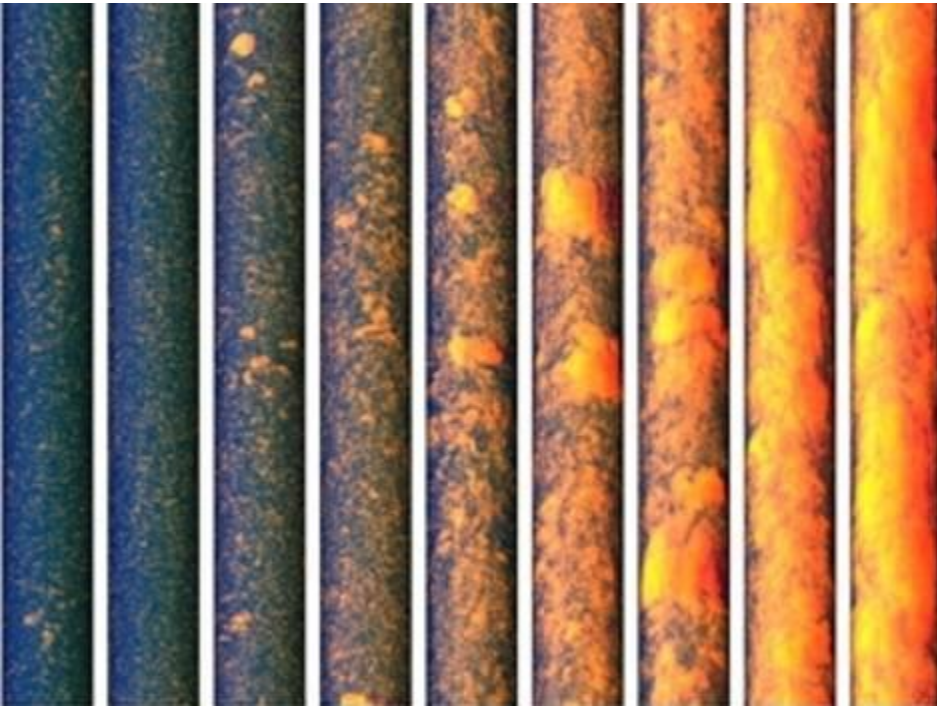


Multiphase Pumps

Optimizing the oilpatch



A technology review

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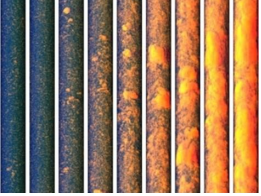


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- Introduction to multiphase flow
- Artificial lift advantage
- Types of artificial lift systems

Conventional

- Rod Pump
- Water Injection
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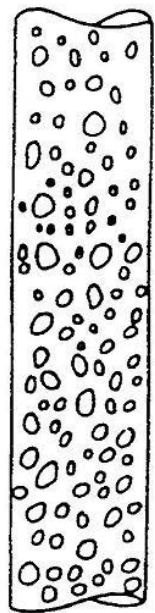
Multiphase Pumps (MPP)

- Electric Submersible Pump (ESP)
- Helico-Axial
- Progressive Cavity Pump (PCP)
- Twin Screw Pump

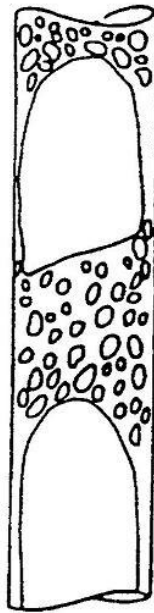
- Benchmark of artificial lift systems
- Pump control & interlocks
- Life-enhancers for MPP – Ceramic coatings
- MPP applications
 - Production increase
 - SAGD
 - Surface streamlining
- Multiphase Flow Meters (MPFM)
- Summary



Multiphase Flow Regimes



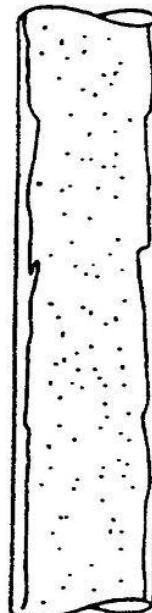
BUBBLY
FLOW



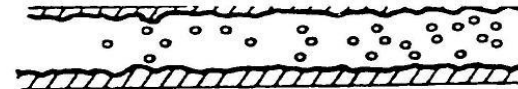
SLUG
FLOW



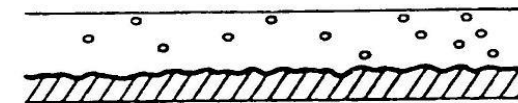
CHURN
FLOW



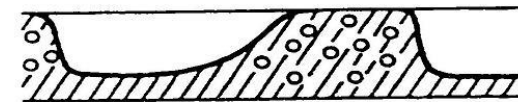
ANNULAR
FLOW



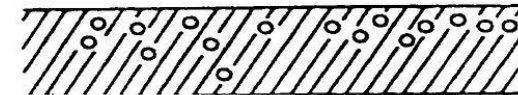
ANNULAR
DISPERSED



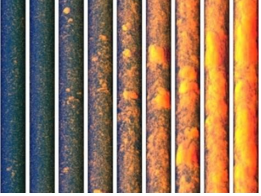
STRATIFIED
WAVY



SLUG
(INTERMITTENT)



