

50th

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Scientists at work at IndianOil's R&D Centre

Commanding the molecules.

directors' review (research & development)

Green is the new *mantra* for sustaining growth in this millennium. IndianOil, since its inception, has been a driver of adopting, developing and commercialising green technologies.

In the global recognition of our commitment and success of green technology initiatives, IndianOil was conferred with the prestigious World Petroleum Congress Award-2008 for its path-breaking R&D work in hydro-processing technologies. It made the year 2008-09, a great luminous landmark in the 50 year golden history of IndianOil.

Despite the upheavals in the global oil market this year, IndianOil's R&D Centre continued innovating with greater vigour and achieved significant advances in development, demonstration and licensing of novel refining and lubes technologies. For our scientists, each downturn is an opportunity and each upturn a challenge.

IndianOil INDMAX Technology chosen for setting up INDMAX RFCC unit of the 15 million tonne refinery at Paradip was reconfigured to make it more flexible. This novel technology has also evinced interest from oil companies abroad.

Continuing with our pursuit of developing Green technologies, we rolled out two new technologies, this year, **INDAdeptG & INDAdeptID** – Adsorbent based Processes, for deep desulphurisation of gasoline and diesel streams, respectively, meeting EURO-IV norms. Another breakthrough achievement of the year was successful development of 'IndVi' - a revolutionary high metal tolerant catalyst additive formulation, for FCC and RFCC.



Continuing innovation with greater vigour and better technology solutions.

This year, the prototype 'INDIPIG-12' was successfully field demonstrated for inspection of 500 km pipeline. Development of commercial 12" IPIG was also started. 'INDIPIG-14' - the prototype 14" IPIG tool was evaluated in the Delhi-Panipat section of Mathura-Jalandhar Pipeline.

To retain lubricant market leadership, IndianOil developed and released 186 product formulations for commercialisation, and received OEM/ Customer approvals for 47 formulations. The significant ones among them were M&M, Suzuki, Tata Motors, Volvo, Eicher, Honda Motors, Cummins, SAIL, Indian Railways and Defence. As a step forward, field trial clearance from leading marine engine OEMs such as MAN B&W (Germany) and SEMT Pielstick (France) were obtained for improved grades of *SERVO* marine oils for DG set applications.

During the year, we intensified research to reduce the carbon footprint of our products and operations. The first ever life cycle analysis of bio-diesel from *Jatropha* was conducted in collaboration with NREL, USA, with encouraging results. We also developed eco-friendly low PAH jute-batching oil. Recognitions for green efforts followed as IndianOil won the Golden Peacock Innovation Award for its eco-friendly agrospray oils, as well as the Petrofed Group Innovation Award for its novel low emission fuel additive.

During the year, IndianOil launched several research programmes in frontier technology areas of second-generation bio-fuels, renewable and alternative sources of clean fuels from bio and fossil



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sources. A MoU was signed with TERI University for advancing research in bio-fuels. Continuing with research in commercialising Hydrogen as fuel, IndianOil commissioned the first commercial H-CNG dispensing station at Delhi. Research was initiated on E-10 (10% blend of ethanol with gasoline) in association with the Society of Indian Automobile Manufacturers.

Seventeen (17) US/Indian patents were filed and ten (10) patents were granted during the year, taking our active portfolio of IP to 214 patents.

During 2008-09, there was 100% increase over the previous year, and we are poised to keep this pace in the years to come.

Collaborative R&D is our new fundamental for success. This year, we entered into research agreements with Criterion for novel catalyst development and evaluation; with BARC for tomography studies for Trickle Bed Reactor and acoustic emission testing; with Indian Institute of Science, Bangalore (Nano Tribology), for study of boundary lubrication in engine and metal working tribology; with Sud-Chemie for commercial production of metal passivation additive; with Delhi College of Engineering for development of parallel hybrid electric vehicle; and with EIL for licensing DHDS/DHDT technology, with TERI University, and IIT Madras for talent development.

With a sharp focus on emerging as a world-class technology company, IndianOil's R&D team has re-dedicated itself to greener innovations, and pledged to ensure continuous value addition to our products and processes, meeting and exceeding the aspirations of our customers.