

Review of VIE Data (Reference Oil Viscosity Analysis)

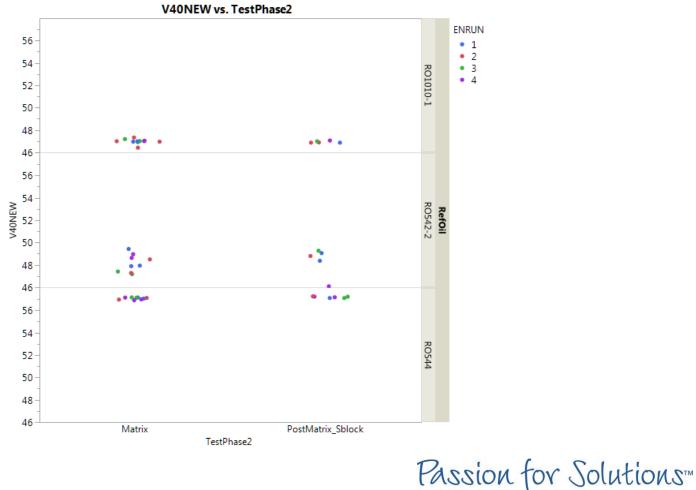
Todd Dvorak 09/13/2017

Passion for Solutions

Analysis of VIE Reference Oil Viscosity Data

- Plot of Fresh Oil KV40 Data
 - Includes n = 29 Precision Matrix (PM) and n = 16 Short Block Matrix (SBM) Tests

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Analysis of VIE Reference Oil Viscosity Data

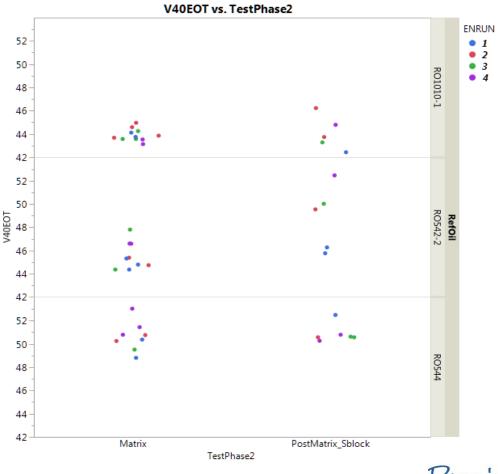
- KV40 Fresh Oil Analysis (PM n = 29 & n = 16 SBM)
 - Analysis suggests no significant difference in KV40 fresh oil viscosities between the test phases (PM vs. SBM)

| Response | | NEW | | | | T | estP | hase2 | | | | |
|------------------------------|---------|---------------|----------------------------|---------|----------|-----------|-------|------------|-----------|------------|---------|--------|
| Whole Me | | | - | | | DLe | vera | ge Plot | | | | |
| Actual k | • | | στ | | | | | - | | _ | | |
| Effect S | umma | ry | | | | ⊿ Le | ast S | quares | Means Tab | ble | | |
| Lack Of | Fit | | | | | | | | Least | | | |
| Residua | l by P | redicted | Plot | | | Lev | /el | | Sq Mean | Std Error | Mean | |
| ⊿ Summa | ry of F | it | | | | Ma | | | | 0.10423677 | 50,4728 | |
| RSquare | | | 0.988488 | | | | | rix_Sblock | | 0.15633086 | 51.2125 | |
| RSquare A | | | 0.98593 | | | | | - | 50.055229 | 0.10000000 | 31,2125 | |
| Root Mear | | | 0.548437 | | | ⊿ LS | Mea | ans Plot | | | | |
| Mean of R | | : um Wats) | 50.73578 45 | | | | 58- | | | | | |
| | | | 45 | | | | | | | | | |
| △ Analysis | Sorva | Sum o | | | | ns | 56- | | | | | |
| Source | DF | | r 5 Mean Squ | are FI | Ratio | Means | - A 1 | | | | | |
| Model | 8 | 929,7978 | | 225 386 | | | 54 - | | | | | |
| Error | 36 | 10.8282 | | 301 Pro | | S | 52- | | | | | |
| C. Total | 44 | 940.6261 | | | 001* | ≥ | - | | | | | |
| ⊿ Parame | ter Est | timates | | | | V40NEW LS | 50 - | | | - | | |
| Term | | Estima | te Std Error | t Ratio | Prob>[t] | /40 | 48- | | | | | |
| Intercept | | 50.7783 | 48 0.094427 | 537.75 | <.0001* | - | 40 | | | | | |
| LTMSLAB[| - | | 0.185219 | | 0.0442* | | 46- | | | | | |
| LTMSLAB[| | | 41 0.249072 | | 0.8584 | | | M | latrix | PostMatrix | _Sblock | |
| LTMSLAB[| | | 31 0.226679 35 0.184856 | | 0.9303 | | | | TestD | hase2 | | |
| LTMSLAB[LTMSLAB] | | | 35 0.184856 48 0.184697 | | 0.7035 | | | | TestP | nasez | | |
| | | | 48 0.184097 31 0.093465 | | 0.5500 | | | | | | | |
| | | - | 1 0.115254 | | <.0001* | | | | | | | |
| RefOil[RO | | | 26 0.118971 | | | | | | | | | |
| Effect T | ests | | | | | | | | | | | |
| | | | Sum of | | | | | | | | | |
| Source | Npa | m DF | Squares | F Ratio | Prob > F | | | | 0 | | 0 | 1 . 1 |
| LTMSLAB | | 5 5 | 1.53910 | 1.0234 | 0.4185 | | | | PAR | sion f | ov No | lutio |
| TestPhase2 | 2 | 1 1 | 0.10371 | 0.3448 | 0.5607 | | | | 1010 | our | 01 00 | includ |
| RefOil | | 2 2 | 889.24665 1 | 478.217 | <.0001* | | | | | | | |



