



Milling Operation Formulas

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List of 18 Milling Operation Formulas

Milling Operation &

Face and Vertical Milling G

1) Diameter of Tool given Proportion of Edge Engagement for Face Milling

$$ext{fx} D_{ ext{cut}} = rac{ ext{a}_{ ext{e}}}{\sin(ext{Q} \cdot \pi)}$$

Open Calculator 🗗

$$=$$
 $\frac{52 \text{mm}}{\sin(0.4 \cdot \pi)}$

2) Feed Speed in Vertical Milling given Maximum Chip Thickness



Open Calculator 🗗

$$0.704 \mathrm{mm/s} = 0.004 \mathrm{mm} \cdot 16 \cdot 11 \mathrm{Hz}$$

3) Machining Time for Milling Operation

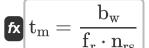
$$ag{t_{
m m}} = rac{{
m L} + {
m L_v}}{{
m V_{
m fm}}}$$

Open Calculator

$$ext{ex} = rac{400 ext{mm} + 27.335 ext{mm}}{0.89 ext{mm/s}}$$



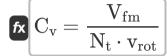
4) Machining Time for Shaping Operation



Open Calculator 🚰

= $487.9121s = \frac{444mm}{0.70mm/rev \cdot 1.3Hz}$

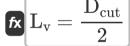
5) Maximum Chip Thickness in Vertical Milling



Open Calculator

 $ext{ex} \ 0.005057 ext{mm} = rac{0.89 ext{mm/s}}{16 \cdot 11 ext{Hz}}$

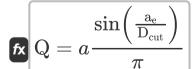
6) Minimum Length of Approach required in Face Milling



Open Calculator

= 27.335mm = $\frac{54.67$ mm $}{2}$

7) Proportion of Cutting Edge Engagement for Face Milling



Open Calculator

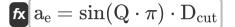
 $oxed{ex} 0.400108 = a rac{\sin\left(rac{52 ext{mm}}{54.67 ext{mm}}
ight)}{\pi}$







8) Work Engagement given Proportion of Edge Engagement for Face Milling

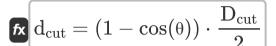


Open Calculator 🖸

$$51.99426$$
mm = $\sin(0.4 \cdot \pi) \cdot 54.67$ mm

Slab and Slide Milling G

9) Depth of Cut in Slab Milling using Tool Engagement Angle



Open Calculator 🗗

10) Diameter of Tool given Proportion of Edge Engagement for Slab and Side Milling

$$extbf{D}_{ ext{cut}} = 2 \cdot rac{ ext{a}_{ ext{e}}}{\sin((ext{Q} - 0.25) \cdot 2 \cdot \pi) + 1}$$

Open Calculator 🗗



11) Feed in Slab Milling given Feed Speed 🛂

 $\mathbf{f_r} = rac{\mathrm{V_{fm}}}{\mathrm{v_{rr}}}$

Open Calculator

 $egin{aligned} extbf{ex} \ 0.684615 ext{mm/rev} = rac{0.89 ext{mm/s}}{1.3 ext{Hz}} \end{aligned}$

12) Feed Speed of Workpiece in Slab Milling

fx $V_{
m fm} = f_{
m r} \cdot n_{
m rs}$

Open Calculator

 $\boxed{ 0.91 \text{mm/s} = 0.70 \text{mm/rev} \cdot 1.3 \text{Hz} }$

13) Maximum Chip Thickness obtained in Slab Milling using Depth of Cut

 $\left| ext{C}_{ ext{max}} = 2 \cdot ext{V}_{ ext{fm}} \cdot rac{\sqrt{rac{ ext{d}_{ ext{cut}}}{ ext{D}_{ ext{cut}}}}}{ ext{N}_{ ext{t}} \cdot ext{v}_{ ext{rot}}}
ight|$

Open Calculator

ex $0.002981 \mathrm{mm} = 2 \cdot 0.89 \mathrm{mm/s} \cdot \frac{\sqrt{\frac{4.75 \mathrm{mm}}{54.67 \mathrm{mm}}}}{16 \cdot 11 \mathrm{Hz}}$ 14) Maximum Chip Thickness obtained in Slab Milling using Tool Engagement Angle

$ag{C_{ ext{max}} = V_{ ext{fm}} \cdot rac{\sin(heta)}{N_{ ext{t}} \cdot v_{ ext{rot}}}}$

