a wide range of tasks in micro-robotic and micro-fluidic applications and can also be used to automate such applications. The scientists have reported on this development in *Nature Communications*.

The device comprises a thin, pointed glass needle and a piezoelectric transducer that causes the needle to oscillate. Similar transducers are used in loudspeakers, ultrasound imaging and professional dental cleaning equipment. The ETH researchers can vary the oscillation frequency of their glass needle. By dipping the needle into a liquid they create a three-dimensional pattern composed of multiple vortices. Since this pattern depends on the oscillation frequency, it can be controlled accordingly.

The researchers were able to use this to demonstrate several applications. First, they were able to mix tiny droplets of highly viscous liquids. "The more viscous liquids are, the more difficult it is to mix them," Professor Ahmed explains. "However, our method succeeds in doing this because it allows us to not only create a single vortex, but to also efficiently mix the liquids using a complex three-dimensional pattern composed of multiple strong vortices."

Second, the scientists were able to pump fluids through a mini-channel system by creating a specific pattern of vortices and placing the oscillating glass needle close to the channel wall.

Third, they succeeded in using their robot-assisted acoustic device to trap fine particles present in the fluid. This works because a particle's size determines its reaction to the sound waves. Relatively large particles move towards the oscillating glass needle, where they accumulate. The researchers demonstrated how this method can capture not only inanimate particles but also fish embryos. They believe it should also be capable of capturing biological cells in the fluid. "In the past, manipulating microscopic particles in three dimensions was always challenging. Our micro-robotic arm makes it easy," Ahmed says.

"Until now, advancements in large, conventional robotics and micro-fluidic applications have been made separately. Our work helps to bring the two approaches together. As a result, future microfluidic systems could be designed similarly to today's robotic systems. An appropriately programmed single device would be able to handle a variety of tasks. Mixing and pumping liquids and trapping particles -- we can do it all with one device," Ahmed says. This means tomorrow's microfluidic chips will no longer have to be custom-developed for each specific application. The researchers would next like to combine several glass needles to create even more complex vortex patterns in liquids.

In addition to laboratory analysis, Ahmed can envisage other applications for micro-robotic arms, such as sorting tiny objects. The arms could conceivably be used in biotechnology also as a way of introducing DNA into individual cells. It should ultimately be possible to employ them in additive manufacturing and 3D printing.

Source: sciencedaily.com

INDUSTRY

Feathered robotic wing paves way for flapping drones

Source: Lund University

Birds fly more efficiently by folding their wings during the upstroke, according to a recent study led by Lund University in Sweden. The results could mean that wing-folding is the next step in increasing the propulsive and aerodynamic efficiency of flapping drones.

Even the precursors to birds benefited from folding their wings during the upstroke, as they developed active flight. Among flying animals alive today, birds are the largest and most efficient. This makes them particularly interesting as inspiration for the development of drones. However, determining which flapping strategy is best requires aerodynamic studies of various ways of flapping the wings. Therefore, a Swedish-Swiss research team has constructed a robotic wing that can achieve just that -- flapping like a bird, and beyond.

"We have built a robot wing that can flap more like a bird than previous robots, but also flap in a way that birds cannot do. By measuring the performance of the wing in our wind tunnel, we have studied how different ways of achieving the wing upstroke affect force and energy in flight," says Christoffer Johansson, biology researcher at Lund University.

Previous studies have shown that birds flap their wings more horizontally when flying slowly. The new study shows that the birds probably do it, even though it requires more energy, because it is easier to create a sufficiently large forces to stay aloft and propel themselves. This is something drones can emulate to increase the range of speeds they can fly at.

The research explains why birds flap the way they do, by finding out which movement patterns create the most force and are the most efficient. The results can also be used in other research areas, such as better understanding how the migration of birds is affected by climate change and access to food. There are also many potential uses for drones where these insights can be put to good use. One area might be using drones to deliver goods.

"Flapping drones could be used for deliveries, but they would need to be efficient enough and able to lift the extra weight this entails. How the wings move is of great importance for performance, so this is where our research could come in handy," concludes Christoffer Johansson.

