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**> PCM SLUGGER IMPROVES RUN LIFE IN MULTIPHASE WELLS**




- **Features**
  - Patented and proven technology
  - Simple upgrade to most PCM Moineau™ pumps
  - Can be used anywhere an elastomeric PCP can be used
- **Applications**
  - PCM Slugger is used to improve run-life when there is (or may be) a high gas fraction at the pump inlet
- **Benefits**
  - Reduces stress in the elastomer near the top of the pump
  - Reduces hysteretic heating of the elastomer
  - Lower stress and lower temperature → longer run-life
  - Pump solids and viscous oil as well as a standard PCP

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PCM Slugger

### > HOW IT LOOKS

- A proven, patented technology
- An easy upgrade for any PCP
- Additional assurance in gaseous wells

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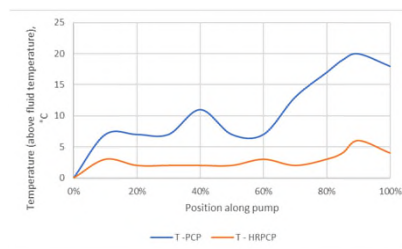
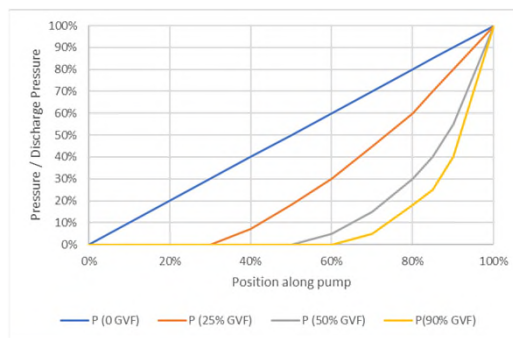
### > HOW IT WORKS

- A PCP with gas has a non-linear pressure gradient
  - The top of the pump carries more pressure
  - This increases stress and hysteretic heating in the elastomer
  - Higher stress and higher internal temperature lead to shorter run-life
- Hydraulic regulators provide a more linear pressure distribution
  - Less stress
  - Less internal heating
  - Longer run-life

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## > HOW IT WORKS

- HRPCP balances the pressure across the pump in multiphase conditions
- HRPCP increases run life by reducing stress and hysteretic heating in the elastomer

**PCP**  
Nonlinear pressure gradient:  
 ▶ Excessive internal heat build-up  
 ▶ Premature aging and stator failure

**HRPCP**  
Equalized pressure gradient:  
 ▶ Lower temperature rise  
 ▶ Less stator stress  
 ▶ Longer run life

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## > PAST REFERENCES

- **Introduction**  
SPE PCP ATW 2004 and 2006 Presentations by Bratu et al  
Papers SPE 95272 by Bratu (2005) and SPE 97833 by Bratu & Seince (2005)
- **Venezuela**  
Papers SPE 137168 by Seince & Caballero (2010), SPE 169309 by Caballero et al (2014), SPE-WVS-526 by Rangel et al (2015), MEALF 2013 paper MLF00118 by BenAmara et al (2013), HOLA13-105 by Caballero et al (2013)
- **Argentina**  
Papers SPE 152228 by Zimmer et al (2012), WHOC 12-380 by Peirchon et al (2012)
- **Middle East**  
Papers SPE 184207 by Al Ajeel et al (2016), IPTC 18516 by Mali et al (2015)
- **Summary**  
Papers SPE 165647 by Bratu et al (includes case studies from Venezuela and Argentina), SPE 209764 by Skoczylas (includes case studies from Australia, Colombia and Canada)

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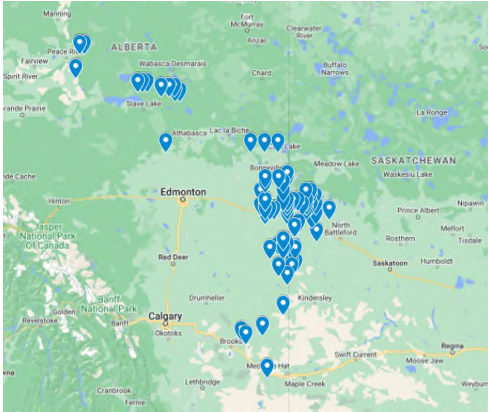
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PCM Slugger

