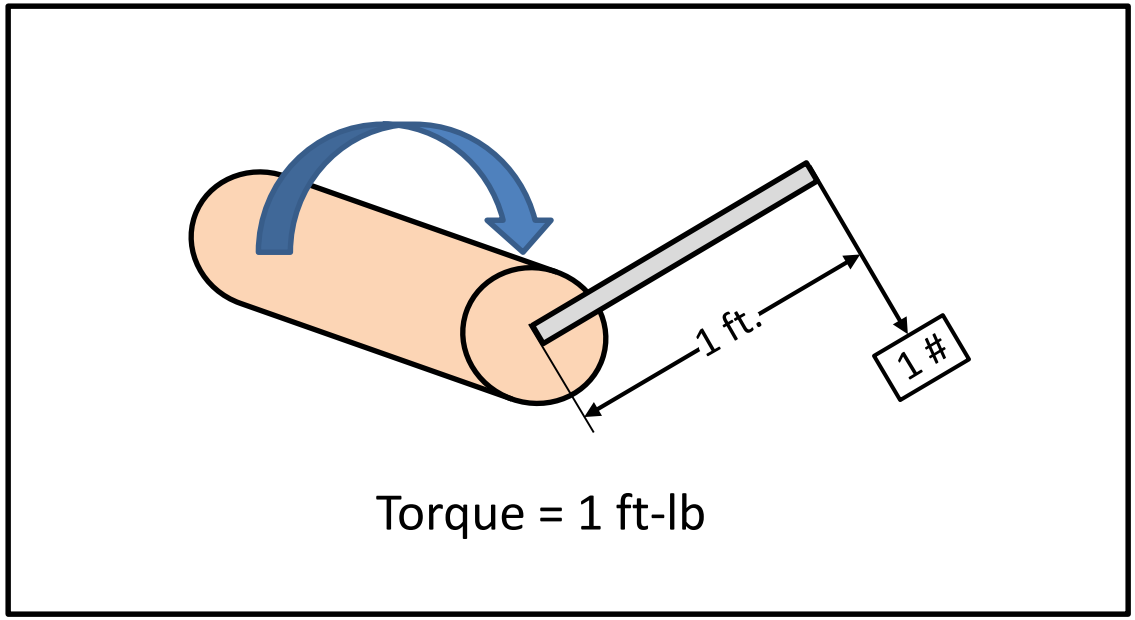
# Horsepower Discussion

- Presentation seeks to explain Horsepower and Torque
- Show effect of changes to the Model “A” to include:
  - Cylinder Head changes (Brumfield/Snyder)
  - Intake manifold changes (A, Bored, Webber)
  - Carburetion change (A, B, Webber)
  - Exhaust change (Aries)

# Horsepower Discussion

- Torque - measure of force (expressed in ft #)



# Horsepower Background

**Mechanical Horsepower (HP)** Is a measure of rate of **work** done

HP term coined by James Watt (steam engine fame)
He determined a horse could pull 180# continuously &
a horse could turn 24' mill wheel 144/hour or 2.4/min
(12 x 2π x 2.4 x 180) = 32,572 ft #, rounded to 33,000

So today

1 horsepower is defined as 33,000 ft #/min work
to convert to work per minute into work/revolution
33,000/(2π radians = 6.2832) = 5,252 ft # work/revolution

# Horsepower Formula

$$\text{Power} = \frac{\text{Work}}{\text{Time}} \quad \& \quad \text{Work is } \frac{\text{Force x Distance}}{\text{Time}}$$