Source: sciencedaily.com

INDUSTRY

Next-generation wireless technology may leverage the human body for energy

Source: University of Massachusetts Amherst

Researchers use the body to harvest waste energy to power wearable devices

While you may be just starting to reap the advantages of 5G wireless technology, researchers throughout the world are already working hard on the future: 6G. One of the most promising breakthroughs in 6G telecommunications is the possibility of Visible Light Communication (VLC), which is like a wireless version of fiberoptics, using flashes of light to transmit information. Now, a team has announced that they have invented a low-cost, innovative way to harvest the waste energy from VLC by using the human body as an antenna. This waste energy can be recycled to power an array of wearable devices, or even, perhaps, larger electronics.

"VLC is quite simple and interesting," says Jie Xiong, professor of information and computer sciences at UMass Amherst and the paper's senior author. "Instead of using radio signals to send information wirelessly, it uses the light from LEDs that can turn on and off, up to one million times per second." Part of the appeal of VLC is that the infrastructure is already everywhere -- our homes, vehicles, streetlights and offices are all lit by LED bulbs, which could also be transmitting data. "Anything with a camera, like our smartphones, tablets or laptops, could be the receiver," says Xiong.

Previously, Xiong and first author Minhao Cui, a graduate student in information and computer sciences at UMass Amherst, showed that there's significant "leakage" of energy in VLC systems, because the LEDs also emit "side-channel RF signals," or radio waves. If this leaked RF energy could be harvested, then it could be put to use.

The team's first task was to design an antenna out of coiled copper wire to collect the leaked RF, which they did. But how to maximize the collection of energy? The team experimented with all sorts of design details, from the thickness of the wire to the number of times it was coiled, but they also noticed that the efficiency of the antenna varied according to what the antenna touched. They tried resting the coil on plastic, cardboard, wood and steel, as well as touching it to walls of different thicknesses, phones powered on and off and laptops. And then Cui got the idea to see what happened when the coil was in contact with a human body.

Immediately, it became apparent that a human body is the best medium for amplifying the coil's ability to collect leaked RF energy, up to ten times more than the bare coil alone.

After much experimentation, the team came up with "Bracelet+," a simple coil of copper wire worn as a bracelet on the upper forearm. While the design can be adapted for wearing as a ring, belt, anklet or necklace, the bracelet seemed to offer the right balance of power harvesting and wearability.

"The design is cheap -- less than fifty cents," note the authors, whose paper won the Best Paper Award from the Association for Computing Machinery's Conference on Embedded Networked Sensor Systems. "But Bracelet+ can reach up to micro-watts, enough to support many sensors such as on-body health monitoring sensors that require little power to work owing to their low sampling frequency and long sleep-mode duration."

"Ultimately," says Xiong, "we want to be able to harvest waste energy from all sorts of sources in order to power future technology."

Source: sciencedaily.com

INDUSTRY

Research team detects additive manufacturing defects in real-time

Source: University of Virginia School of Engineering and Applied Science

Machine learning approach helps hit 100% prediction rate

Researchers can now detect the formation of keyhole pores, one of the most challenging defects common in additive manufacturing, with incredible accuracy.

A research team led by Tao Sun, associate professor of materials science and engineering at the University of Virginia, has made new discoveries that can expand additive manufacturing in aerospace and other industries that rely on strong metal parts.

Their peer-reviewed paper was published on Jan. 6, 2023, in Science Magazine: "Machine learning aided real-time detection of keyhole pore generation in laser powder bed fusion." It addresses the issue of detecting the formation of keyhole pores, one of the major defects in a common additive manufacturing technique called Laser Powder Bed Fusion, or LPBF.

Introduced in the 1990s, LPBF uses metal powder and lasers to 3-D print metal parts. But porosity defects remain a challenge for fatigue-sensitive applications like aircraft wings. Some porosity is associated with deep and narrow vapour depressions which are the keyholes.

The formation and size of the keyhole is a function of laser power and scanning velocity, as well as the material's capacity to absorb laser energy. If the keyhole walls are stable, it enhances the surrounding material's laser absorption and improves laser manufacturing efficiency. If, however, the walls are wobbly or collapse, the material solidifies around the keyhole, trapping the air pocket inside the newly formed layer of material. This makes the material more brittle and more likely to crack under environmental stress.

Sun and his team, including materials science and engineering professor Anthony Rollett from Carnegie Mellon University and mechanical engineering professor Lianyi Chen from the University of Wisconsin-Madison, developed an approach to detect the exact moment when a keyhole pore forms during the printing process.