## › THE CANADIAN STORY

- Despite thousands of installations around the world since 2007, the PCM Slugger was only introduced in Canada in 2021
- Since May 2021, there have been 185 installations of the PCM Slugger across western Canada
  - 23 Oil Companies
  - 50 Fields
- Diverse locations and fields from Medicine Hat to Edam, SK, to Peace River




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## › A QUICK SUMMARY OF CANADIAN RESULTS

- Production data is not available for most wells
- 185 PCM Slugger HRPCPs installed (as of Sept 19, 2023)
- 61 have been pulled (\*)
- 41 have failed (\*)
- Longest running time: 820 days (and still running as of Sept 19)
- MTTF = 750 days

\* Some pulls may not have been reported to PCM

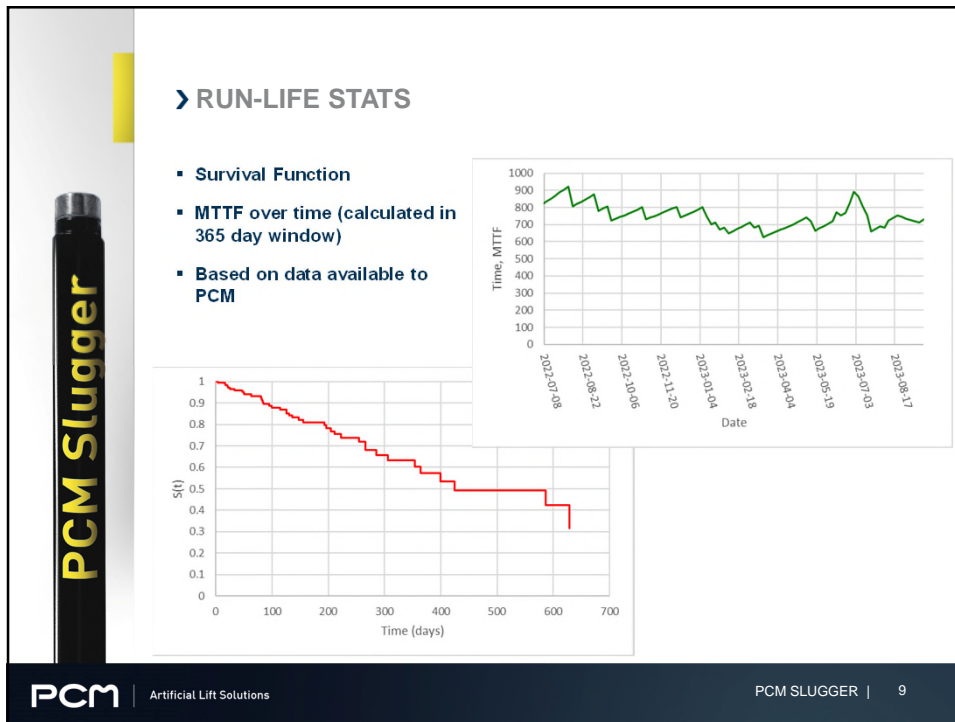
\* Failures are counted as follows: Pumps that have tested well after being pulled are **not** considered to have failed. Otherwise (including if there is no data on the pump's condition), the pump is assumed to have failed.

