

Core Engineering Disciplines – Civil, Electrical & Mechanical

Current Challenges and Remedies

The traditional core engineering disciplines—Civil, Electrical, and Mechanical are losing their attractiveness among students. A major factor is the sharp salary disparity, with IT graduates starting at salaries three to four times higher. Although core engineering professionals tend to match IT counterparts in earnings after about five years of experience, the initial low pay deters students from pursuing these fields. IT companies regularly visit campuses, conducting interviews and offering high salary packages ranging from Rs 8 lakhs to Rs 15 lakhs per annum, while there is hardly any recruitment for core engineering streams. This stark difference creates a perception of limited opportunity in the core engineering sectors.

C.A. Prasad, Director, Metey Engineering Consultancy, and C. Shekar Reddy, National Vice Chairman, India Green Building Council (IGBC) and Managing Director, CSR Estates, Hyderabad, highlight the underlying causes behind the decline in interest, the challenges in education and employment, and propose remedies like updating the curricula, industry collaborations, skilling initiatives, and internship opportunities to attract a stronger pool of engineers for India's growing infrastructure demands.

Employment Opportunities in Core Engineering

Who employs Civil, Electrical, and Mechanical Engineers?

- Real Estate Developers
- Builders & Contractors
- Consultants

Salary Disparities: Core Engineering vs IT

- Core engineers: Starting salaries range from ₹10,000 to ₹20,000 per month.
- IT professionals: Starting salaries typically range from ₹50,000 to ₹75,000 or higher.

Why Salaries Remain Low in Core Engineering

Industry players argue that low operating margins and high risks limit their ability to offer competitive salaries. Many contractors underbid by 10% or more just to secure projects, often employing non-technical staff in place of qualified engineers. Reputed firms also employ only 10–20% engineers, with the rest being non-engineers handling technical tasks. Similarly, many Class 1 contractors also hire non-engineers. This practice stems from bidding at the lowest possible tender values and being unable to afford qualified engineers. This practice, though against contract rules, persists widely. "But how long can we continue in this situation?"

Admission into Engineering Colleges

Many students opt for civil engineering without genuine interest, often because they could not secure admission into IT-related courses. As a result:

- Students show limited engagement in learning.
- Colleges pass students regardless, to maintain reputation and avoid high failure rates.

Curriculum Gaps

Current civil engineering curricula lack practical exposure to modern industry practices such as:

- Precast and Prefab Engineering (Structural Steel)
- Formwork Systems

- Advanced Construction Technologies (e.g., Monolithic/Mivan, Composite Construction, LGS Technology)

Since many teachers themselves are not updated on these technologies, graduates emerge with limited industry relevance. To bridge this gap, efforts are underway to introduce these subjects in colleges, with industry professionals (including the author) teaching specialized courses such as Precast and Formwork in select institutions.

Urban Infrastructure Challenges

Persistent civic issues, such as inefficient drainage systems, frequent traffic congestion, and inadequate water supply, highlight the urgent need for competent civil, electrical, and mechanical engineers. However, the situation within government engineering departments reveals several concerns.

Many engineers do not update themselves with the latest technologies and show little interest in improving their knowledge. Once they are in the comfort zone of receiving a regular salary, whether they work effectively or not, they stop making efforts to upgrade their skills. As a result, they rarely attend workshops or seminars conducted by professionals, which are intended to help them stay current and improve.

Within the system, there are always a few good engineers who work hard and strive to deliver quality. Yet, they are heavily overburdened, as nearly 20% of efficient engineers end up carrying the workload of the remaining 80% who are either inefficient or not committed. Consequently, the system continues to move forward but without real pace or quality improvement, and this directly reflects in the poor state of civic infrastructure across cities.

Consultants to the Rescue

There are consultants who provide good reports with recommendations for improvement. However, the government often does not implement them immediately due to financial constraints faced by state governments. As a result, the consultant's report is usually implemented only after two or three years. By that time, the system demands have already increased, but the implementation is still carried out based on the old report, which makes it ineffective.

Demand for Core Subject Engineers at Present

The Government of India has undertaken several large-scale initiatives such as:

- Modernization of railway stations across India with annual budgets of ₹1 lakh crore.
- Construction of new airports.
- Expansion of highways across the country.
- Development of metro routes in multiple cities.

The country urgently needs engineers to meet these demands. While the salary structure may be low in the initial years, it has been observed that after about three years of experience, engineers working in these fields often earn more than their counterparts in the IT sector.

Industry Internships for Final-Year Students

In the fourth year, first semester, colleges need to introduce subjects related to construction industry specializations. After completing these subjects, students may join respective organizations in the industry to undertake their project work during the fourth year, second semester. This would allow them to be trained throughout the entire semester and, in many cases, secure a job offer from the same organization.

Specialisation Fields in Civil Engineering and their Demand

S. No	Specialisation	Demand
1	Structural Engineering	Construction Industry (Tall Buildings, Bridges, etc.,)
2	Geotechnical Engineering	Specialised field required for all types of constructions
3	Transportation engineering includes Railways, airports, etc.,	Infrastructure Engineering demand
4	Environmental Engineering	Water supply, drainage and STP's require Engineers
5	Water resources Engineering	Irrigation, Construction of dams, Maintenance of built environment
6	Construction management	PMC consultancies have huge requirements
7	Marine Engineering,	The global demand for marine engineers is currently strong and projected to grow in the coming years, particularly due to increasing maritime trade and the development of offshore energy projects
8	Tunnel and under Ground Engineering	Infrastructure requirement (Highways and Metro's)

Like the above, other core groups such as Electrical and Mechanical branches can also have specialized subjects aligned with industry demands.

Bridging the Skills Gap

There is a strong need to focus on the capacity building of engineering graduates so that they are equipped to meet present-day industry demands. As the country undertakes large-scale infrastructure development, it requires a steady supply of well-trained and competent engineers.

Consulting organizations, construction companies, builders, and developers should actively engage B.Tech fourth-year, second-semester students for internships and industry-based training. Such structured exposure will enhance their practical knowledge, bridge the gap between academia and industry requirements, and ensure they are industry-ready when they get full-time employment.

Civil, Electrical, and Mechanical engineers are indispensable for nation-building. Addressing salary disparities, updating curricula, providing meaningful internships, and fostering industry-academia collaboration are crucial to revitalizing interest in these core disciplines. With India's ambitious infrastructure development plans, there is an urgent need to produce skilled, motivated engineers who can meet these challenges effectively.