"By integrating operando synchrotron x-ray imaging, near-infrared imaging, and machine learning, our approach can capture the unique thermal signature associated with keyhole pore generation with sub-millisecond temporal resolution and 100% prediction rate," Sun said.

In developing their real-time keyhole detection method, the researchers also advanced the way a state-of-the-art tool -- operando synchrotron x-ray imaging -- can be used. Utilizing machine learning, they additionally discovered two modes of keyhole oscillation.

"Our findings not only advance additive manufacturing research, but they can also practically serve to expand the commercial use of LPBF for metal parts manufacturing," said Rollett, who is also the co-director of the Next Manufacturing Centre at CMU.

"Porosity in metal parts remains a major hurdle for wider adoption of LPBF technique in some industries. Keyhole porosity is the most challenging defect type when it comes to real-time detection using lab-scale sensors because it occurs stochastically beneath the surface," Sun said. "Our approach provides a viable solution for high-fidelity, high-resolution detection of keyhole pore generation that can be readily applied in many additive manufacturing scenarios."

Source: sciencedaily.com

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BUSINESS STRATEGY

A Guide to Setting Employee Goals

By **M Ramesh Kumar, TAB Certified Business Coach and Business Owner Advisory Boards Facilitator.**

In business, everyone should have job-related goals, from the front-line staff to those occupying the highest levels in the organization. In all cases, the more specific the goals (as opposed to abstract objectives like “boosting sales”), the more effective the process will be.

For employees, goals can often be separated into two broad categories:

Learning

This can entail anything that involves acquiring new skills through training programs or broadening the range of one’s duties, such as taking on a leadership role for a specific company initiative.

Performance

This type of goal more closely linked to an individual employee’s job responsibilities. Performance goals “might be set in terms of improvements to be made, actions to be taken, attributes to develop, and things to cut down on in the work process” to achieve higher workplace productivity. Goal-setting can be established as “an agreement between an employer and an employee” or as an employee’s personal commitment “to meet or exceed their own work targets and boost their chances for a promotion or pay raise.”

Specific employee goal-setting tips to keep in mind include:

Be sure there’s alignment

Every employee goal must be somehow aligned with the company’s broader vision and mission. Employees feel better about improving themselves and their performance if they can see how this effort fits into the organization’s growth and purpose.

Without aligned goals, employees might get tunnel vision, narrowing the scope of their focus to simply completely their day-to-day tasks and ending up feeling disconnected with overall business operations.

Make clear what’s in it for them

Of course, employees want to improve performance and feel more valued by the organization. But they are also motivated by the belief that career advancement within the company is a genuine possibility.

As part of the goal-setting process, look for ways to highlight how individual goals support the employee’s career advancement process. Conduct an in-depth conversation “about where the employee wants to be (in a year, in five years, etc.) and what added skills are needed to get them” so he or she can “contribute with greater enthusiasm” in the workplace.

Incorporate SMART goals for the best results

SMART goals (specific, measurable, attainable, relevant, time-bound) are popular among employers for a very good reason. They work! Within this framework, performance objectives are easily understood by everyone involved, thus avoiding confusion and a negative connotation with annual performance evaluations. They also clearly lay out what an employee can do to achieve his or her specific goals and how they serve the organization’s larger strategic plan.

Keep the process as flexible as possible

A goal enacted at the outset of the year might not prove so viable six months down the road. Market and industry conditions are always in flux, so “failing to revisit goals can be demotivating” to employees. Goals aren’t meant to be “moving targets, but rather” objectives that “should be adapted as the environment changes."

Monitor progress towards the goal

Goal setting shouldn’t be a “one-off” thing. Working together with employees, set specific goals early on, and then continue to monitor progress towards achieving those goals throughout the year. Schedule formal or informal meetings to assess where an individual stands with respect to these goals, and when it comes to feedback be kind, supportive, and clear about your take on the progress that’s being made. This type of close collaboration helps ensure that goals are eventual met.

Ramesh Kumar M is a TAB Certified Business Coach and Business Owner Advisory Boards Facilitator. He can be contacted for a Free 30 minutes Consultation on improving you Profitability and Cash Flow, through rameshkumar.m@thealternativeboard.in / whatsapp: 98450 71134.