Analysis of VIE Reference Oil Viscosity Data

Plot of EOT Oil KV40 Data





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Analysis of VIE Reference Oil Viscosity Data

- KV40 EOT Oil Analysis (PM n = 28^{1} & n = 16 SBM)
 - Analysis suggests significant increase in KV40 EOT viscosity between the 2 test phases (PM-EOT-KV40 < SBM-EOT-KV40)

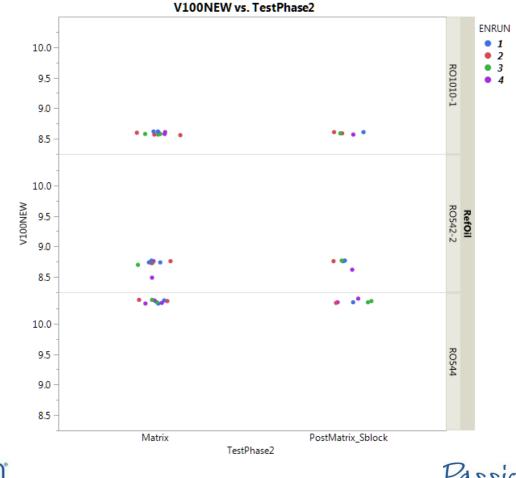
| Response Vhole Mo | | | | | | 0 | - | estPhase2 | | | | | |
|---|---------|------------|--------------------------|------------------|--------------------|-----------------------------|-----------------|----------------|--------------|---------------|-----------|--|--|
| | | licted Plo |)t | | | D | Le | verage Plot | | | | | |
| Actual by Predicted Plot Effect Summary | | | | | | ⊿ Least Squares Means Table | | | | | | | |
| Residua | | - | Plot | | | ~ | | astoquares | | <i></i> | | | |
| Summa | - | | IUC | | | | | | Least | | | | |
| RSquare | yorr | | 0.922925 | | | | Lev | rel | Sq Mean | Std Error | Mean | | |
| RSquare Ad | di | | 0.922923 | | | | Ma | trix | 46.744931 | 0.19680592 | 46.3550 | | |
| Root Mean | Square | | 1.008013 | | | | Pos | Matrix_Sblock | 47.839877 | 0.28854523 | 48.1231 | | |
| Mean of Re | | | 46.99795 | | | | | - | | | | | |
| Observatio | | | 44 | | | 4 | LS | Means Plot | | | | | |
| Analysis | of Va | | | | | | | 54 | | | | | |
| Source | DF | Sum of | Mean Squ | ara E 1 | Ratio | | | 52- | | | | | |
| Model | 9 | 413.67968 | | | .2366 | | ans | 52 | | | | | |
| Error | 34 | 34.54704 | | 161 Pro | | | -eë | 50 - | | | | | |
| C. Total | 43 | 448.22672 | | <.0 | 001* | | 2 | - | | _ | | | |
| Paramet | ter Est | imates | | | | | V40EOT LS Means | 48- | | | | | |
| Term | | Estimate | e Std Error | t Ratio | Prob> t | | Ö | 46- | 1 | | | | |
| Intercept | | | 3 0.481718 | | | | <u>6</u> | | | | | | |
| LTMSLAB[/ LTMSLAB[| | | 9 0.340691 6 0.461472 | | <.0001* 0.6577 | | Ś | 44 - | | | | | |
| LTMSLAB[| - | | 0.401472 7 0.418086 | | 0.8919 | | | | | | | | |
| LTMSLAB | D] | -0.85754 | 3 0.340012 | -2.52 | 0.0165* | | | 42 N | latrix | PostMatrix | Sblock | | |
| LTMSLAB[| | | 3 0.363351 | | 0.1838 0.0037* | | | | | | | | |
| RefOil[RO1 | | | 3 0.175463 5 0.214131 | | | | | | TestP | hase2 | | | |
| RefOil[RO5 | | | 2 0.220769 | | | | | | | | | | |
| ENHREND | | 0.00220 | 6 0.00067 | 3.29 | 0.0023* | | | | | | | | |
| Effect T | ests | | | | | | | | | | | | |
| | | | Sum of | | | | | Note 1: One of | observation | missing DM | | | |
| Source | Npar | m DF | Squares | | Prob > F | | | NOLE I. ONE | UDSEI VULION | inissing Pivi | LOT VISCO | | |
| LTMSLAB TestPhase2 | , | 5 5 1 1 | 41.88479 9.89202 | 8.2443 9.7354 | <.0001* 0.0037* | | | | D. | 1 6 | 51 | | |
| RefOil | | | 316.06649 : | | <.0001* | | | | Pas: | sion fo | N 101 | | |
| ENHREND | | | 11.02211 | 10 8476 | 0.0023* | | | | | | | | |



