

Petroleum Production Engineering III

Lecture 1

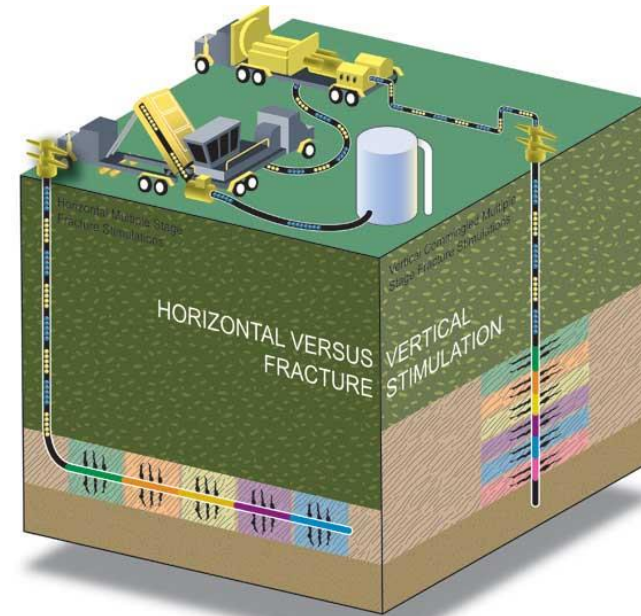
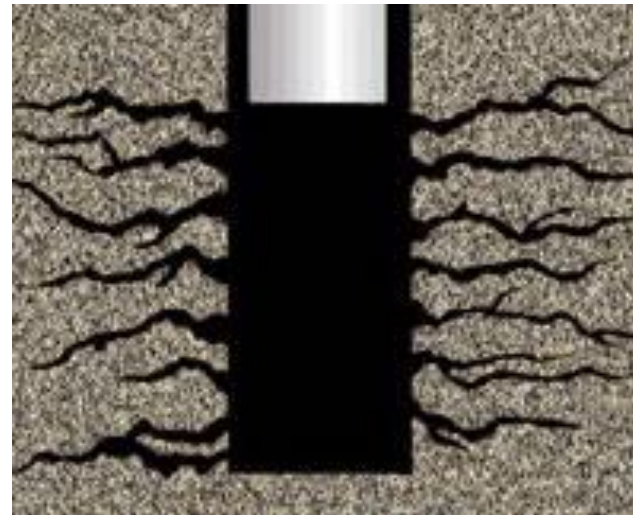
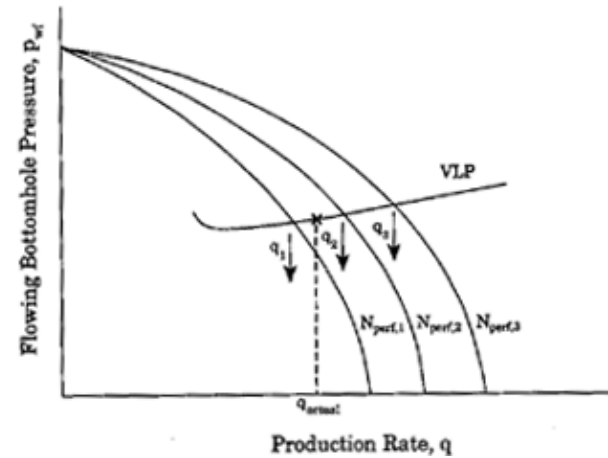
What does a Production Engineer Do?

The role of a production engineer is to take over once a well is drilled and completed, monitor daily production, and determine if the well is producing optimally. The production engineer monitors daily oil/gas/water production, well injection, maintains well production decline curves, analyzes well test data, prepares acidizing programs and hydraulic fracturing designs, and prepares well workover programs.