HEALTH & FITNESS

Yoga for Fitness (YoFi)

YOGAMUDRASANA

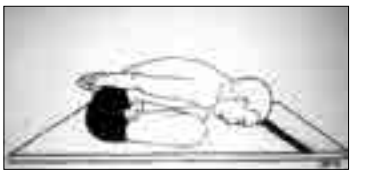
1. Sit in padmanasana and close the eyes
2. Relax the body for some time breathing normally.
3. Hold on wrist behind the back with the other hand inhale deeply.
4. While exhaling bend forward keeping the spine straight.
5. Bring the forehead to the floor as close as possible
6. Relax the whole body in the final position breathing slowly and deeply. Be aware of the pressure of the heels on the abdomen.
7. Stay in the final position for as long as is comfortable
8. Do not strain the back, ankles, knees or thighs by forcing the body into the posture
9. Slowly return to the starting position
10. Repeat the pose with legs cross the other way around.

Breathing

- Inhale slowly and deeply in the starting position
- Exhale while bending forward
- Breathe deeply and slowly in the final position
- Inhale while returning in the starting pose

Benefits

This is an excellent asana for massaging the abdominal organs and removing many ailments connected with this part of the body, including constipation and indigestion. It streaches the spine gently toning the spinal nerve



which emerges from the space between vertebrae, contributing to good general health. Yogamudrasana is used to awake the manipura chakra.

The Author, Mr.Bijudev is a Yoga Teacher of repute for the past 2 decades.
He is available for free consultation on
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HEALTH & FITNESS

Tips to Improve Your Health at Work

Avoid those snacks, take a walk during lunch, and clean that keyboard. You are on your way to a healthier workday. Eight hours in a chair in front of a computer, five or six days a week can take a toll on your body. From avoiding eye strain and tension neck syndrome to passing on those extra calories, the tips below will help you stay healthy and in shape at work.

1. Take regular breaks to get a breath of fresh air. Skip candies and snacks. If you are hungry, have fruit at your desk.
2. Drink an adequate amount of water -- eight to 10 glasses every day, to stay hydrated. The 3 o'clock lull that many people feel at work can be due to dehydration. Bring a half litre bottle of water to work and consume it by 2 hours of work. Refill and repeat thrice so that you drink about 2 litres by 5 p.m.
3. One of the most important things to de-stress and stay healthy and in shape is to exercise. So, walking during lunch is a great idea. And, if you can, make it a habit to take the stairs instead of the elevator.
4. Eat a healthy lunch at work, but also practice portion control so you aren't consuming too many calories and then sitting in a chair all afternoon.
5. Tension neck syndrome (TNS) can occur when the neck and upper shoulders are held in a fixed, awkward position for long periods of time. It can happen to people in the workplace who talk on the phone for a most of the day or type a lot. It can cause neck and shoulder pain, muscle tightness, and tenderness. So use a speakerphone, a shoulder cradle, or use a headset at work when you're on the phone."
6. Eyestrain is another problem that can be encountered in front of a computer. It can cause headaches, difficulty focusing, and increased sensitivity to light. To prevent eyestrain, the computer screen from your eyes should be an arm's length away. Simply increasing the font size on your computer can help/
7. Avoid burnouts from long stretches/ long days of work. Burnout can also impair a person's immune system, as well as interfere with sleep and their ability to concentrate. It is beneficial to get away for a long vacation that will help you recharge your 'batteries".
8. Your keyboard, mouse, and phone can harbour germs. So disinfect them periodically.

The most important way to stay healthy at work starts with self-awareness. Know your limits and do the best you can to stay within those limits. Get plenty of exercise, which helps you both physically and mentally, both at work and at home.

Source: webmd.com

ENVIRONMENT

Clean the Environment and Protect the Environment

By **K.Baskaran, Chairman, Industrial waste management association**

What is E-waste?

E-waste poses the huge risk to humans, animals, and the environment. E-waste typically consists of plastics, metals, cathode ray tubes (CRTs), printed cables, circuit boards, and so on. The valuable metals like copper, silver, gold, and platinum can be reused from e-wastes once they are scientifically processed. The presence of toxic substances like liquid crystal, lithium, mercury, nickel, selenium, polychlorinated biphenyls (PCBs), arsenic, barium, brominates flame retardants, cadmium, chrome, cobalt, copper, and lead makes it very hazardous, in case e-waste get dismantled and processed in a crude manner with the rudimentary techniques.