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Analysis of VIE Reference Oil Viscosity Data

▲ Plot of Fresh Oil KV100 Data



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Analysis of VIE Reference Oil Viscosity Data

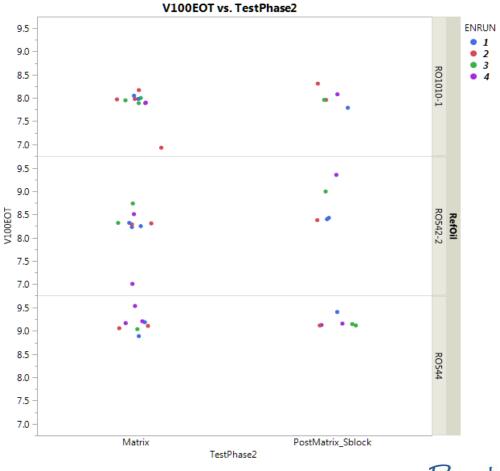
- KV100 Fresh Oil Analysis (PM n = 29 & n = 16 SBM)
 - Analysis suggests no significant difference in KV100 fresh oil viscosities between the test phases (PM vs. SBM)

| | Response Vhole Mo | | | | | | | stPh | | _ | | |
|------------------|---|---------|------------------------------------|---------------------------|-----------------------------|--------------------|------------------|----------------|---------|-----------|------------|-----------|
| - | Actual by | | icted Plo | t | | | ▷ Lev | verag | e Plot | | | |
| | Effect Su | | | | | | ⊿ Lea | ast So | uares | Means Tal | ble | |
| | Lack Of F | | | | | | | | | Least | | |
| \triangleright | Residual | by Pro | edicted P | Plot | | | Lev | el | | Sg Mean | Std Error | Mean |
| ⊿ | Summary | y of Fi | t | | | | Mat | | | 9.2243835 | | 9.17862 |
| | RSquare RSquare Adj | | Ċ | 0.997746 0.997245 | | | | | _Sblock | | 0.01223999 | 9.30125 |
| | Root Mean S Mean of Res Observation | sponse | 9 | 0.04294 9.222222 45 | | | ⊿LS | Mear 10.5 - | ns Plot | | | |
| | Analysis | • | | | | | SL | - | | | | |
| | Source | DF | Sum of Squares | Mean Squa | are FF | Ratio | Mear | 10- | | | | |
| | Model Error C. Total | 36 | 29.380799 0.066379 29.447178 | | 260 1991 184 Prol | | V100NEW LS Means | 9.5 - | | | | it i |
| | Paramete | er Esti | mates | | | | - BNO | 9 - | | | | |
| | Term | | Estimate | e Std Error | t Ratio | Prob> t | 10 | - | | | | |
| | Intercept LTMSLAB[A] | 1 | | 7 0.007393 2 0.014502 | 1247.1 0.56 | <.0001* 0.5760 | ~ | 8.5 - | | | | |
| | LTMSLAB[B] | | -0.002891 | 0.019501 | -0.15 | 0.8830 | | | | Matrix | PostMatr | ix_Sblock |
| | LTMSLAB[C] LTMSLAB[D] | | | 7 0.017748 3 0.014473 | -3.24 1.46 | 0.0025* | | | | Tes | tPhase2 | |
| | LTMSLAB[F] | Ī | 0.0324424 | 4 0.014461 | 2.24 | | | | | | | |
| | | | | 8 0.007318 | 0.62 | | | | | | | |
| | RefOil[RO10 RefOil[RO54 | | | 8 0.009024 8 0.009315 | -70.05 -53.88 | <.0001* <.0001* | | | | | | |
| | Effect Te | - | -0.501903 | 0.009313 | -00.00 | <.0001" | | | | | | |
| | | | | Sum of | | | | | | | | |