MTTF is calculated as per SPE 190962 → total time / number of failures

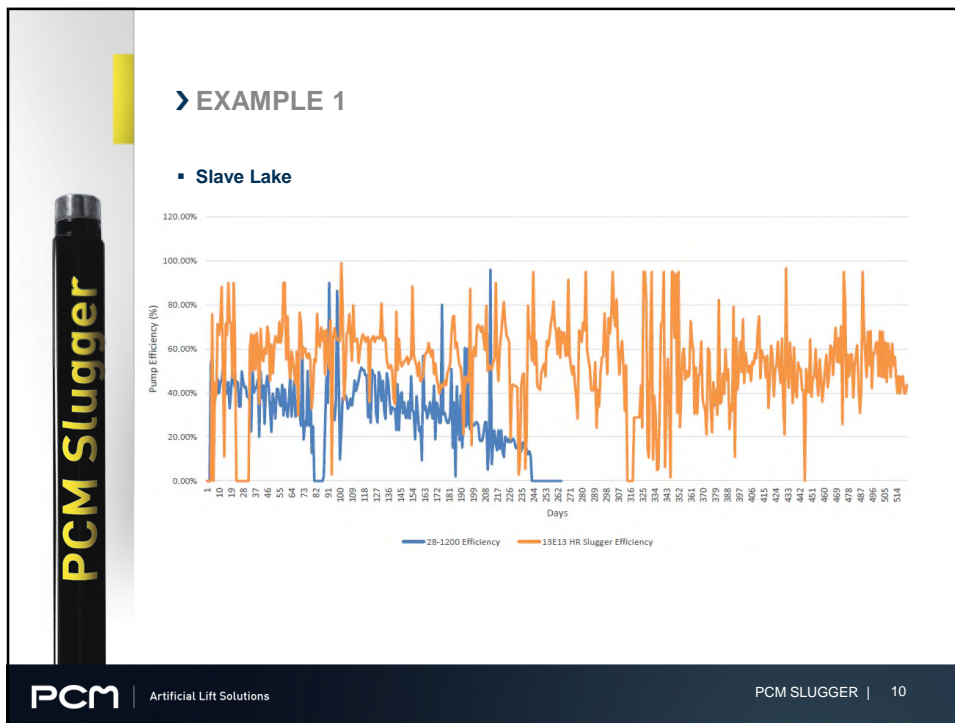

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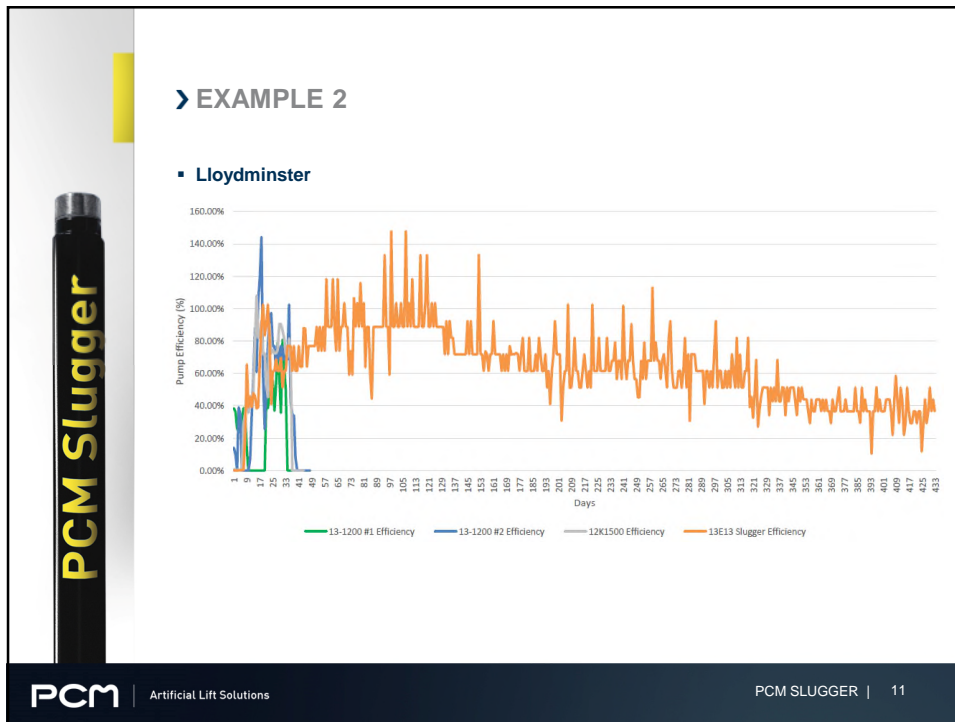
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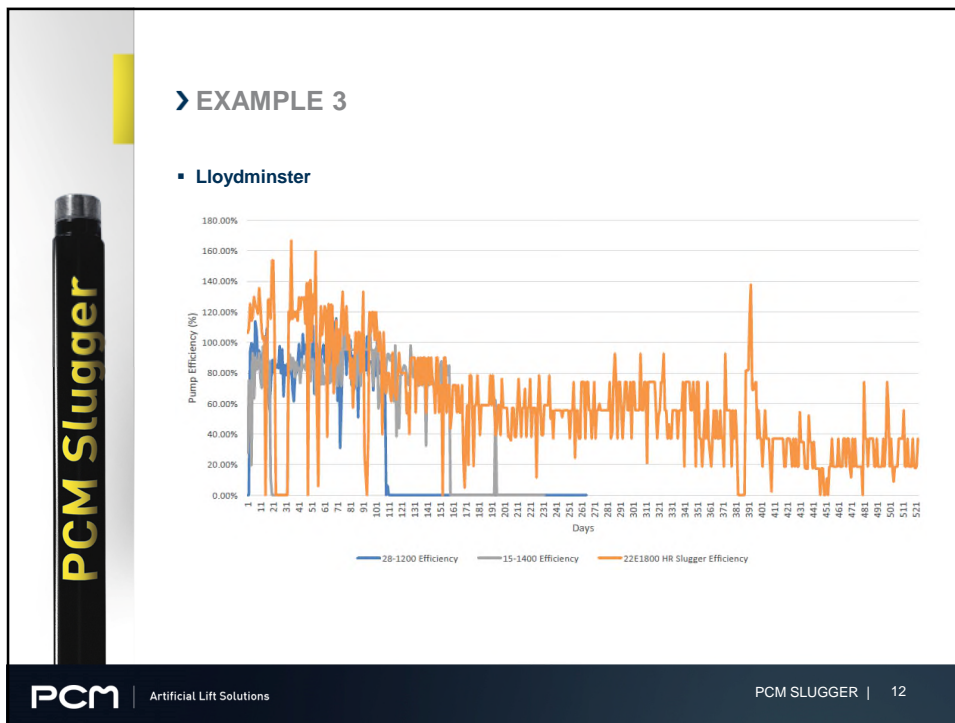
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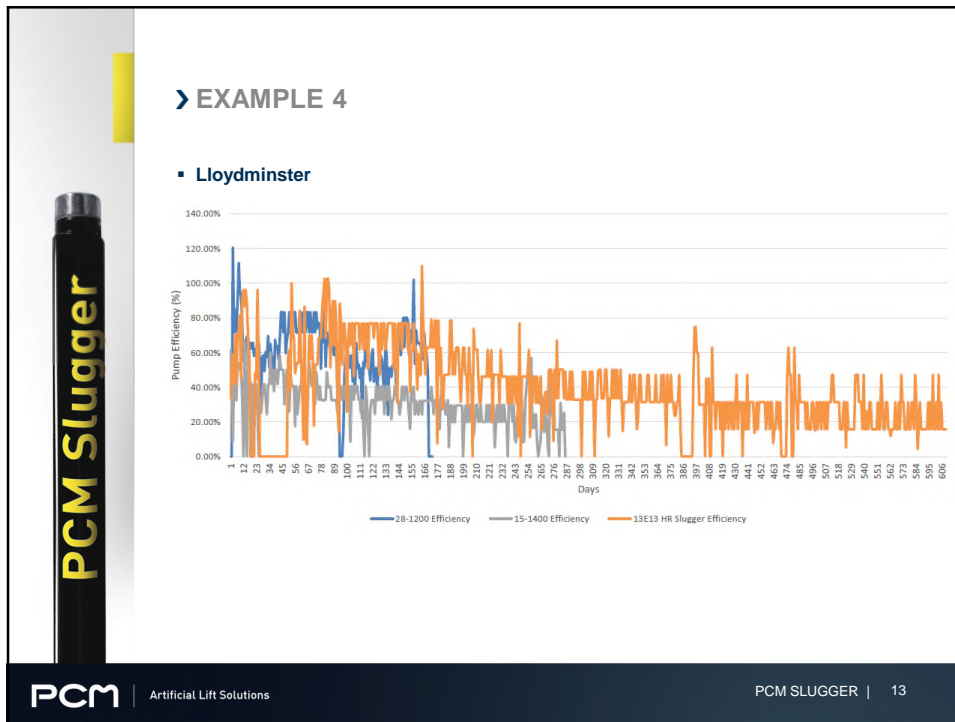
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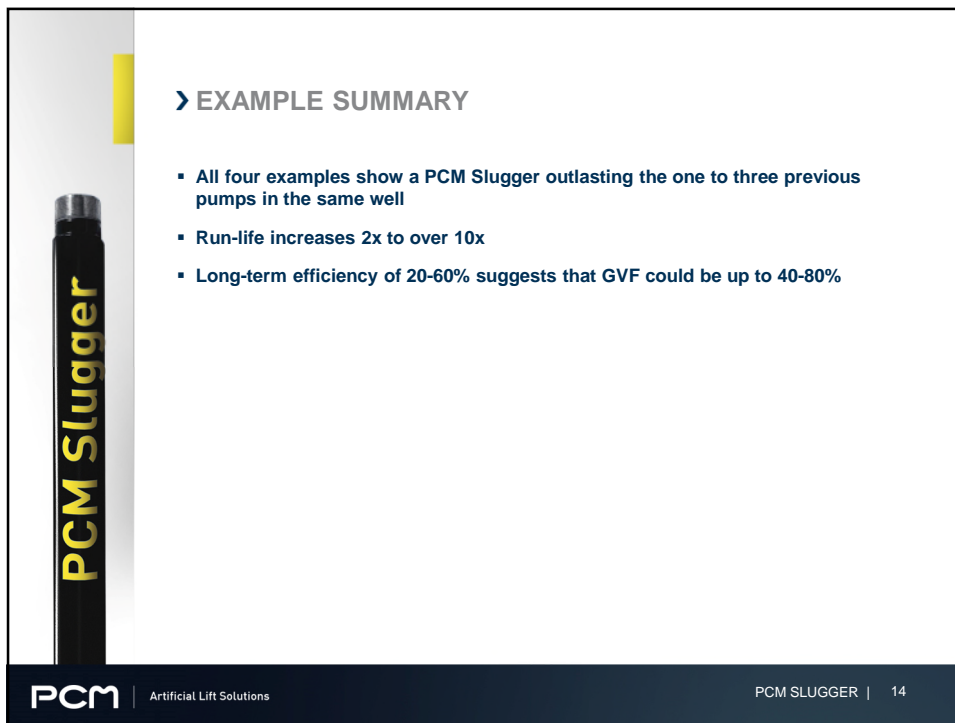
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## › CONCLUSION

- The patented PCM Slugger PCP can significantly improve the run-life of a pump compared to a standard PCP in the same well
- Thousands of PCM Sluggers have been run worldwide
- Recent Canadian trials of the PCM Slugger have shown the same benefits in Canada that users around the world have seen
- The PCM Slugger provides insurance against short run-life in wells that have (or even might have) gas production
- PCM Sluggers can be used in any well where a PCP would be installed

There is no downside to the technology when there is little or no gas  
The performance is identical in the presence of solids and/or viscous oil

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<https://www.youtube.com/watch?v=5DGH2Y8oMIQ>

## Your PCP Specialist

We believe in the high value of a specialized company dedicated to PCP technology to truly accompany our Oil & Gas customers through their challenges in optimizing mature fields and unlocking unconventional resources, responsibly.

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