

# CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2002

DateRun: 10/21/2002

Experimenters: Jason Marshall

ClientType: Manufacturing

ProjectNumber: Project #1

Substrates: Stainless Steel

PartType: Part

Contaminants: Cutting/Tapping Fluids, Lubricating/Lapping Oils, Metal fines, Oxides, Oil

Cleaning Methods: Ultrasonics

Analytical Methods: OSEE

Purpose: To clean additional supplied parts and analyzing using OSEE

Experimental Procedure: Two products from the previous trial were selected for cleaning supplied parts. One was diluted to 5% and the other was diluted to 3% using DI water in 1500 ml beakers. Both products were heated to 130 F on a hot plate. Each solution was degassed for 5 minutes in a Crest 40 kHz ultrasonic tank. OSEE readings for five supplied parts were recorded using a PET SQM 100. Multiple readings were made for each of the parts. One part was then cleaned using Acetone. Two parts were cleaned in each solution for 6 minutes using ultrasonic energy. Parts were rinsed in DI water at 120 F for 15 seconds followed by drying with a Master Appliance Heat Gun at 500 F for 30 seconds. Once dry parts were dry, OSEE readings were recorded. The parts were then visibly inspected and wiped with a white towel soaked with Acetone to determine cleanliness.

Contaminant: Milacron Marketing Company CIMTECH® 310 metal working fluid concentrate (102-71-6, 78-96-6, 26896-20-8)

Results: Both cleaners were very successful in removing the machining fluids and other contaminants from the outside of the parts. It was observed that there was some black residue on one end of the insides of the "T" parts. This was probably due to the way the parts were placed into the beakers. As the parts were cleaned, one end of the "T" was partially out of the cleaning solution for a portion of the cleaning cycle. If the parts were cleaned in the ultrasonic tank alone, the black residue would have been removed. The table below lists the readings made for the two cleaners and acetone.

Table 1. OSEE Readings

| Cleaner  | Part       | OSEE<br>DIRTY | Average | OSEE<br>Clean | Average |
|----------|------------|---------------|---------|---------------|---------|
| Acetone  | T1         | 132122        |         | 148156        |         |
|          |            | 149112        |         | 158185        |         |
|          |            | 53 63         |         | 136202        |         |
|          |            | 136143        |         | 166177        |         |
|          |            | 90 99         | 110     | 166159        | 165     |
| Acetone  | E1Body     | 146           |         | 259           |         |
|          |            | 148           |         | 145           |         |
|          |            | 100           |         | 204           |         |
|          |            | 124           |         | 190           |         |
|          |            | 166           |         | 205           |         |
|          |            | 296           | 163     | 466           | 245     |
| Citranox | T2         | 122216        |         | 249228        |         |
|          |            | 114109        |         | 298338        |         |
|          |            | 160174        |         | 286351        |         |
|          |            | 199297        |         | 285263        |         |
|          |            | 130166        | 169     | 234201        | 273     |
| Citranox | E2<br>Body | 190           |         | 225           |         |
|          |            | 97            |         | 254           |         |
|          |            | 121           |         | 283           |         |
|          |            | 70            |         | 175           |         |
|          |            | 123           |         | 229           |         |
|          |            | 178           | 130     | 358           | 254     |

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|           |            |     |     |     |     |     |     |
|-----------|------------|-----|-----|-----|-----|-----|-----|
| Citranox  | E2<br>Ring | 254 |     |     | 330 |     |     |
|           |            | 165 |     |     | 317 |     |     |
|           |            | 217 |     |     | 342 |     |     |
|           |            | 291 |     |     | 329 |     |     |
|           |            | 252 |     |     | 356 |     |     |
|           |            | 285 |     | 244 | 305 |     | 330 |
| Citranox  | T3         | 147 | 131 |     | 305 | 279 |     |
|           |            | 123 | 136 |     | 272 | 250 |     |
|           |            | 201 | 185 |     | 344 | 284 |     |
|           |            | 166 | 109 |     | 235 | 261 |     |
|           |            | 132 | 110 | 144 | 267 | 263 | 276 |
| Daraclean | E3<br>Body | 101 |     |     | 599 |     |     |
|           |            | 189 |     |     | 620 |     |     |
|           |            | 217 |     |     | 538 |     |     |
|           |            | 202 |     |     | 547 |     |     |
|           |            | 174 |     |     | 569 |     |     |
|           |            | 117 |     | 167 | 586 |     | 577 |
| Daraclean | E3<br>Ring | 64  |     |     | 263 |     |     |
|           |            | 78  |     |     | 321 |     |     |
|           |            | 121 |     |     | 485 |     |     |
|           |            | 149 |     |     | 459 |     |     |
|           |            | 116 |     |     | 483 |     |     |
|           |            |     |     | 106 | 563 |     | 429 |
| Daraclean | T4         | 194 | 133 |     | 408 | 263 |     |
|           |            | 213 | 201 |     | 485 | 437 |     |
|           |            | 188 | 129 |     | 501 | 486 |     |
|           |            | 164 | 233 |     | 378 | 499 |     |
|           |            | 172 | 169 | 180 | 408 | 383 | 425 |
| Daraclean | E4<br>Body | 116 |     |     | 222 |     |     |
|           |            | 166 |     |     | 299 |     |     |
|           |            | 226 |     |     | 276 |     |     |
|           |            | 105 |     |     | 223 |     |     |
|           |            | 104 |     | 148 | 231 |     | 277 |
| Daraclean | E4<br>Ring | 240 |     |     | 252 |     |     |
|           |            | 150 |     |     | 388 |     |     |
|           |            | 337 |     |     | 292 |     |     |
|           |            | 300 |     |     | 391 |     |     |
|           |            | 231 |     |     | 666 |     |     |
|           |            | 304 |     | 260 | 474 |     | 411 |

The next table summarizes the cleaning results for the products evaluated.

Table 2. Summary Data

|           |       |     |        |
|-----------|-------|-----|--------|
|           | Dirty |     |        |
|           | T     | E   | E Ring |
| Overall   | 151   | 152 | 203    |
|           | Clean |     |        |
|           | T     | E   | E Ring |
| Citranox  | 275   | 254 | 330    |
| Daraclean | 425   | 427 | 420    |
| Acetone   | 165   | 245 |        |
|           | 288   | 308 | 298    |

Summary:

|                      |  |
|----------------------|--|
| <b>Substrates:</b>   | Stainless Steel  |
| <b>Contaminants:</b> | Cutting/Tapping Fluids, Lubricating/Lapping Oils, Metal fines, Oxides, Oil |

## CLEANING LABORATORY EVALUATION SUMMARY

| Company Name: | Product Name: | Conc.: | Efficiency: | Effective:                          | Observations: |
|---------------|---------------|--------|-------------|-------------------------------------|---------------|
| Alconox Inc   | Citranox      | 3      |             | <input checked="" type="checkbox"/> |               |
| Magnaflux     | Daraclean 282 | 5      |             | <input checked="" type="checkbox"/> |               |

Conclusion:

Both products were very successful in cleaning the supplied parts. The results suggest that the Daraclean 282 cleaned the parts better than the Citranox and Acetone.