| | Source | Nparr | n DF | Squares | F Ratio | Prob > F | | | | 0 | | |
| | LTMSLAB | | 5 5 | 0.025229 | 2.7365 | 0.0340* | 1 | | | 12. | ision f | 5 6 |
| | TestPhase2 | | | 0.000717 | 0.3889 | 0.5368 | | | | | DIMIN T | |

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Analysis of VIE Reference Oil Viscosity Data

Plot of EOT Oil KV100 Data





Passion for Solutions.

Analysis of VIE Reference Oil Viscosity Data

KV100 EOT Oil Analysis (PM n = 28¹ & n = 16 SBM)

 Analysis suggests no significant difference in KV100 EOT oil viscosity between the two test phases (PM vs. SBM)

| Response V100EOT | TestPhase2 | | | | | | |
|---|--|--|--|--|--|--|--|
| Whole Model | Leverage Plot | | | | | | |
| Actual by Predicted Plot | | | | | | | |
| Effect Summary | Least Squares Means Table | | | | | | |
| Residual by Predicted Plot | Least | | | | | | |
| Summary of Fit | Level Sq Mean Std Error Mean | | | | | | |
| RSquare 0.856921 RSquare Adj 0.819047 Root Mean Square Error 0.264399 Mean of Response 8.469318 Observations (or Sum Wqts) 44 | Matrix 8.4320360 0.05162173 8.35321 PostMatrix_Sblock 8.5329459 0.07568473 8.67250 | | | | | | |
| | ⊿ LS Means Plot | | | | | | |
| Analysis of Variance | 0.5 | | | | | | |
| Source DF Squares Mean Square F Ratio | 9.5 - | | | | | | |
| Model 9 14.235242 1.58169 22.6257 | 9 - 9 - 9 - 9 - 9 - 9 - 9 - 9 - 9 - 9 - | | | | | | |
| Error 34 2.376838 0.06991 Prob > F | ž – | | | | | | |
| C. Total 43 16.612080 <.0001* | S 8.5 - T | | | | | | |
| Parameter Estimates | 5 8- | | | | | | |
| Term Estimate Std Error t Ratio Prob> t | | | | | | | |
| Intercept 8.4033273 0.126354 66.51 <.0001* LTMSLAB[A] 0.4205577 0.089362 4.71 <.0001* | 10000 7.5 - 7 - 7 - | | | | | | |
| LTMSLAB[F] 0.0305934 0.095306 0.32 0.7502 | Matrix PostMatrix_Sblock | | | | | | |
| TestPhase2[Matrix] -0.050455 0.046024 -1.10 0.2807 RefOil[R01010-1] -0.56454 0.056166 -10.05 <.0001* | TestPhase2 | | | | | | |
| ENHREND 0.000118 0.000176 0.67 0.5062 | | | | | | | |
| Effect Tests Sum of | Note 1: One observation missing DM EOT viscosity de | | | | | | |
| Source Nparm DF Squares F Ratio Prob > F | Note 1: One observation missing PM EOT viscosity do | | | | | | |
| LTMSLAB 5 5 2.150183 6.1516 0.0004* TestPhase2 1 1 0.084017 1.2018 0.2807 RefOil 2 2 10.638073 76.0873 <.0001* | Passion for Solut | | | | | | |

