

**Dr. Ajoy Kumar Das**

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***Sub: Application for the position advertised in Facultyplus.com***

I am excited to see this advertisement in Facultyplus.com, as my past work background is very similar to your requirement, as is detailed in the advertisement.

After post-graduation in Mechanical Engineering, I started my career as Aircraft Designer & after a brief period, switched to Automotive R&D & worked there for nearly 30 years. There I headed the R&D establishment both in Jamshedpur as well as in Ashok Leyland.

My inclination was always to design & develop new type of product & thus created several new designs, several of them were first of its kind in India, the details of which are elaborated in my CV. During my working in industry, several first of its kind was created by me, which are still performing in the market.

After completion of my Ph.D. in 1997, I was engaged as guest faculty & external examiner in National Institute of Technology, Jamshedpur for their undergraduate and post graduate mechanical engineering courses. I continued this for nearly 6 years. I joined in full time teaching in 2013, after leaving industry and since then worked as Professor.

My major contribution in teaching was:-

- Make students understand the purpose of learning the course, develop engagement and the focus on to help learners to access information, evaluate it critically, and use it to solve problems.
- To develop new curriculum and courses after benchmarking them with similar courses across the world. During working in MVN University, I established Automobile Engineering Department & formed the entire course structure. I also installed automobile labs & workshop there.
- In MVN University, while working as HOD, Mechanical Engineering, I was actively associated with UGC approval & prepared all departmental documents, presentation to UGC, academic curriculum etc. Taught graduate and post graduate students.
- Aligning the curriculum in line with industrial requirements. In most of the subjects I taught, practical application part was added. Here my past working experience in industry helped me in doing this.
- Along with teaching, I was managing the entire departmental functions & administration as HOD while working in MVN University.
- In BML Munjal University, I taught a course of Automobile engineering and Hybrid Vehicle Technology. I also established there several labs like, motorcycle & automobile lab, Material Science, Fluid Mechanics & Machinery labs. Here I had also guided students for various automobile projects to take part in national competitions. Under my guidance, Eco-Cart model won safest vehicle and third prize award. An operational model for All Terrain Vehicle was also made & demonstrated. I also guided students on various projects, which helped them immensely during placement interviews.
- In BML Munjal University, I formed the graduate curriculum structure. Guided faculties for better teaching, mentoring students to focus their attention for all round development etc.
- My research interest remained in automotive technology, non-conventional energy generation, robotics and mechatronics. I guided a group of final year under graduate students to develop a hybrid power plant model, suitable for implementation in desert like rural areas e.g. Rajasthan in India.

I look forward for hearing from you.

Thanking you,

Ajoy Kumar Das

Date: 24<sup>th</sup> October, 2018

## Dr Ajoy Kumar Das

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## Education

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- **Ph.D. Mechanical Engineering** 08/1990 – 01/1996  
Indian Institute of Technology, Kharagpur  
Finite element analysis of corner joint in framed structure: Analysis methodology proposed for finite element analysis of complex structure like commercial vehicle frame keeping model size small.
- **M.Tech, Mechanical Handling** 07/1976 – 06/1978  
Indian Institute of Technology, Kharagpur  
No overall grade awarded, only grade awarded on individual subjects  
Project: On Pneumatic transportation of mixed sized solids to study pressure distribution & power calculation.
- **B.E, Mechanical Engineering** 07/1970 – 05/1976  
Regional Engineering College (currently National Institute of Technology) Durgapur  
Received University Gold Medal for securing first class first position with 86.7% marks.  
Projects done:
  - Design of positive infinitely variable drive, suitable for implementation in light automobiles.
  - Design of a 2000 HP gear box for driving a cement kiln.
- **Higher Secondary** 03/1969  
Bihar Board of Secondary Education  
Secured First division with 66.1% marks.  
Subject: Science  
Active participant of scientific models fabrication. Organized science exhibition consecutively three times during school days.

