TOC Ref No: EAR 4-07 Rev No: 1
IPDE#:

TOC Analysis Summary Report

Date:

Brief Title: CHT Pump

Section 1: Admin

(Requestors to fill out Sections 1-6 and forward to Domain PM)

Asset/Domain: Surface/ILS
Lead IPT or CPT: Lifetime Ops and Support

Originator: Steve Adkins
e-mail address: steve.adkins@dwicgs.com
Due Date Desired:

Organization: LCE IPT
Phone: 571-218-3323

Section 2: Description /Scope

Description/Scope: ID ways to decrease TOC by employing alternative CHT pumps on the OPC

Analysis Type (Select one):

☐ **Engineering Assessment – Quick Turn** – Analysis of Alternatives (low fidelity); ~ 1-week turnaround
☒ **Engineering Assessment – Rough Order of Magnitude** – Analysis of Alternatives (medium fidelity); ~ 2-week turnaround
☐ **Engineering Assessment – Detailed** – Analysis of Alternatives (high fidelity); ~ 1-month turnaround
☐ **TOC Inquiry** – Elucidation/Understanding of Data/Data Request

References:

CLIN(s):
DWBS#(s):
Asset Spec(s):
CDRL(s):
Other:

Section 3: Impact: What is the impact of not doing the change?

Section 4: Purpose: Check the appropriate line. If more than one apply, write "P" adjacent to the primary purpose.

Check	Purpose	
☐	Statutory	Required to meet Federal laws or regulations, regardless of source (E.g., EPA, SOLAS, DoD, FAR)
☐	Mandated	Required to meet ORD, directed by the PM, or required as a result of a "fact of life" situation that is beyond the Alliance's control
☐	Correct Error	Correct errors in the specification, contract drawings or contract SOW
☐	Grant Relief	Relax/modify a requirement to allow more flexibility or allow alternative equipment/processes to be used (e.g., change a configuration requirement to enhance producibility).
☒	System Performance	Improving system performance (e.g., effectiveness, efficiency, operability, maintainability, reliability)
☐	Mission Capability	Increasing the ship's operational capability (e.g., as a result of DFO/Fleet recommendation)
☒	Quality of Life	Improving the living conditions or working environment
☒	Safety	Correcting, alleviating, or preventing a hazardous condition

Section 5: Potential Impacts

	Check One				Check One		
Impact Area	**Favorable**	**Unfavorable**	**None**	**Impact Area**	**Favorable**	**Unfavorable**	**None**
Operating and Support Costs	☒	☐	☒	Weight	☐	☐	☒
Acquisition Cost	☐	☐	☒	KG	☐	☐	☒
Access	☐	☐	☒	Survivability	☐	☐	☒
Producibility	☐	☐	☒	Vulnerability	☐	☐	☒
Standardization	☐	☐	☒	Radar Cross Section	☐	☐	☒
Logistics Support	☐	☐	☒	Shock	☐	☐	☒
Environmental	☒	☐	☒	Noise/Vibration	☐	☐	☒
Human Engineering/Safety	☐	☐	☒	Coatings & Protective Systems	☐	☐	☒
Tests and Trials	☐	☐	☒	Structure	☐	☐	☒
GFE/GFI	☐	☐	☒	Propulsion System	☐	☐	☒
PARM Impacts	☐	☐	☒	Auxiliary Systems	☐	☐	☒
Electrical Load	☐	☐	☒	Deck Machinery/Systems	☐	☐	☒
Heat Load	☐	☐	☒	Damage Control	☐	☐	☒
Arrangements	☐	☐	☒	Communication Systems	☐	☐	☒
Long Lead Material	☐	☐	☒	Weapons Systems	☐	☐	☒
Material Selection	☐	☐	☒	Controls and Monitoring	☐	☐	☒

Other (explain): ☐ ☐ ☒

Section 6: Total Ownership Cost Analysis (Rough Estimate ONLY – Detailed Analysis to Follow)

CG Man Hours Saved per Month: 0

Initiative Cost Data	Current Design ($K)	Initiative ($K)
Acquisition Cost	$0.00	$0.00
Total Maintenance Costs	$0.00	$0.00
Non-CG Manpower Costs	$0.00	$0.00
Tech Manual Development Costs	$0.00	$0.00
Total Training Cost	$0.00	$0.00
Total Costs ($K)	$0.00	$0.00
TOC Impact ($K)	$0.00	