The computers, mainframes, servers, monitors, printers, scanners, compact discs (CDs), copiers, calculators, battery cells, cellular phones, fax machines, transceivers, TVs, medical apparatus, iPods, refrigerators, washing machines, and air conditioners are examples of e-waste when they become unfit for its use. The presence of highly toxic substances and heavy metals like mercury, lead, beryllium, and cadmium pose a significant threat to an environment even in minute quantities.

Electronic or Electrical Equipment becomes Unfit for the Intended use or if it has crossed its expiry date. Due to Rapid Technological Advancements and the production of newer electronic equipment, the old ones get easily replaced with new models. It has particularly led to an exponential increase in e-waste in India. People tend to switch to the newer models and trending technologies; also, the lives of products get reduced with time.

Initiatives such as Extended Producer Responsibility; Design for Environment; (3Rs) Reduce, Reuse, Recycle technology platform for linking the market facilitating the circular economy aim to encourage consumers to correctly dispose of the e-waste, with an increased reuse and recycling rates, and also adopt sustainable consumer habits.

In many developed countries, e-waste management is given high priority. In contrast, in developing countries, it is exacerbated by completely adopting or replicating developed countries' e-waste management and several related problems, including a lack of investment and technically skilled human resources. In addition, there is a lack of infrastructure and the absence of appropriate legislation, specifically dealing with e-waste. Also, there is an inadequate description of stakeholders' and institutions *'roles and responsibilities involved in e-waste management, etc.*

Waste Electronic and Electrical Equipment's convert into raw materials like Metals, Plastics, PCB's and Glass. This is how a Product **Waste becomes Raw Material**.

Disposing of E Waste in safe and secured manner very important. If E- Waste not disposed in proper way, E-waste can be **Toxic**, is Not **Biodegradable** and Accumulates in the Environment, in the **Soil, Air, Water and Living Things**.

Conclusion

E-waste management in India is a great challenge for governments of many developing countries. It is becoming a huge public health issue and is exponentially increasing by the day. It has to be collected separately, treated effectively, and disposed of e-waste. It is also a diversion from conventional landfills and open burning. It is essential to integrate an informal sector with the formal sector. That is why AIEMA has started CIlection Center at AIEMA Building along with Authorised Recycler Virogreen 9940831313 Weekly once he will take the E-Waste and give the form -6.

K.BASKARAN, CHAIRMAN
Industrial waste management association,IWMA,
www.iwma.in, 9444074727

HISTORY

வாழ்க வளத்துடன்

யாதும் ஊரே

யாவரும் கேளிர்..

திருத்தணி:
தமிழகத்தின் திருவள்ளூர் மாவட்டத்தில் உள்ள ஒரு வட்டத்தின் தலைமையிடம்.

பெயர்க்காரணம்:

தேவர்களுக்குத் தீராத துன்பம் கொடுத்து வந்த சூரபத்மனுடன் போர் புரிந்து தேவர்களின் துயரத்தை நீக்கி, வள்ளியை மணந்து கொள்ள வேடர்களுடன் விளையாட்டாகப் போர் புரிந்து,முருகப் பெருமான் கோபம் தணிந்து அமர்ந்ததால், இந்த ஊர் தணிகை எனப் பெயர் பெற்று பின் திருத்தணி எனப்பட்டது.

தேவர்கள் பயம் நீங்கிய இடம், முனிவர்கள் காம வெகுளி மயக்கங்களாகிய பகைகள் தணியும் இடம், அடியார்களின் துன்பம், கவலை, பிணி, வறுமை முதலியவற்றைத் தணிக்கும் இடமாதலாலும், திருத்தணி என பெயர் பெற்றது.

செருவை (கோபத்தை) தணித்த இடமாதலால் செருதணி என்பது மருவி திருத்தணியாகியது என்றும் சொல்லப் படுகிறது.

தணிகை என்னும் சொல்லுக்கு பொறுத்தல் (பொறை) என்பதும் ஒரு பொருளாதலின், 'அடியார்களின் பிழைகளையும் பாவங்களையும் பொறுத்து அருள் புரியும் தலம், திருத்தணிகை' என்று கொள்ளுதலும் பொருந்தும்.

