

Technical Guide: Calculating Tonnage for Coining

Unlike standard blanking or bending, coining requires the metal to reach a state of plastic flow to fill the die details. This demands significantly higher tonnage.

1. The Core Formula

To estimate the required force P in tons for a coining operation, use the following calculation:

$$P = A \times S_c$$

- **A:** The total surface area of the coin or part being struck (in square inches).
- **S_c:** The **coining constant** (tons per square inch) required for the specific material and detail depth.

2. Material Tonnage Constants S_c

Use these values as a starting point for your calculations. *Note: High-relief designs or "Proof" finishes may require 20%–40% additional tonnage.*

Material Type	Tonnage Constant (S _c)	Recommended Press Type
Aluminum	40 – 60 Tons/sq. in	C-Frame / Mechanical
Copper / Brass	60 – 100 Tons/sq. in	Mechanical / Servo
Sterling Silver	80 – 120 Tons/sq. in	Servo (Best for detail)
24K Gold	60 – 90 Tons/sq. in	Hydraulic / Servo
Carbon Steel	120 – 150 Tons/sq. in	Straight-Sided
Stainless Steel	150 – 200+ Tons/sq. in	Straight-Sided Heavy Duty

3. Critical Factor: The "Detail Multiplier"

The complexity of your die significantly impacts the tonnage needed to achieve a full strike:

- **Simple Lettering/Flat Relief:** Use the standard constant.
- **High-Relief Medallions:** Multiply the result by 1.3x.
- **Sharp, Deep Textures:** Multiply the result by 1.5x.

4. Why Frame Rigidity Matters in the Calculation

When calculating tonnage, you must account for Frame Stretch. If you use a 200-ton C-Frame press for a 180-ton coining job, the frame may flex enough that the die never fully bottoms out.

For coining, we recommend a "25% Safety Buffer." If your calculation calls for 100 tons, use at least a 125-ton Straight-Sided press to ensure the frame stays rigid and the strike remains crisp.