TOC Costs Compiled By (Name/Phone): **Date:**

Section 7: Tasking Approval*

Lead IPT Review: **IPT:** **Date:**

Name:
Comments:

☐ **Recommend Approve (ICGS Leader)** ☐ **Recommend Approve (Coast Guard Leader)** ☐ **Disapprove**
Refer To:

Domain PM Review: **Date:**

Name:
Comments:

☐ **Recommend Approve (ICGS Leader)** ☐ **Recommend Approve (Coast Guard Leader)** ☐ **Disapprove**
Refer To:

SOS Engineering IPT Tasking: **Date:**

Name:

1. Administrative Details	
Approval (Y/N).	
Assigned Due Date	
SoS Control No.	
Shop Order	
Remarks	

***Inquires do not require domain level approval**

Section 8: Report

1. Description of Problem: The Collection, Handling and Transfer (CHT) pump, Herborner centrifuge pump, currently planned on the baseline OPC has extensive maintenance costs. Identify the potential cost savings of implementing the Eddy Pump Corp. Tornado Effect

CC3000.

2. Assumptions:

- All costs provided in Constant 2002$
- Costs were deflated using the latest approved USCG Inflation Memo, 19 Oct 2005 (Master Number: 18265)
- All costs correspond to the delivery of the first OPC in 2012.
- Evac Zodiac is planning to propose the Herborner centrifuge pump for the OPC which is the pump that is currently being implemented on the NSC.
- Implementation Plan Version 1.9 used for this study.
- Maintenance Costs
  - Preventative Maintenance durations are rough orders of magnitude (ROM's) from Eddy Pump and Evac Zodiac
  - Corrective Maintenance hours were not provided by either of the vendors because MTBF testing has never been preformed on the two systems. The cost had to be generated by using a study completed by the Navy.
  - All corrective maintenance is assumed to be done by the contractor or third party subcontractor.
  - Utilized the 2002 Standard Personnel Cost (SPC) Calculator
  - Assumed 231 working days per year to calculate the average cost per hour of Coast Guard billet performing preventative maintenance.

3. Methodology Employed:

Eddy Pump CC3000

- Acquisition ROM's provided by Eddy Pump Corporation via email and phone conversation.
- ROM includes 2 pumping units and 1 controller. A comminutor is not needed for the Eddy Pump system.

Herborner 5.5 QSH

- Acquisition ROM provided by Evac Zodiac via email and phone conversation.
- ROM includes 2 pumping units, 1 controller, and 1 comminutor.

Maintenance Cost Estimate

- Eddy Pump provided a ROM for the durations of time needed for preventative maintenance actions
- Herborner Preventative Maintenance ROM provided by a third party subcontractor via email and phone conversation through Evac Zodiac.
- Using the 2002 Standard Personnel Cost (SPC) Calculator and assuming a middle salary grade E-5, generated a yearly salary to generate a cost per hour:
  - Assumed 231 workings days per year for an E-5 (365 - 104 weekends - 30 Leave)
  - Assumed 8 working hours per day to generate working hours per year
  - Divided the E-5 salary per year by the working hours per year to generate a labor cost per hour
  - Using the duration for the maintenance actions and the labor cost per hour, generated a cost to maintain the CHT Pump System per year. This cost was then spread over the OPC lifecycle using the V1.9 Implementation Plan.
- The vendor did not provide corrective maintenance hours or MTBF data on the Eddy Pump. In order to generate an estimate for corrective maintenance cost, ICGS TOC utilized data presented in a US Navy study. The Navy study compared the Eddy Pump system to a centrifuge system on the CVN class ships. (Similar centrifuge system as planned on the OPC). Corrective Maintenance data for seven aircraft carriers collected on the Eddy Pump to May of 1998 was compared to corrective maintenance data for the previously installed centrifuge pump. (Zero Leakage Tornado Effect Pump in the Fleet, Master #18515)
  - By analogy, an estimate for the Eddy CC3000 corrective maintenance (CM) was generated:
    - (Eddy Pump Acquisition ROM * Navy Eddy Pump CM Cost) / Navy Eddy Acquisition Pump ROM = Eddy Pump CM Cost
    - (128,000 * 171) / 450,000 = 48.64
  - By analogy, an estimate for the Herborner system corrective maintenance was generated:
    - (Eddy Pump CM Cost * Navy Old System CM Cost) / Navy Eddy Pump CM Cost = Herborner CM Cost
    - (48.64 * 8454) / 171 = 2405

Overhaul Cost Estimate

- Evac Zodiac provided a ROM for the overhaul cost and schedule of the Herborner system.
- Eddy Pump provided a ROM of $0.00 for overhaul costs citing that the Eddy pumps have operated on CVN class Navy ships for 10 years without needing an overhaul.