சிறப்புகள்:

திருத்தணி சுப்ரமணியசாமி கோவில் 365 படிகள் கொண்டதாகும். நக்கீரரின் திருமுருகாற்றுப்படை போற்றும் அறுபடை வீடுகளில் ஐந்தாவது படை வீடாகும். அருணகிரிநாதரால் திருப்புகழ் பாடப்பெற்ற தலம். சங்கீத மும்மூரத்திகளில் ஒருவரான முத்துசாமி தீட்சதர் முருகன் அருள் பெற்று முதன் முதலில் 'ஓம் குரு குஹாய நமஹ' எனப் பாடியுள்ளார். வருடப்பிறப்பு அன்று திருப்புகழ் திருப்படி திருவிழாவும், ஆடிக் கிருத்திகை காவடித் திருவிழாவும் இங்கு சிறப்பு. மேலும் திருநாவுக்கரசு சுவாமிகளால் 'கழுநீர்க்குன்றம்' என பாடப்பெற்ற தேவார வைப்புத்தலமாகும். கச்சியப் பசிவாச்சாரியார், பாம்பன் சுவாமிகள் மற்றும் இராமலிங்க அடிகளார் ஆகியோரும் இம்முருகனை பாடியுள்ளனர்.

திருத்தணி (வீரட்டேசர், விஜயராகவ பெருமாள், ஆறுமுகசாமி), திருவாலங்காடு (வடாரண்யேஸ்வரர், இரத்தினசபை, தேவாரத்தலம்), பழையனூர் (அம்மையப்பர்) பாகசாலை (பாலசுப்ரமணியர், திருப்புகழ்த்தலம்), மணவூர் (நந்தீசர்), ஆற்காட்குப்பம் (சோழீசர்), நல்லாத்தூர் (ஆஞ்சநேயர்) நெமிலி (வைகுண்ட பெருமாள்) கோவில்கள் இப்பகுதியில் சிறப்பு.

சுப்பிரமணியசுவாமி கோவில், திருத்தணி

வடாரண்யேஸ்வரர் கோவில், திருவாலங்காடு.

******

கும்மிடிப்பூண்டி:
தமிழகத்தின் திருவள்ளூர் மாவட்டத்தில் உள்ள ஒரு வட்டத்தின் தலைமையிடம்.

பெயர்க்காரணம்:

கும்மிடிப்பூண்டி பேரூராட்சி ஆங்கிலேயர்கள் காலத்தில் குமரிகிரி பட்டிணமாக அமைத்து வந்து, நாளடைவில் கும்மிடிப்பூண்டி என்று பெயர் மருவி அழைக்கப்பட்டு வருகிறது.

சிறப்புகள்:

இவ்வூரில் உள்ள சந்திர சேகரேஸ்வரர் மற்றும் பாலீஸ்வரர் கோவில்கள் பல்லவர் காலத்தில் கட்டப்பட்டவை.

சந்திரசேகர் கோவில், கும்மிடிப்பூண்டி

புதுவாயல் (அகத்தீசர், விஜயராகவ பெருமாள்), அரியதுறை (வரமூர்த்தீசர்) கோவில்கள் சிறப்பு.

வரமூர்த்தீஸ்வரர் கோவில், அரியதுறை.

இப்பகுதியில் சென்னையின் குடிநீர் தேவைக்காக கண்ணன் கோட்டை தேர்வாய்கண்டிகை என்ற ஒரு புதிய நீர்த்தேக்கம் உருவாக்கப் பட்டுள்ளது.

கும்மிடிப்பூண்டி சிப்காட் தொழில் பூங்கா வளாகத்தில் 350க்கும் மேற்பட்ட தொழிற்சாலைகள் உள்ளன.

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Sundaram motors - CIN: U35923TN2017PTC119549 .

CAAIIUC Activities

continued from page 18...


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09. HDPE PIPE LAYING WORK CARRIED OUT IN SOUTH PHASE FROM SECTOR-3, 1ST STREET SEWAGE WELL TO THE WELL NEAR FLUIDTHERM IN 3RD MAIN ROAD.

10. REPLACEMENT OF SERVICED PUMP IN SEWAGE WELL @ 1ST CROSS MAIN ROAD NORTH PHASE SECTOR-3.

11. ZEBRA CROSSINGS CREATED FOR PEDESTRIANS IN THE JUNCTIONS OF ALL THE MAIN ROADS IN SOUTH & NORTH PHASE OF AMBATTUR INDUSTRIAL ESTATE.

12. IN 3RD MAIN ROAD NORTH PHASE FROM EB ROAD TO TELEPHONE EXCHANGE, THERMOPLASTIC PAINTING HAS BEEN DONE TO MARK PEDESTRIAN PATHWAY.