## Work Experience

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### Academic experience

- **Professor, Mechanical Engineering** 05/2015 – 05/2018  
BML Munjal University, Haryana  
Teaching graduate students core mechanical engineering subjects. For details of subjects taught, refer cover letter.  
Prepared course content for core mechanical engineering subjects.  
Mentored students for project work, job placements and overall improvement.  
Installed Fluid mechanics, Material science and Automobile labs.  
Consultancy projects handled:
  - Design of a bio-gas generation unit for installation in rural area.
  - Design of a water ATM for implementation in rural areas.Guided project on hybrid power plant.  
Guided project for design & fabrication of Eco Cart, which won third prize in the All India competition.  
New academic program development: Developed complete course structure of Material Science, Fluid Mechanics, Automobile Engineering and Engineering Mechanics.
- **Professor & HOD Mechanical Engineering** 02/2014 – 05/2015  
MVN University, Palwal, Haryana  
Established Automobile Engineering Department.

Teaching graduate & post graduate students.

Handled departmental budget, project development, faculty development programme.

Prepared University Grant Commission (UGC) approval documents.

Completed academic curriculum formulation for Mechanical Engineering Department & presented to Board of Studies team.

- **Professor, Mechanical Engineering** 07/2013 – 02/2014  
Dronacharya College of Engineering, Farrukh Nagar, Haryana  
Guiding faculties & students for all round improvement.  
Teaching graduate level students.
- **Part time faculty** For 4 years starting 1998  
National Institute of Technology, Jamshedpur  
Teaching graduate post-graduate students.  
Serving as external examiner.

### Industrial R&D experience

- **Head, Design & Development** 02/2013 – 05/2013  
OK Play India Ltd  
This is an industry engaged in development & manufacture of plastic moulded (blow & roto-moulded) components like fuel tank, cab roof, console for agricultural tractors etc.
  - Installed new process to reduce rejection & scrap generation.
  - Installed new material testing equipment & processes
- **Vice President, R&D** 11/2011 – 06/2012  
SANY Heavy Industry India Ltd  
This is a multinational Fortune500 company, manufacturing concrete & earth moving machineries, having head quarter in China & branches worldwide.
  - Worked under guidance of CEO to improve market share, product portfolio enlargement.
  - Developed backhoe loader & obtained certification from ARAI, to compete in Indian market.
- **General Manager, Product Development** 11/2009 – 09/2011  
Ashok Leyland Ltd, Chennai  
This is the second largest commercial vehicle manufacturing unit in India.  
Undertook development of heavy & medium commercial vehicle models.
  - Created new series of rigid trucks, tractors & tipper models, which had resulted Ashok Leyland Ltd to improve its market share compared to Tata Motors Ltd.
  - Developed several exploratory products, like 37 tonner 10x4 truck, multi-axle truck with lift axle, which had improved market share by 40% till 2015.
  - Fuel efficient haulage tractor models was developed as an exploratory product. This model gave 21.6% fuel consumption improvement during testing.
  - Developed series of vehicles to meet Euro-III & Euro-IV norm.
  - Handled development budget, external consultancy programme etc.
- **Asst. General Manager, Engineering Research Centre** 03/1979 – 10/2009  
Tata Motors Ltd, Jamshedpur  
This is the largest commercial vehicle manufacturing unit in India.  
Worked as chief product development engineer in Engineering Research Centre, Jamshedpur & developed commercial vehicle chassis suitable for commercial & defence use.
  - Developed crash protection for a commercial vehicle fully built cab. Extensive finite element analysis & testing performed for this work.
  - Developed 2-axle (both 4x2 & 4x4 version) & multi-axle (MA) tippers. This MA tipper became India's top selling product.
  - Development of a short wheel base AC bus. Developed an innovative AC drive system because of space problem & received a patent.
  - Was in the core team for evaluation of feasibility for technology transfer with KAMAZ (Russia) for off highway vehicles and HUMVEE (US) for Army vehicles.

