1. SUMMARY

The ability to compute the torque and thrust developed using drills of different sizes with varying feed rates without having to perform drilling tests can simplify problems encountered with usage of drilling machines of known power capabilities, i.e. the limits of operation could be established. The knowledge of these parameters before hand could also lead to simplification of problems involved with the design of new drilling machines for particular applications. The values of torque and thrust developed determines the limits under which the drill can be operated satisfactorily.

The torque and thrust developed in drilling mild steel with standard drills of diameters 6.35 mm-19.05 mm and at feed rates between .102 mm/rev and .305 mm/rev were measured using a direct reaction type drilling dynamometer. Three tests were performed for each combination of feed and drill diameter and the average values of torque and thrust computed in each case.

The parameters affecting drill torque and thrust were investigated and relationships established theoretically, by considering similarity between cutting action of drill and other cutting processes, to predict these values. The values of torque and thrust measured experimentally were used to test these theoretical predictions which were found to be approximately valid for the tests conducted.

The results were similar to those obtained earlier by M.C. Shaw and J.R. Oxford Jr. The main relationships derived are summarised below.

(a) $$U = \frac{0.26\ H_B}{(Fd)^{0.2}}$$

(b) $$M = 0.41\ H_B F^{0.83}\ d^{1.79}$$

(c) $$T/d^2 H_B = 0.062 F^{0.8}/d^{1.2} + 0.0016$$