5.8 Design on the basis of testing

While it is possible to design many cold formed steel members on the basis of analysis, the very large variety of shapes that can be formed and the complex interactions that occur make it frequently uneconomical to design members and systems completely on theoretical basis. The behaviour of a component or system can often be ascertained economically by a test and suitable modifications incorporated, where necessary.

Particular care should be taken while testing components, that the tests model the actual loading conditions as closely as possible. For example, while these tests may be used successfully to assess the material work hardening much caution will be needed when examining the effects of local buckling. There is a possibility of these tests giving misleading information or even no information regarding neutral axis movement. The specimen lengths may be too short to pick up certain types of buckling behaviour.

Testing is probably the only realistic method of assessing the strength and characteristics of connections. Evaluating connection behaviour is important as connections play a crucial role in the strength and stiffness of a structure.

In testing complete structures or assemblies, it is vital to ensure that the test set up reflects the in-service conditions as accurately as possible. The method of load application, the type of supports, the restraints from adjacent structures and the flexibility of connections are all factors to be considered carefully and modeled accurately.

Testing by an independent agency (such as Universities) is widely used by manufacturers of mass produced components to ensure consistency of quality. The manufacturers also provide load/span tables for their products, which can be employed by structural designers and architects who do not have detailed knowledge of design procedures. An advantage to the manufacturers in designing on the basis of proof testing is that the load/span tables obtained are generally more advantageous than those obtained by analytical methods; they also reassure the customers about the validity of their load/span tables.