DISPERSED
BUBBLE



Artificial Lift Advantage

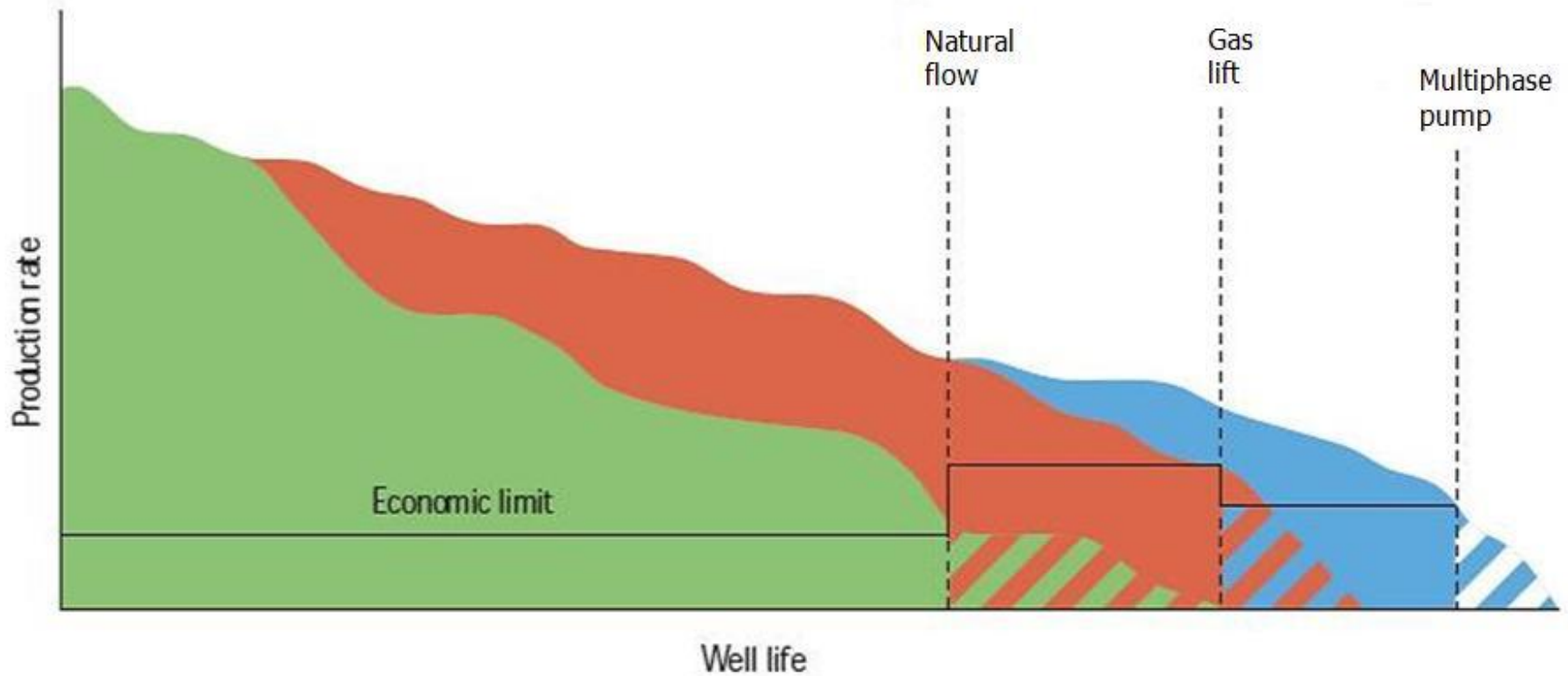
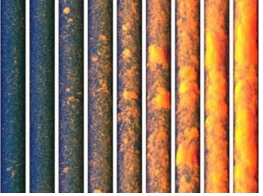
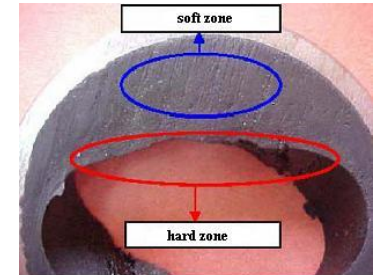


