CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 1999

DateRun: 02/15/1999

Experimenters: Jason Marshall

ClientType: Bolt, Screw & Nut Manufacturer

ProjectNumber: Project #1

Substrates: Alloys, Nickel

PartType: Coupon

Contaminants: Cutting/Tapping Fluids, Lubricating/Lapping Oils, Oil

Cleaning Methods: Immersion/Soak

Analytical Methods: Gravimetric

Purpose: To find a replacement soap that will yield consistent cleaning for all substrates.

Experimental Procedure:
The pH should be <12.5.
Desire a non-emulsifying oil to limit waste stream.

Seven cleaning chemistries were selected using the Laboratory's Effective Test Conditions Database and from vendor supplied information. The chemistries were made into five percent solutions in 400 mL beakers using DI water. The pH of the solutions were then measured using an Orion Research microprocessor pH/millivolt meter 811. The cleaners were then heated to 140 F on a hot plate.

Twenty-one preweighed coupons were contaminated as described below. After recording contaminated weights, three coupons were cleaned in each solution for five minutes using stir-bar agitation. Coupons were rinsed in tap water at 120 F for 30 seconds and dried using a Master Appliance Corp, Hot-air gun model HG-301A at 500 F for one minute. After allowing the coupons to return to room temperature, final weights were recorded and cleaning efficiencies were calculated.

SUBSTRATE MATERIAL: Nickel Alloy - M400
CONTAMINANTS: Machine Lubricating oil S-50 (CAS#s: 64742-54-7, 64742-57-0), Die coolant oil W-373 (CAS#s: 64741-44-2, 64742-53-6, 64742-52-5)
CONTAMINATING PROCESS USED: Coupons were coated with the oils using a handheld swab and then placed in an oven at 160 F for one hour. Coupons were cooled to room temperature before reweighing.

Results: All seven cleaners tested had good to excellent removal of the two oils from the coupons. Only one was less than 80% effective, and three were cleaning over 90% of the oil. Additional observations were made to determine how the cleaner/oil mixtures separated. Six of the seven began to separate after an hour of sitting. The seventh cleaner, Accu-Clean, required no separation time. Table 1 lists the calculated cleaning efficiencies for each product tested.

	Accu-Clean	Safety Wash	KPC 820 N	790 P	Geo-Guard	Miracle #50	Ardrox
Coupon 1	83.09	90.19	91.35	91.89	86.38	86.90	92.42
Coupon 2	81.35	90.82	78.63	95.18	89.03	85.84	96.09
Coupon 3	93.35	91.90	63.09	98.89	89.54	85.04	88.80
Ave	85.93	90.97	77.69	95.32	88.32	85.93	92.44
Std Dev	6.49	0.86	14.15	3.50	1.70	0.93	3.65

Summary:

Substrates:	Alloys, Nickel				
Contaminants:	Cutting/Tapping Fluids, Lubricating/Lapping Oils, Oil				
Company Name:	**Product Name:**	**Conc.:**	**Efficiency:**	**Effective:**	**Observations:**
ITW Fluid Products Group	AccuClean	5	85.93	☑	
Emkay Chemical Company	Safety Wash Clear	5	90.97	☑	
US Polychem Corporation	Polyspray Jet 790 P	5	95.32	☑	
Calgon Corporation	Geo Guard 2000	5	88.32	☑	
By Pas and Star Products	Star Cleaning Miracle # 50	5	85.93	☑	
Ardrox Inc	6333	5	92.44	☑	
AW Chesterton	KPC 820 N	5	77.69	☐	

Conclusion:

CLEANING LABORATORY EVALUATION SUMMARY

EMKAY, US Polychem and Ardrox all removed 90% or better of the two oils. These three cleaners will be used in the next round of testing. Coupons will be cleaned using a low pressure spray wash unit (~14 psi). All other testing parameters will be kept the same.