12

CAAIIUC Activities


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13. IN 2ND MAIN ROAD SOUTH PHASE FROM AMBIT JUNCTION TO WAVIN JUNCTION, THERMOPLASTIC PAINTING HAS BEEN DONE FOR ROAD MARKING.

14. CENTER MEDIAN WORK CARRIED OUT IN 1ST MAIN ROAD NEAR SOUTH AVENUE JUNCTION & EXTENSION WORK CARRIED OUT NEAR WABCO 3RD MAIN ROAD.

15. BOLLARDS INSTALLED ON PEDASTRIAN PATHWAY IN AAVIN DAIRY ROAD

16. OVERBURDEN REMOVED FROM VILLAGE ROAD NORTH PHASE SECTOR-1

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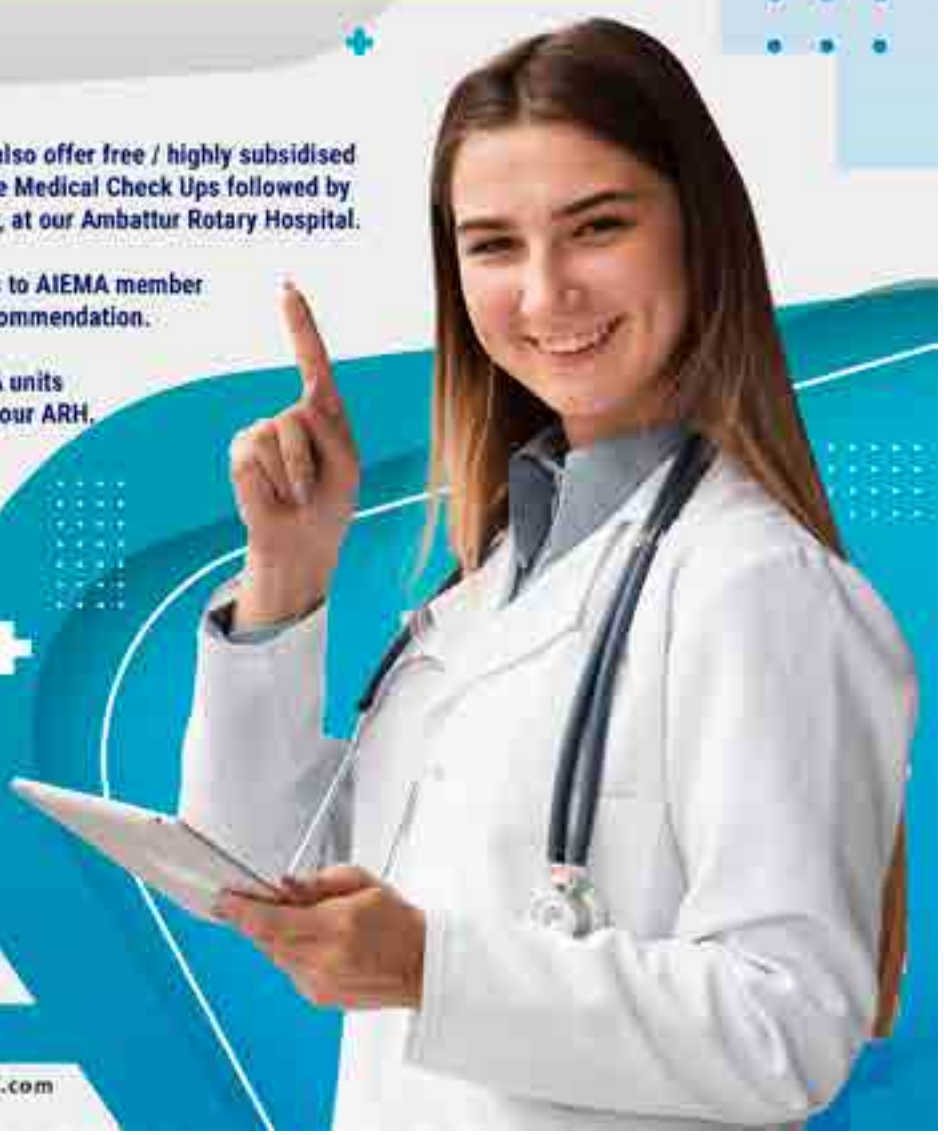

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AIEMA ROAD, AMBATTUR INDUSTRIAL ESTATE, CHENNAI - 600 058.

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