

## **Research at the Chair in Construction Engineering and Management**

Research at the Chair for Construction Engineering and Management focuses on the fields described below. The aim is to perform applied research which can serve as basis for improved performance in the South African construction industry. This is accomplished by improvement in various aspects of the industry, ranging from skills development, risk management, identification of hurdles and shortcomings, through to management of large projects.

### ***Modular Construction***

Pre-fabrication in construction has the advantage of faster delivery of large projects, improved construction quality in certain aspects, and potentially improved construction safety. In South Africa relatively little use is made of pre-fabrication in construction projects. Although the concept may be well developed and applied for structural steelwork application, not many construction projects in reinforced concrete are carried out using pre-fabrication.

Investigations identified that, although several projects in South Africa have successfully made use of prefabrication, several others have been less successful. This identified a general shortcoming in management capabilities, quality of workmanship and lack of skills, all items which need extensive attention to improve the efficiency of the construction industry as a whole.

### ***Infrastructure asset management***

Municipal and national infrastructure needs careful coordinated planning, implementation and maintenance. Although infrastructure management procedures have been well developed and documented, these are not necessarily applicable to the local industry. South Africa has a shortage of infrastructure financing, but also of managerial skills to implement provision of infrastructure and to maintain existing systems.

New models are required through which the necessary skills can be developed through accelerated learning processes. Creative solutions are required to involve the community in infrastructure maintenance, and national support is required in the form of knowledge centres.

Research is directed to address these items in the South African context. Lessons learned in South Africa will be applicable to other developing countries, and is an essential stepping stone towards economic growth in developing countries.

The Construction Management Program (CMP) is well positioned to develop managerial skills at middle management level to enable a more effective management and procurement of infrastructure in South Africa.

### ***Risk Management***

All projects are subject to risks, and these can range from risks for the client, consultant and contractor.

Often risks are created by one project participant, which have an influence on the risks experienced by other project participants. Although risk management procedures have been developed and are widely used, these are often seen from the perspective of individual project participants. Information is required on risks experienced by different project participants in the South African context, and procedures need to be developed which will enable collaborative risk management on projects.

Development of risk management practices also has the benefit of allowing project participants to think creatively about the project. This thinking process is one of the essential skills which need to be developed, and which was identified as one of the principle outcomes expected from a program in Construction Engineering and Management.

### ***Design Management***

Normally, each party (designer and contractor) have their own priorities for project concept and details, based on their perspective, experience and contractual position. This leads to projects which cost more than what they should, wasting valuable finances and time. Ideally, a dedicated design management process is needed (not only on large projects) which can drive the design process, by taking into account construction requirements, preferences, experience and knowledge.

Procedures to direct this process need to be identified and defined. Information which is of practical use for designers need to be documented in such a way that constructability can be incorporated along specific guidelines during the design process.

### ***Large projects***

Large projects often have a tendency to exceed the anticipated project cost and duration. This may be related to a variety of factors, which may include the experience of project participants in making cost estimates by not allowing for all the different aspects of the project, it may include a project scope which is beyond the experience of the planners, it may also be related to scope changes and economical conditions. Several others factors play a role in possible cost and time overruns.

The research aims to investigate these factors with the aim of improvement of project delivery.