4. Findings:

- Using the vendor provided data along with estimates for the maintenance costs; the total ownership cost is estimated at $4.1M for the proposed Eddy Pump system and $21.8M for the planned Herborner system. This reflects a $17.7M savings for implementing the Eddy Pump on the OPC. The following table provides a detailed cost breakdown for the estimate.

Eddy Pump CC3000	Cost 2006$	Quantity	Inflation Factor	Total 2002$
Acquisition	$128,000	25	0.9249	$2,960,000
Overhaul	$0		0.9308	$0
Corrective Maintenance				$359,000
Preventative Maintenance				$782,000
Total Ownership Cost Eddy Pump CC3000				**$4,101,000**

Herborner 5.5 QSH	Cost 2006$	Quantity	Inflation Factor	Total 2002$
Acquisition	$125,000	25	0.9249	$2,890,000
Overhaul	$822,000		0.9308	$765,000
Corrective Maintenance				$17,747,000
Preventative Maintenance				$416,000
Total Ownership Cost Herborner 5.5 QSH				**$21,818,000**

Reduction of Total Ownership Cost (RTOC)	**$17,717,000**

5. Further Areas for Cost Reduction:

- This study was based on the CHT Pump system for the OPC. We can also look into incorporating the Eddy Pumps on the NSC and the FRC. With NSC design nearing completion an RTOC study would have to look into ECP costs to incorporate the Eddy Pump System into the current design. The CHT system for the FRC has not been finalized as of the time of this study.
- The Coast Guard already has the Eddy Pump System installed on 378 Cutters Hamilton and Chase. A study looking into incorporating the Eddy Pump system on all Legacy Coast Guard Cutters should be considered.
- The use of the Eddy Pump system should also be considered for the brine application (water distilling plant).

Cost Components	Current Condition	Cost ($K)	New Condition	Cost ($K)	Net ($K)
Acquisition Cost					
Asset A	XYZ as Issued	0	XYZ Improved	0	
	Component X	0	Component Y	0	
Asset B	W/O ABC	0	ABC Added	0	

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Net			0		0	0
Total Maintenance Costs						
Asset A	XYZ as Issued	0		XYZ Improved	0	
Asset B	W/O ABC	0		ABC Added	0	
Net			0		0	0
Manpower Costs						
Asset A	XYZ as Issued	0		XYZ Improved	0	
Asset B	W/O ABC	0		ABC Added	0	
Net			0		0	0
Tech Manual Development Costs						
Asset A	XYZ as Issued	0		XYZ Improved	0	
Asset B	W/O ABC	0		ABC Added	0	
Net			0		0	0
Total Training Cost						
Asset A		0		XYZ Improved	0	
Asset B		0		ABC Added	0	
Net			0		0	0
Total Costs			**0**		**0**	
TOC Impact						**0**

Additional Comments:

Section 10: TOC Engineering IPT Administration

To be completed by ICGS TOC ENG Team Point Rep

1. Administrative Details	
Task Ref. No.	EAR 4-07
ICGS Point of Contact	Timothy Griffis
Additional POCs	Vince Cereste
ACEIT build used	
Supporting Documentation	
2. IPT Endorsement	
Review Date	
Vote	For, Against
Acceptance (Y/N)	
Remarks	
3. Delivery	
Date Delivered	
Recipient	

Section 11: TOC Performance Metrics Remarks

1. Participation	
CG Staff Assigned	
2. Comments on Soundness and Validity	
Problem Description	
Assumptions	
Methods	
Results	
3. Conclusion	
Concurrence (Y/N)	
Remarks	
Name & Rank	
Date	

Section 12: Subsequent Disposition

Remarks	
Contract Mods (Number/Date)	/ /
Completed by	
Date Completed	