Open Calculator 🖸

 $oxed{ex} 0.0029 \mathrm{mm} = 0.89 \mathrm{mm/s} \cdot rac{\sin(35°)}{16 \cdot 11 \mathrm{Hz}}$





15) Minimum Length of Approach required in Slab Milling

 $oldsymbol{eta} \mathbf{A} = \sqrt{\mathrm{d}_{\mathrm{cut}} \cdot \left(\mathrm{D}_{\mathrm{cut}} - \mathrm{d}_{\mathrm{cut}}
ight)}$

Open Calculator 🚰

 $ext{ex} 15.3987 ext{mm} = \sqrt{4.75 ext{mm} \cdot (54.67 ext{mm} - 4.75 ext{mm})}$

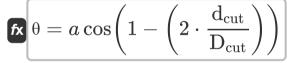
16) Proportion of Cutting Edge Engagement for Slab and Side Milling

 $egin{aligned} \mathbf{R} \ \mathbf{Q} = 0.25 + \left(a rac{\sin\left(\left(2 \cdot rac{\mathrm{a_e}}{\mathrm{D_{\mathrm{cut}}}}
ight) - 1
ight)}{2 \cdot \pi}
ight) \end{aligned}$

Open Calculator 🗗

 $egin{aligned} \mathbf{ex} \ 0.42907 = 0.25 + \left(a rac{\sin\left(\left(2 \cdot rac{52 ext{mm}}{54.67 ext{mm}}
ight) - 1
ight)}{2 \cdot \pi}
ight) \end{aligned}$

17) Tool Engagement Angle in Slab Milling using Depth of Cut



Open Calculator 🚰

$$oxed{ex} 34.2866^\circ = a\cosigg(1-igg(2\cdotrac{4.75 ext{mm}}{54.67 ext{mm}}igg)igg)$$



18) Work Engagement given Proportion of Edge Engagement for Slab and Side Milling



Open Calculator 🗗



Variables Used

- A Length of Approach in Slab Milling (Millimeter)
- **a**_e Work Engagement (Millimeter)
- **b**_w Width of Workpiece (Millimeter)
- C_{max} Max Chip Thickness in Slab Milling (Millimeter)
- C_v Max Chip Thickness in Vertical Milling (Millimeter)
- d_{cut} Depth of Cut in Milling (Millimeter)
- **D**_{cut} Diameter of a Cutting Tool (Millimeter)
- fr Feed Rate in Milling (Millimeter Per Revolution)
- L Length of Workpiece (Millimeter)
- L_v Length of Approach in Vertical Milling (Millimeter)
- n_{rs} Reciprocating Strokes Frequency (Hertz)
- N_t Number of Teeth on Cutting Tool
- Q Time Proportion of Cutting Edge Engagement
- t_m Machining Time (Second)
- V_{fm} Feed Speed in Milling (Millimeter per Second)
- V_{rot} Rotational Frequency in Milling (Hertz)
- **θ** Tool Engagement Angle in Milling (Degree)



Constants, Functions, Measurements used

- Constant: pi, 3.14159265358979323846264338327950288
 Archimedes' constant
- Function: acos, acos(Number)

 The inverse cosine function, is the inverse function of the cosine function. It is the function that takes a ratio as an input and returns the angle whose cosine is equal to that ratio.
- Function: asin, asin(Number)

 The inverse sine function, is a trigonometric function that takes a ratio of two sides of a right triangle and outputs the angle opposite the side with the given ratio.
- Function: cos, cos(Angle)
 Cosine of an angle is the ratio of the side adjacent to the angle to the hypotenuse of the triangle.
- Function: sin, sin(Angle)
 Sine is a trigonometric function that describes the ratio of the length of the opposite side of a right triangle to the length of the hypotenuse.
- Function: sqrt, sqrt(Number)
 A square root function is a function that takes a non-negative number as an input and returns the square root of the given input number.
- Measurement: Length in Millimeter (mm)
 Length Unit Conversion
- Measurement: Time in Second (s)
 Time Unit Conversion
- Measurement: Speed in Millimeter per Second (mm/s)
 Speed Unit Conversion
- Measurement: Angle in Degree (°)
 Angle Unit Conversion





- Measurement: Frequency in Hertz (Hz)
 Frequency Unit Conversion
- Measurement: Feed in Millimeter Per Revolution (mm/rev)
 Feed Unit Conversion





Check other formula lists

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