- **Aeronautical Engineer, Aircraft Design Bureau** 07/1978 – 02/1979  
Hindustan Aeronautics Limited, Bangalore  
Structural design & testing of trainer jet aircraft. Responsibility was to co-ordinate with various design groups for completeness of design, prototype making & subsequent testing.

## Membership of Professional Body

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Fellow of Institution of Engineers, India (Membership No. F-1229135).

## Languages & IT Knowledge

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- Bengali & Hindi: Native language
- English: Fluent
- German: Read & speak with difficulty
- Good knowledge on installation of Linux & Windows system, installation of dual boot system.
- Good knowledge on MS Word, Excel, Power point, Outlook etc.
- Good knowledge on FEM analysis software (ANSYS etc.)

## Invited Talks

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- Introduction to CFD using Open FOAM: A talk delivered in Jaypee University, Uttar Pradesh, India.
- Judged a Science & Technology Exhibition, organized by Raffles University, Rajasthan, India. Also delivered a lecture on “Challenges in higher education in India”.
- Delivered talk on “Science & Technology in Economic Development” in KIIT College of Engineering in Gurgaon on the occasion of Engineer’s day.

## Personal details

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- Marital status: Married
- Present address: House No.1021, First floor, Sector-31, Gurugram - 122001
- Permanent address: Saraju Bala Apartment, Bipin Pal Sarani, College Para, Siliguri – 734001
- Date of birth: 15<sup>th</sup> Jan, 1953

## Statement of Research: Dr Ajoy Das

Since I was working in industrial R&D section, publication of technical work was not allowed. Hence there is no formal publication for my research work done in industry. The brief highlight is detailed below:-

### Overview of Ph.D work:

Complex structures are commonly being used for automotive frame application. No close end analytical method is available to solve for stresses & deflection.

FEA is used for calculation of these parameters. However, accuracy of analysis depends upon use of higher order elements, smaller subdivision, thus requiring supercomputer facilities, which are expensive proposition.

A methodology was proposed to reduce such computing facility requirement & with this proposed method, a normal computer can be used for solving a very large structure. The new method proposed was to use mixed elements to model the structure, where model size was substantially reduced. A good match was observed by proposed FEM model actual test results.

### New Developments in commercial vehicle design:

Listed below are few major works done during working in Tata Motors Ltd and Ashok Leyland Ltd, both are commercial vehicle manufacturing company.

- **Meeting cab survival space norm to protect occupants for Tata Semi Forward Control cab, as per ARAI Standard AIS-029.** (picture of cab shown below)

The regulation specifies that the cab of the vehicle shall be so designed and so attached to the vehicle as to eliminate to the greatest possible extent the risk of injury to the occupants in the event of an accident. For testing the cab was subjected to impact loads of frontal load of 1500+/-250 Kg, top load of 10000 Kg & rear wall load of 200 Kg. The cab before modification did not met the regulation.

The finite element model for the cab was made & analysis was done under impact load & its deformation was compared with deformation/ damage noted for its structural parts, it's mounting & frame during actual impact test of the cab. Thereafter the strain energy in major structural components were checked from FEA results, which had gone large deformation during testing.

Thereafter design modification was done for cab mounting & other underbody parts so as to absorb this additional energy due to impact during front & top collision. The cab met the norm after all these modifications.



- **Introduction of rebound leaf in leaf spring**

In tipper, the failure of top leaf in a leaf spring is very critical as it locates the axles. The life of top leaf were observed to be low for tippers operating in mines. A rebound leaf was introduced above top leaf, which reduced the failure rate to a large extent.

