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Comparison of structural behavior of existing cold-formed steel purlin sections used in Sri Lanka

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Until recently, the hot-rolled steel members have been recognized as the most popular and widely used steel group, but in recent times, the use of cold-formed high strength steel members has rapidly increased. The cold formed steel sections which made out of thin-gauge high strength steel have been found as an ideal solution to replace the stocky hot-rolled steel sections used in simple light steel structures. The application of such cold formed steel sections in the light steel structures give many advantages over the conventional hot-rolled steel sections such as; cost effective, easy handling, easy forming to various section shapes, light weight. Structural behavior of these light gauge high strength cold-formed steel members characterized by various buckling modes has not been fully understood yet. The existing cold-formed steel sections such as C- and Z-sections are commonly used because of their simple forming procedures and easy connections, but they suffer from certain buckling modes. It is therefore important that these buckling modes are either delayed or eliminated to increase the ultimate capacity of these members. Therefore this research was undertaken to study the flexural behavior of existing coldformed steel purlin sections and thereby suggest most economical and structurally viable coldformed steel section to be used as purlins. The structural analysis software SAP 2000 was used to model the different shape of purlin sections. The accuracy of computer model was tested using a set of laboratory experiments conducted at the building engineering laboratory with results reaching an 80-89% go with in the yielding capacity to what predicted in the SAP model indicating the models can be accepted, with the consideration of practical difficulties in building a physical model which is close to the computer model. Out of the common sections modeled with fixed unit weight per length, C section held the highest capacity.

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