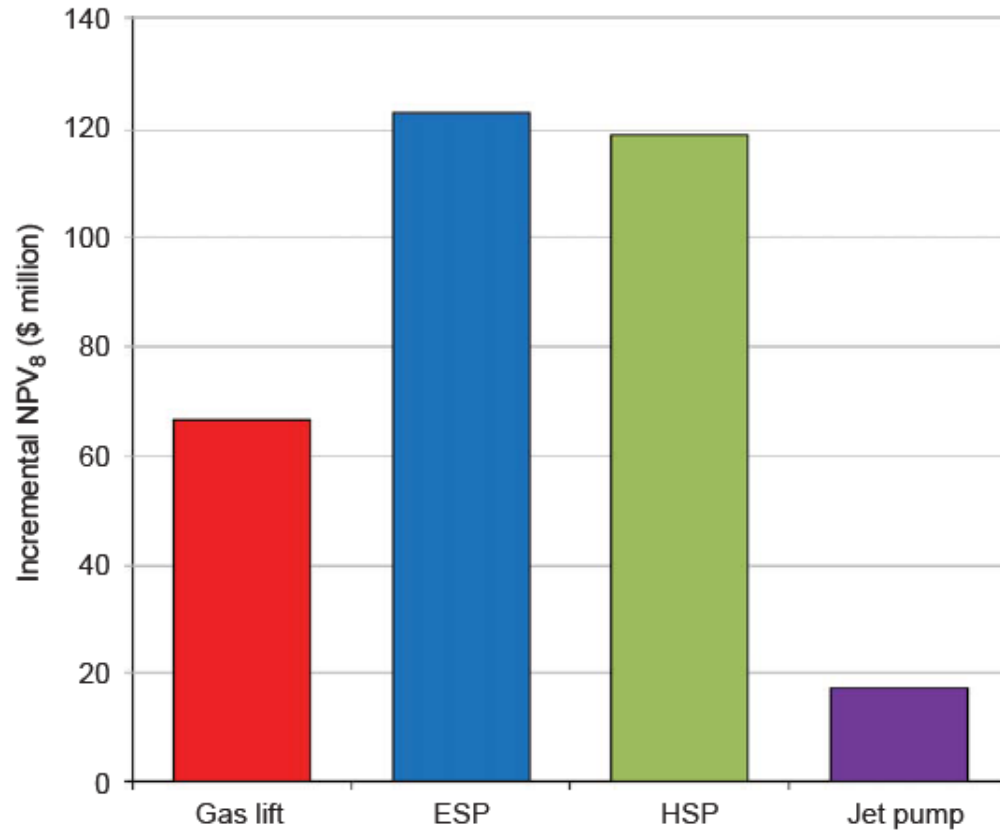
Image by Fleshman



PCP issues

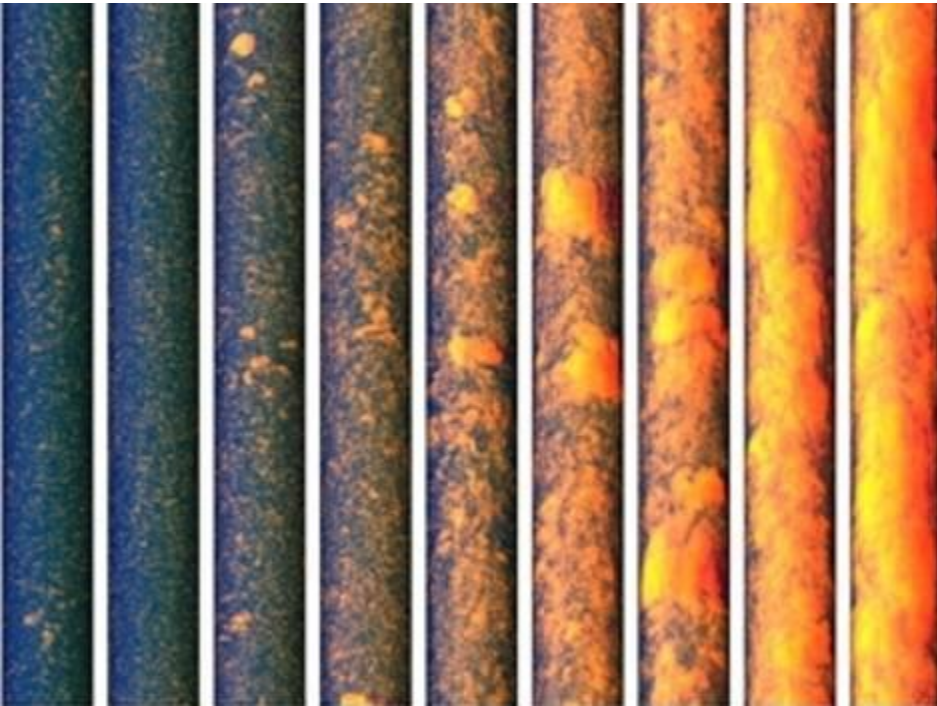


NPV per artificial lift type



Thanks

This presentation contains just a few slides,
please contact me



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