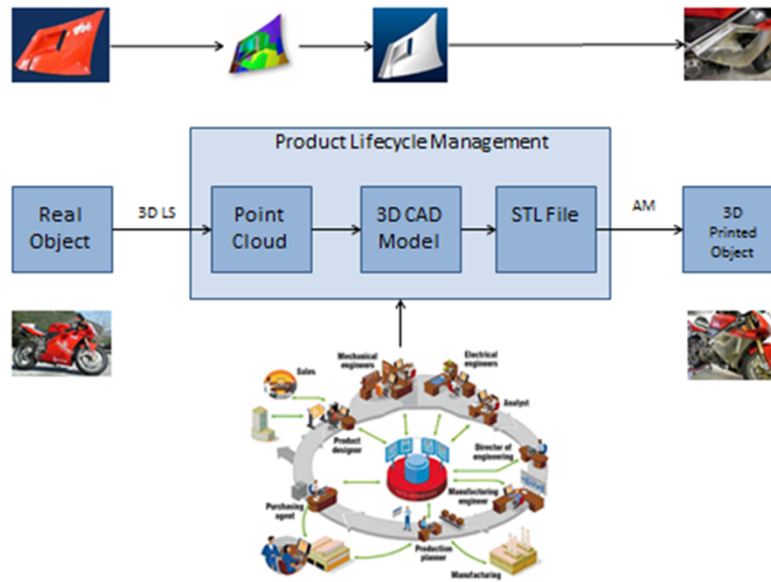


This thesis uses knowledge value added (KVA) methodology to identify additional cost savings that can be achieved in the ship maintenance (SHIPMAIN) process by implementing information technologies. Specifically, the technologies considered in this study are 3D printing, product lifecycle management, and 3D laser scanning. Using the current process as a baseline, KVA is applied to two notional scenarios, one using 3D printing only and one using all three technologies to reengineer the current process.



To Be SHIPMAIN Process Overview

Core Process	Process Title	Number of Employees	Total Benefits	Total Cost	ROK	ROI
Block 250	Authorize and Issue Letter of Authorization (LOA)/Hull Maintenance Plan (HMP); Generate 2Ks	9	\$22,588,963	\$5,685,884	397%	297%
Block 265	Hull Installation and Risk Assessment	44	\$94,800,881	\$138,454,222	68%	-32%
Block 270	Authorize Installation	4	\$24,677,019	\$3,294,087	749%	649%
Block 280	Resolve "Not Authorized/Deferred SC	1	\$3,701,553	\$663,192	558%	458%
Block 300N	Install SC Normal	46	\$66,216,667	\$30,437,316	218%	118%
300AM	Install SC AM	13	\$28,374,718	\$642,386	4417%	4317%
Block 310	Feedback: Cost, CM, Performance, Schedule, ILS	2	\$1,850,776	\$663,192	279%	179%
Block 320	Continue Installs	5	\$4,626,941	\$3,284,846	141%	41%
Block 330	Final Install, Closeout SC	1	\$925,388	\$331,596	279%	179%
			\$247,762,905	\$183,466,701	135%	35%

Radical To-Be SHIPMAIN Process Overview

Core Process	Process Title	Number of Employees	Total Benefits	Total Cost	ROK	ROI
Block 250	Authorize and Issue Letter of Authorization (LOA)/Hull Maintenance Plan (HMP); Generate 2Ks	4	\$16,215,953	\$2,230,371	727%	627%
Block 265	Hull Installation and Risk Assessment	26	\$172,381,012	\$67,136,528	257%	157%
Block 270	Authorize Installation	4	\$26,334,464	\$3,299,649	798%	698%
Block 280	Resolve "Not Authorized/Deferred SC	1	\$4,937,712	\$403,478	1224%	1124%
Block 300AM	Install SC	36	\$121,122,075	\$552,118	21938%	21838%
Block 310	Feedback: Cost, CM, Performance, Schedule, ILS	1	\$2,370,102	\$204,520	1159%	1059%
Block 320	Continue Installs	5	\$6,172,140	\$2,633,439	234%	134%
Block 330	Final Install, Closeout SC	1	\$1,975,085	\$270,839	729%	629%
			\$351,508,543	\$76,730,941	458%	358%

Thesis Findings

- “To-Be” Scenario (3D Printing only): The overall ROK and ROI of the process stayed the same at 135%, although the ROK for the portion of Block 300 with 3D printing rose to 4,317% compared to the traditional production ROK of 118%
- “Radical To-Be” Scenario (3D Printing, PLM, & 3DLS): The overall ROK and ROI of the process rose to 458%, including gains of over 100% in every block except Blocks 270 and 320.
- The “Radical To-Be” Scenario indicates a savings of \$120 million per year is possible if all the technologies are implemented.