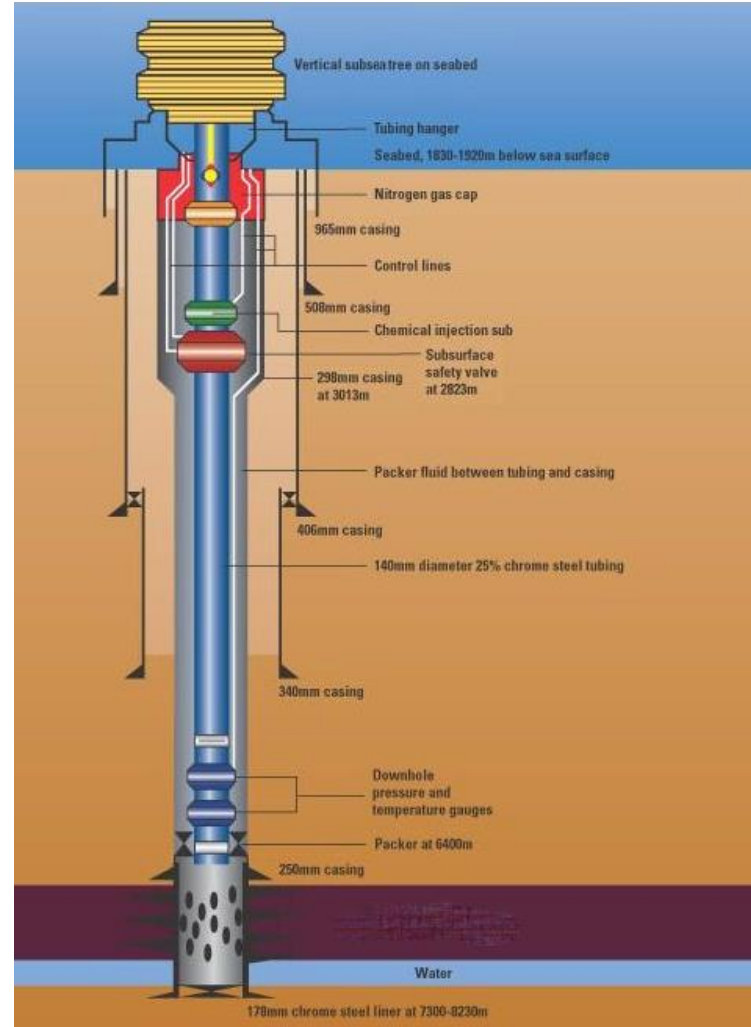
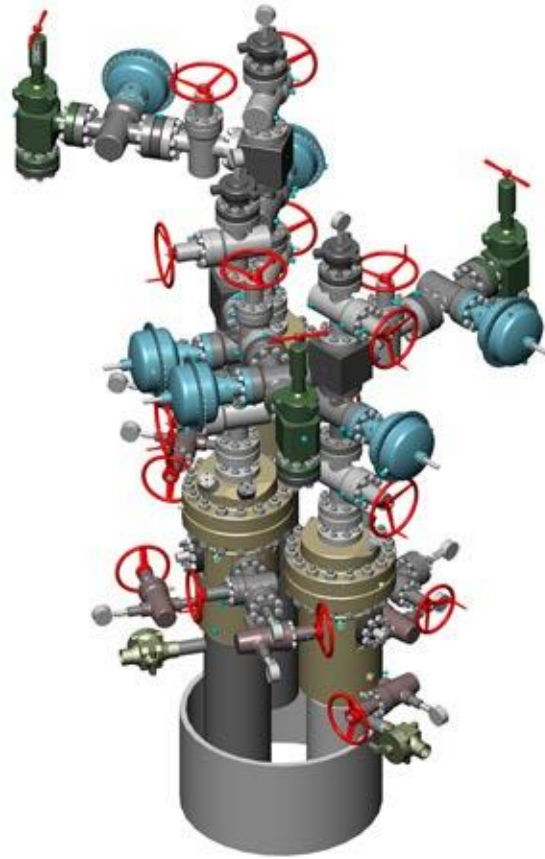
- A production engineer is challenged to perform all of the tasks in a **cost-effective** manner. There is no point in increasing production, if it isn't cost effective to do so. As a production engineer, you will be challenged to maximize production, while minimizing costs.



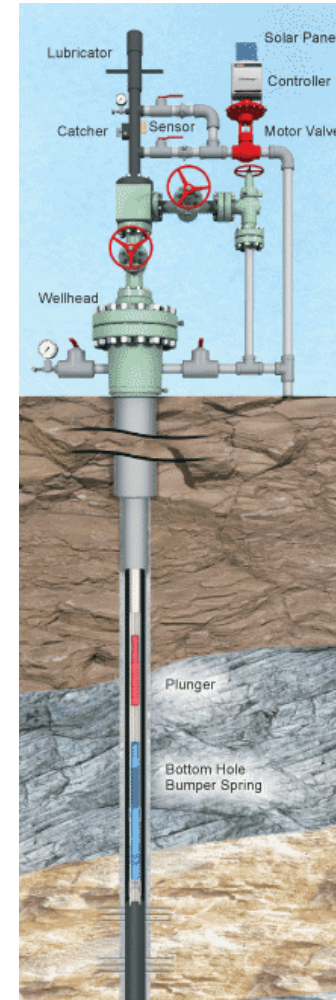
Well Performance and Production Systems



Well Completion Design



PE 323 Artificial Lift



Production System – Inflow, Outflow

- Petroleum Production involves 2 distinct but intimately connected general systems:

Outflow: the reservoir, which is frequently a porous medium with unique storage and flow characteristics. Aspects of the sandface are included in the outflow system.

Inflow: the tubular conduit including all equipment on the tubing string, bottomhole and wellhead assemblies, the surface gathering, separation and, storage facilities.

Important Aspects of the Petroleum Production System

1. Volume and Phase of reservoir hydrocarbons.
(Reservoir type and characteristic, Reservoir Porosity, Reservoir thickness, Fluid saturation)
2. Fluid flow in reservoir
3. The characteristics of the near wellbore region, the sand face and the well completion.
4. The well and surface equipment.

Well Productivity

- All of the component of the petroleum systems can be condensed into the productivity index (J or PI).
- The term productivity index is the ratio of the production rate (q) to the pressure drawdown at the midpoint of the producing interval.

$$J = \frac{q}{\bar{p}_r - p_{wf}}$$

Productivity Index (J)

- The productivity index is derived from Darcy's Law by:

$$J = \frac{q}{\bar{p}_r - p_{wf}} = \frac{kh}{\alpha_r B \mu (p_D + s)} \quad \text{Eq(1-6)}$$

- Where q = flow rate, STB/D
 J = productivity index, STB/D/psi
 p_r = volumetric average drainage area pressure
 p_{wf} = bottom hole flowing pressure

So what can a production engineer actually control?

- So, from equation we see the only parameters that a production engineer can control are pressure drawdown ($p-p_{wf}$) and skin factor(s).
- This is the world of the production engineer.