I. TURNING (SINGLE-POINT)

A. CUTTING SPEED (SURFACE FEET PER MINUTE)
   \( S.F.M. = \frac{R.P.M. \times \text{CUT \( \phi \)}}{3.82} \quad \text{OR} \quad S.F.M. = R.P.M. \times \text{CUT \( \phi \)} \times 0.262 \)

B. REVOLUTIONS PER MINUTE
   \( R.P.M. = \frac{S.F.M. \times 3.82}{\text{CUT \( \phi \)}} \quad \text{OR} \quad R.P.M. = \frac{S.F.M.}{\text{CUT \( \phi \)}} \times 0.262 \)

C. FEED RATE (INCHES PER MINUTE)
   \( I.P.M. = I.P.R. \times R.P.M. \)

D. MATERIAL REMOVAL RATE (CUBIC INCHES PER MINUTE)
   \( \text{IN}^3/\text{MIN} = \text{D.O.C.} \times \text{FEED/REV.} \times S.F.M. \times 12 \)

E. SURFACE FINISH (Ra, µin)
   \( Ra = \left( \frac{(\text{FEED RATE}^2)}{8 \times \text{TOOL NOSE RADIUS}} \right) \times 317500 \)

F. SURFACE FINISH (RMS, µin)
   \( \text{RMS} = Ra \times 1.11 \)

G. CUTTING TIME (t)
   \( t = \frac{\text{L.O.C. (IN)}}{\text{FEED RATE (IN/MIN)}} \)

H. HORSEPOWER REQUIRED AT MACHINE SPINDLE MOTOR (\( HP_m \))
   \( HP_m = \frac{(M.R.R. \times \text{IN}^3/\text{MIN} \times \text{MAT’L POWER CONSTANT})}{\text{SPINDLE DRIVE EFFICIENCY} \times 100} \)

II. MILLING

A. CUTTING SPEED (SURFACE FEET PER MINUTE)
   \( S.F.M. = \frac{R.P.M. \times \text{CUTTER \( \phi \)}}{3.82} \quad \text{OR} \quad S.F.M. = R.P.M. \times \text{CUTTER \( \phi \)} \times 0.262 \)

B. REVOLUTIONS PER MINUTE
   \( R.P.M. = \frac{S.F.M. \times 3.82}{\text{CUTTER \( \phi \)}} \quad \text{OR} \quad R.P.M. = \frac{S.F.M.}{\text{CUTTER \( \phi \)}} \times 0.262 \)

C. MATERIAL REMOVAL RATE (CUBIC INCHES PER MINUTE)
   \( \text{IN}^3/\text{MIN} = \text{D.O.C.} \times \text{W.O.C.} \times \text{FEED (IN/MIN)} \)

D. CHIP LOAD (FEED PER TOOTH)
   \( \text{F.P.T.} = \frac{I.P.R.}{\# \text{TEETH}} \quad \text{OR} \quad I.P.M. \div (\# \text{TEETH} \times R.P.M.) \)
E. FEED RATE (INCHES PER MINUTE)
   I.P.M. = F.P.T. X # TEETH X R.P.M.

F. FEED RATE (INCHES PER REVOLUTION)
   I.P.R. = I.P.M. / R.P.M.

G. TABLE FEED (Vf)
   Vf = # TEETH X F.P.T. X R.P.M.

H. CUTTING TIME (t)
   SAME AS TURNING “t” FORMULA

I. HORSEPOWER REQUIRED AT MACHINE SPINDLE MOTOR (HPm)
   SAME AS TURNING “HPm” FORMULA

III. THREADING & TAPPING

A. TAP DRILL SIZE (INCH SIZE CUT TAPS)
   DRILL Ø = BASIC O.D. OF THD – ((0.0130 X % OF FULL THD)/PITCH (T.P.I.))

B. TAP DRILL SIZE (INCH SIZE ROLL FORM TAPS)
   DRILL Ø = BASIC O.D. OF THD – ((0.0068 X % OF FULL THD)/PITCH (T.P.I.))

C. TAP DRILL SIZE (METRIC SIZE CUT TAPS)
   DRILL Ø = BASIC O.D. OF THD – ((PITCH IN MM X % OF FULL THD)/76.98)

D. TAP DRILL SIZE (METRIC SIZE ROLL FORM TAPS)
   DRILL Ø = BASIC O.D. OF THD – ((PITCH IN MM X % OF FULL THD)/147.06)

E. FEED (INCHES PER REVOLUTION - LATHE)
   I.P.R. = 1/T.P.I.

F. FEED (INCHES PER MINUTE - MILLING)
   I.P.M. = R.P.M./T.P.I.

G. THREAD HELIX ANGLE
   HA = ArcTan(PL/PDXπ)
   WHERE:
   HA = HELIX ANGLE
PL = PITCH LEAD
PD = BASIC PITCH Ø
Π = 3.14159

H. THREAD HELIX ANGLE – MULTI-START THREADS
HA = ArcTan((# OF STARTS) X PL/PD×Π)

IV. INCH – METRIC CONVERSIONS

A. INCHES TO MILLIMETERS
   MM = IN X 25.4

B. MILLIMETERS TO INCHES
   IN = MM/25.4 – OR – IN = MM X 0.03937

C. CUTTING SPEED (SURFACE FEET PER MIN TO SURFACE METERS PER MIN)
   S.M.M. = S.F.M. X 0.3048

D. CUTTING SPEED (SURFACE METERS PER MIN TO SURFACE FEET PER MIN)
   S.F.M. = S.M.M. X 3.2808399