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Distance engineering: New trends in structural engineering

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There is an ever-growing trend set by a number of multinational companies in the consulting business to hire engineers in India for projects elsewhere in the world. Improved communication systems and advanced techniques of interaction have made this trend possible! This write-up looks into various aspects of distance engineering, and issues related to adopting such systems of working. It does not necessarily advocate the use of "distance engineering" as the only mode of operation, but looks into the feasibility and operational aspects of using such systems of working.

There is a long history of Indian students aspiring to go abroad for higher education. Many of these students have subsequently taken up jobs in the respective countries where they undertook courses at higher levels of education. This was mainly because of the lack of jobs in India, that would be commensurate with their level of education, and could fetch them sufficient monetary returns to compensate for their expenses in obtaining higher education.

This trend was then followed by a large number of companies in the middle-east hiring qualified engineers from India in view of the shortage of qualified engineers within their home countries.

Later on, in the early 1990s, after development of better communication systems like e-mails, and the internet, large software companies set up big business centres providing software engineering services to cater to the large demand in the software development field in the US and the UK. This trend was quickly picked up by the core engineering sector as well, including the manufacturing/engineering/piping and structural engineering.

Remote offices

India has been tapped as one of the biggest markets for development of "remote offices" for the following reasons.

- Dearth of qualified engineers in other countries
- Ample availability of well qualified engineers in India
- Lower cost of man power in India
- Lower cost of other resources like space, engineering software, electricity etc.
- Advantage of time difference
- Willingness to work long hours to meet dead lines
- No language problems, since a large population can comfortably manage speaking, reading and writing English

Advantages to Indian industry

The trend of large multinational companies establishing offices in India started off with a number of companies fetching local partners and developing joint ventures. This automatically required local partners to meet international norms and follow international standards of practice. The result was that a large number of engineering companies opted for ISO certification so that they could ensure competence at international level.

In case of number of government projects that were funded internationally, foreign funding organisations stipulated quality standards and practices to be followed on projects in order to ensure proper utilisation of funds. Involvement of foreign consulting companies was made mandatory on a number of projects by such foreign funding bodies.

This has led to a general growth in the awareness of quality systems and has exposed the Indian industry, consulting engineers also in particular, to international standards and has raised the remuneration of engineers to some respectable levels.

Issues related to working remotely

There are a number of problems normally encountered by "remote offices" while do-

ing outsourced work. These include the following:

(i) incomplete or incorrect project information delivered to the remote office

(ii) Inexperience of local staff to the use of international codes and practices

(iii) Difficulty of visualising problems at site

(iv) No direct communication with project site

(v) No site visits leading to lack of understanding of practical aspects of construction

(vi) Lack of development of vision for the works at site

(vii) Local offices tend to keep time schedules very tight making timely delivery of drawings much more difficult.

These problems could be overcome in the following manner.

(i) Establishing a foolproof co-ordination system with clear understanding of project parameters at the beginning of the project with a one-to-one correspondence between project managers in both the "local office" and the "remote office". Scheduled dialogue between the two offices involving all the concerned staff. This could be well accompanied by transfer of site pictures at various stages of construction at regular intervals. It would be good to send remote staff on short term visits at critical juncture during the progress of works at site.

(ii) Organising regular training programmes for learning various softwares, usage of important aspects of codes or practices followed in detailing of structures.

(iii) Junior staff should be trained. They could be sent for local site visits on projects similar to the ones they are working upon. This will help them build up visualisation and understand practical site problems.

(iv) Without any direct communication with site, there could be lapses or there could be situations where the site works are ahead of the design office. This poses immense problems and the project manager local office should focus priorities keeping in mind the progress of works at site and should update the remote office of the same.

(v) As in *(iii)* above.

(vi) As in *(iii)* above.

(vii) Before the remote offices accept work, time schedules could be mutually agreed upon between the two offices, and if necessary additional resources could be allocated for timely completion of work. These should be reviewed at all times during the progress of works.

The "local" project offices also face a number of problems while getting the work done through remote offices. These are:

(i) lack of control on progress of design and detailing works

(ii) lack of commitment on the behalf of remote offices

(iii) tendency to produce more conservative design leading to increase in project costs

(iv) inconsistency or substandard quality of work produced by remote offices.

Almost all of the above problems could be sorted out by complete and clear understanding of project parameters and clear definition of project roles. The project manager could get a regular update on the progress of drawings scheduled for issue everyday, and any change could be noted and communicated to the site and re-planning could be done if necessary. In order to avert any sub-standard/ inconsistency in the quality of work, there should be sufficient training for new staff at regular intervals. It is extremely helpful to have regular project team meetings and discuss problems faced frankly so that they could be tackled before reaching any crisis. It should be noted that mistakes committed should be discussed in details and should be taken as a learning lesson for all within the project team. A comprehensive check list could be prepared to ensure everyone in the team knows the correct project parameters. These check lists could be developed further to eradicate any problem or mistake committed during the progress of the project.

Areas in structural engineering

In relation to structural engineering, there are principally two segments in which outsourcing could be undertaken:

(i) design and detailing services

(ii) detailing services

There are companies in India offering the above mentioned services.

Requirements for effectively carrying out work are given below.

(i) Core group of people in the remote office who could effectively manage setting up team for carrying out the work as per requirements with basic know-how of practices of the local office is essential

(ii) Effective and fool-proof communication system should exist between the two offices

(iii) Establishing complete and clear understanding of the role between the offices is vital

(iv) A well-rounded experienced project manager in the local office who could liaise with the client/ contractor and the remote office at all times keeping track of construction progress and a control on the progress of design and detailing in the remote office should be present

(v) Administrating quality control through comprehensive multi-level checking regime is required.

Mode of operation

The manner in which such companies are setup and the way they function are generally as under.

- A company called ABC Limited based in the USA or the UK or elsewhere starts an office in Mumbai in the name of ABC (India) Limited.
- After setting up office to suit their requirements and standards, they send work to the office in Mumbai.
- The entire design and detailing work is done in the remote office in Mumbai, which gets reviewed in the remote office itself as per the standard quality assurance systems, and completed set of design calcula-

tions and drawings are sent back to the local offices for approval.

- It has been observed that there is always an issue with the certification of design and drawings which has to be done by a certifying authority, which the company either heirs locally or the reviewer in the local office signs-off the drawings and the design and drawings are issued for construction.

Risks involved

Despite incorporating very extensive quality control procedures, mistakes could still happen. These could be due to non-implementation of quality procedures on the behalf of staff, or reluctance to adopt such procedures and short circuit the procedures to speed-up production. It is therefore suggested that neither the remote office nor the local office should skip any quality procedures. Quality procedures could be updated to meet established standards at all times.

A "risk management" regime should be available in case there is failure in production or otherwise, through mutual agreement between offices. All possible risks involved could be listed and solution for every such anticipated risk should be worked out through mutual understanding.

Generally, risks like power failure, malfunctioning of communication system, computer/local area network (LAN) system failure, miscommunication of data, totally incorrect designs could be encountered. It would be better to have a crisis-management regime in place and working before any such thing happens so that the team is focused on solving the problem immediately. In case of any problem, rather than asking "who", it would be better to answer the "why" and "what", so that the answer to "how" could be quickly arrived at!

Conclusion

The present trends indicate that many more companies could be venturing into India to outsource work. Indian engineers should see this as a major challenge and be prepared for it in advance. This would also mean that the education system needs a bit of revamping to international standards so that Indian engineers could very easily get ready for a better and a more challenging future ahead!

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