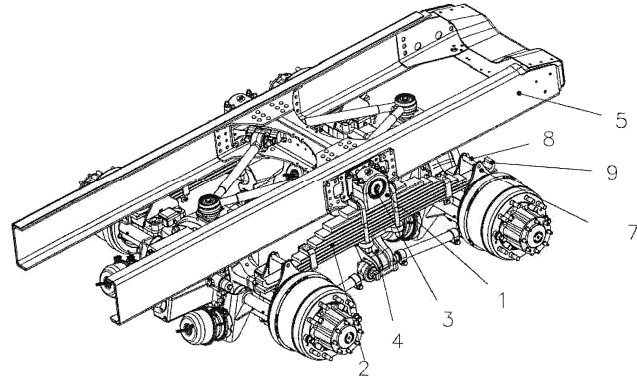
- **Design, testing & validation of lift axle for a highway truck.**

The design, prototype fabrication, testing & validation was done for a 37 tonne truck chassis with 10x2 and 10x4 configuration with 230HP CRDI engine. Such vehicle was first of its kind in India at the time of product launch.



- **Design & validation of a tipper bogie suspension.**

The main load bearing members were first analysed through finite element analysis & then the mounting bracket was first tested in test rig under dynamic load condition. Thereafter a sample were strain gauged at critical locations as observed through FEA & was assembled in a tipper chassis. Thereafter road-load data was collected by running this instrumented vehicle in different loading conditions like rated load, overload & severe overload in various mines, long highway route and rock mining applications. Thereafter a damage-correlation analysis was done to establish safe working load. The 25-tonner suspension was found to withstand up to 46.5 tonnes of load, which was safe for such operations. This was fitted on multi-axle tippers and the model is still a top selling model in India.



- **Fuel efficient truck:**

A 6x4 tractor was used to make this FE truck. The details of specification in brief is detailed below. The mileage prediction was done first using AVL-Cruise and thereafter the test prototype was built, which were tested with various combinations of the changes. The most effective modifications are listed with kmpl improvement figure.

Specification of powertrain used:

- Engine : 165 kW CRS Euro-3
- Gear box : ZF, 9S109
- Rear axle ratio : 6.83 (tandem axle with provision of lifting rearmost axle)

*The modifications done were:*

- Multiple data set in engine ECU.
- Selective Catalytic Reduction at exhaust
- Cruise control
- Lift & Twin speed rear axles (new development)
- Single wide base tires (new development)
- Driveline optimization
- Cooling system optimization
- Lubrication & additives
- Aerodynamic shape optimization

Tests done on a route: Total 307 km, which includes city, highway and hilly terrain roads.

**Actual kmpl improvement achieved: 21.79%**

## Overview of major work in academic field:

### Project Details

1. **Design of a biogas plant** for rural usage under Indian condition. This design was sent to the originator, a NGO and the prototype will be arranged by him.
2. **Design of a hybrid power plant** consisting of hydel & solar power plant suitable for implementation in rural India, where during daytime power will be supplied through solar cells and at night time power will be supplemented by hydel power generation. Since at night power requirement reduces, this scheme can be implemented where the water supply is less like Rajasthan (India).
3. **Worked on a water ATM project** using ozone water purification, suitable for implementation in rural India. In the second stage, proposal was made to couple this with a solar plant to make this self-supporting.
4. **Guiding students for Eco-Cart model** design & fabrication to build the prototype to participate in the competition. This involved selection of all aggregates, manufacturing of the model, testing the prototype.
5. **Guiding students for All Terrain Vehicle** design & prototype building.

### Major Learning

We had to collect data on the operation & raw material requirement for a family of four. The learning were about construction, daily running & maintenance of such plants.

The main learning of students was load balancing during day, when sunlight is available and night, when the load reduces. Also to take care of rainy seasons when sun rays were not available and hydel power generation takes the entire load.

The main learning is to use an alternate method to purify water where ill effects of RO system like water wastage, elimination of useful minerals etc. are eliminated

The model was awarded third prize in the competition & was declared as safest vehicle among other participants.

To configure the vehicle suitable for off-road operation, ensure proper safety of the passengers etc.