Torque = Work  Time & Revolutions = RPM

Therefore:

$$HP = \frac{\text{RPM x Torque}}{5252}$$

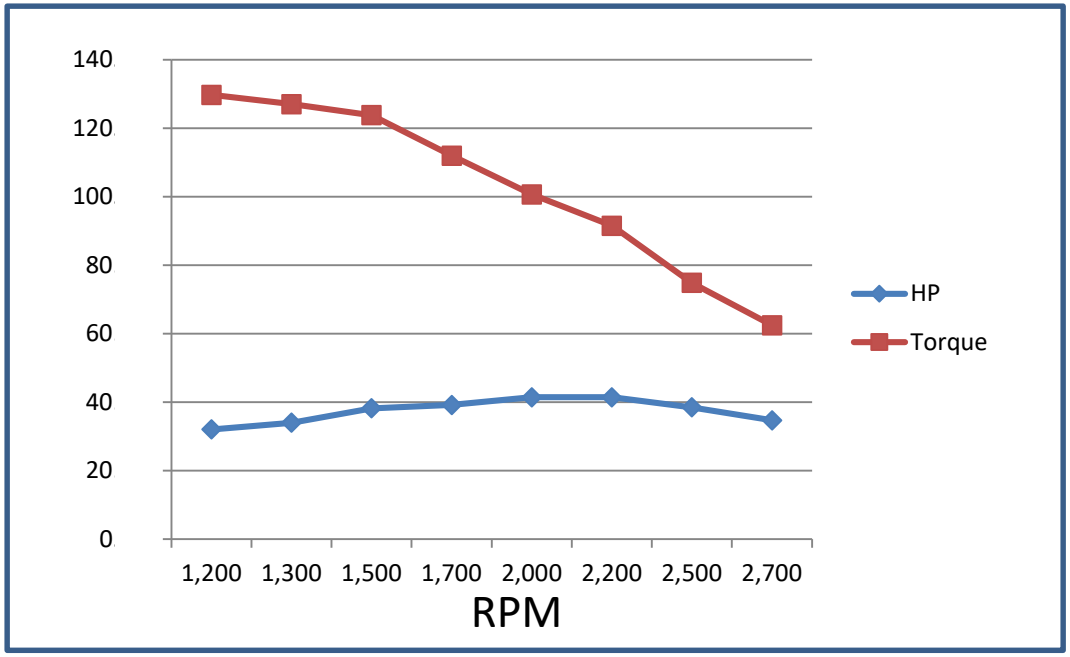
# Model “A” Horsepower Discussion

- Background and Sources
  - Baseline Model “A” HP and Torque values
    - Performed by Dennis Pirano (www.modelaparts.net)
    - He compared 13 different configurations of bolt-on items
      - Cylinder Heads
      - Exhaust Components
      - Carburation
      - Intake Manifolds
  - Results published over RPM ranges 1,200-2,700

# Model “A” Horsepower

(corrected values)

- Stock Model “A” results (on gasoline)
  - Maximum HP 43.43 @ 2,200 rpms
  - Maximum torque 129.70 ft # @ 1,200 rpms



# Model “A” Horsepower Examples

(corrected values)

- Model B Head and B Carburetor
  - HP = 53 @ 2,000 rpm ( 28% increase over stock)
  - Torque = 141 ft/# @ 1,500 rpm
  - **Cost $300 (used) or $30/HP added**
- Snyder Head (5.2:1) with Model A manifold and Carburetor
  - HP = 51 @ 2,000 rpm (23% increase over stock)
  - Torque = 140 ft/# @ 1,300 rpm
  - **Cost $315 or $39/HP added**
- Brumfield Head with Model A manifold and Carburetor
  - HP = 51 @ 2,200 rpm (23% increase over stock)
  - Torque = 141 ft/# @ 1,200 rpm
  - **Cost $200 (used) or $25/HP added**

# Model “A” Horsepower Examples

(corrected values)

- Brumfield head, B carb, A manifold bored to B
  - HP 56 @ 2,200 rpm (35% increase over stock)
  - Torque 146 @ 1,300 rpm
  - **Cost estimated at $450 or $35/HP added**
- Stock engine, Weber carb & manifold
  - HP 74 @ 1,500 rpm (79% increase over stock)
  - Torque 132 @ 1,300 rpm
  - **Cost estimate at $750 or $24/HP added**
- Stock engine, Aries muffler
  - HP +3 to 4 HP across range (46-47 HP)
  - **Cost $255 or $63/HP added**

# Estimated Cost of Modifications

- **Conclusion** – Most bang for buck - $38/HP
  - Used High Compression Head (adds 8 HP)
  - Aries Muffler (adds 4 HP)
  - Increase HP by 28% for about $450