ME 410 Day 33

- Review of volumetric efficiency
- Tuning - simple calculations
- Performance Maps

For those who missed Friday, November 1.

- Please read Ch. 6. Pages
- Also review the notes on the website.
- There will be a question on these notes.

Resource:

Test 4 from last year will be posted at the website.

Note: this year the coverage of Test 4 will be somewhat different. There will definitely be a question or questions covering combustion and emissions on the test.

For example:

1. List the 4 major types of emissions from IC engines. State why each is harmful.

2. Give two ways that have been used to reduce NO_x emissions. Explain how they reduce it.

Performance Maps

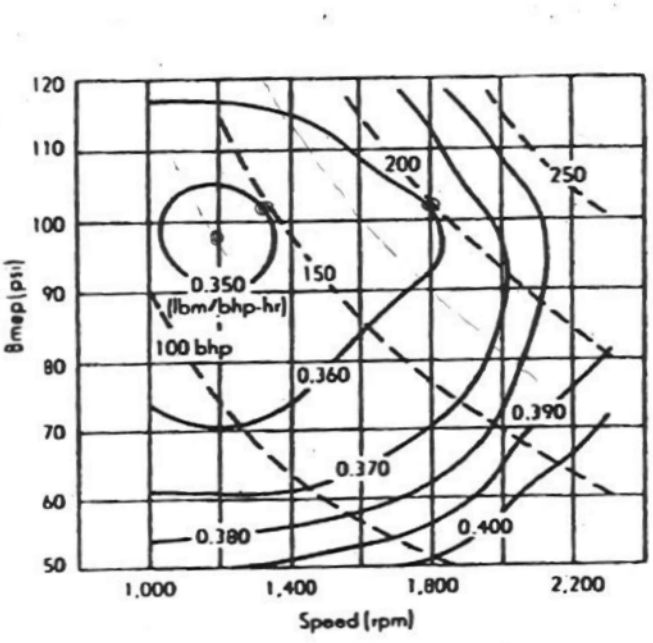

FIG. 2-25. Performance map of Mack Truck's Model END 864 diesel (V-8, 5 × 5½ in., 864 in.^{3}, open chamber).

- At a bmep of 70 psi and 1100 RPM what would the bsfc be?
- What would be the bsfc at 150 hp and 1800 RPM? What would the bmep be?
- At about what bmep and RPM could you get the lowest possible bsfc?
- Say you want to operate the engine at 200 hp. What RPM would you want the engine to operate at?
- In the previous question, suppose that the tire diameter was 3 feet, and the speed was 60 miles/ hr = 88 ft/sec. What overall gear ratio (OGR) would be required?
- Assume the fuel has density 7.2 lbm /gal. Predict the mileage in the previous question.

Maple Solution

```
> N_eng := 1800;
```

$$N\_eng := 1800$$

```
> omega := 88/1.5;
```

$$\omega := 58.66666667$$

```
> N_wheel := evalf( 60 * omega/(2*Pi) );
```

$$N\_wheel := 560.2253995$$

```
> OGR := N_eng/N_wheel;
```

$$OGR := 3.212992488$$

```
> bsfc := 0.36;
```

$$bsfc := .36$$

```
> P_b := 200.;
```

$$P\_b := 200.$$

```
> mdotf := P_b * bsfc;
```

$$mdotf := 72.00$$

```
> density := 7.2;
```

$$density := 7.2$$

```
> vdotf := mdotf /density;
```

$$vdotf := 10.00000000$$

```
> mileage := 60 / vdotf;
```

$$mileage := 6.000000000$$

```
>
```