VIROTE TRIEMCHEROENPORN : OPTIMUM PLASTIC DESIGN OF STEEL RIGID FRAMES. THESIS ADVISOR : PROF. THAKSIN THEPCHATRI, Ph.D. 102 PP.

A fortran program for optimum plastic design of unbraced steel rigid frames of arbitrary configuration has been developed in this research work. Both fixed and simple supports can be taken into consideration. The kinematic approach with automatic generation of independent mechanisms together with the principle of virtual displacement was used to determine equilibrium equations for the structural system. Assuming a linear relationship between the plastic moment capacity and the weight per unit length, the method can be formulated as a linear programming problem. The solution yields a minimum objective function, $\Sigma M_p L$, subjected to equilibrium condition constraints and plastic moment condition constraints. Following the AISC specifications, member sizes are obtained taking into account the effects of axial forces, shear forces, local buckling, in-plane and out-of-plane buckling.

It was found that about 0-8% savings in the objective function can be obtained when all secondary effects are included in the constraints. Moreover, when several loading conditions are simultaneously considered, the method will yield about 10-18% savings in the objective function. Finally, when compared with the conventional plastic design, savings of about 10-20% in the objective function can be obtained.