XXII. EFFECTS OF REDUCED MANNING

A. INTRODUCTION

With the budgetary constraints experienced by DOD during the 1990s, the Navy leadership started exploring reduced manning onboard ships. In 1995 Admiral Boorda, then Chief of Naval Operations, sponsored the Smart Ship Program to test some of the ideas and technologies that could potentially lead to reduced manning in every ship of the U.S. Navy. In 1995, *USS Yorktown* (CG 48) was the first ship to test this new operational concept. Through the use of a fiber optic ship wide area network (SWAN), automation software, and a radical change in the ship's organization and watchbill, *Yorktown* successfully operated with integrated bridge, damage control, and engineering systems which automated many of the routine daily tasks. *Yorktown's* Smart Ship evaluation report also claimed the following:

- A 15% reduction in maintenance workload.
- The potential for an estimated $1.75 million per year shipboard manpower savings.
- An estimated $2.76 million per year reduction in life cycle costs, including associated shore manpower reductions and shipboard repair savings [US Navy website 2002].

In 1996, a similar program was initiated onboard *USS Rushmore (LSD 47).* As in the *Yorktown's* case, the *Rushmore* was upgraded with a ship wide area network and automation software. In addition, *Rushmore* also served as a test platform for new technology to be implemented in the new *San Antonio (LPD 17)* class amphibious assault ships. The increase in automation and efficiency brought about by advanced technologies suggested a consequent reduction in the number of personnel required to operate the ship. Based solely on operational watch standing requirements, it was decided that the ship could reduce its manning from 311 to 268 personnel. The ship would be organized under

a core watchbill, with three sections dedicated to standing watch. Non-watch standing personnel would carry out the ship's daily routine, conducting maintenance and keeping the ship clean. These personnel would also be assigned on the core watchbill to billets for infrequent events and special details such as underway replenishment and flight operations. The ship's damage control organization was also revamped, with numbered repair lockers being replaced by the Red, White, and Blue Teams.

As new ships design are developed, reduced manning concepts have increasingly become one of the most import considerations in ship design, not only because it is a fact of life that new automation technologies are becoming more stable and reliable, but also because of its potential benefits in operating cost reductions, quality of life for sailors, and overall ship's readiness.

The following analysis compared manning onboard current amphibious platforms and the proposed manning onboard the TSSE conceptual design. This analysis focused in manning demographics, crew volume requirements, and manning costs. This chapter ends with sections on conclusions and recommendations.

B. MANNING DEMOGRAPHICS

1. Analysis Data

Manning demographics and cost data from the Naval Center for Cost Analysis were used. Manning demographics per pay grade for LHA class, LHD class, LPD, and LSD are illustrated in Appendix 12-1. Manning demographics for the TSSE conceptual design were taken from the TSSE report.

2. Current Manning

Current manning doctrine onboard Navy ships is heavily composed of junior enlisted personnel, especially the E-1 through E-3 pay grades. These grades account for 38.6% of the total crew in an LHA, and for 49% of the crew in an LPD.

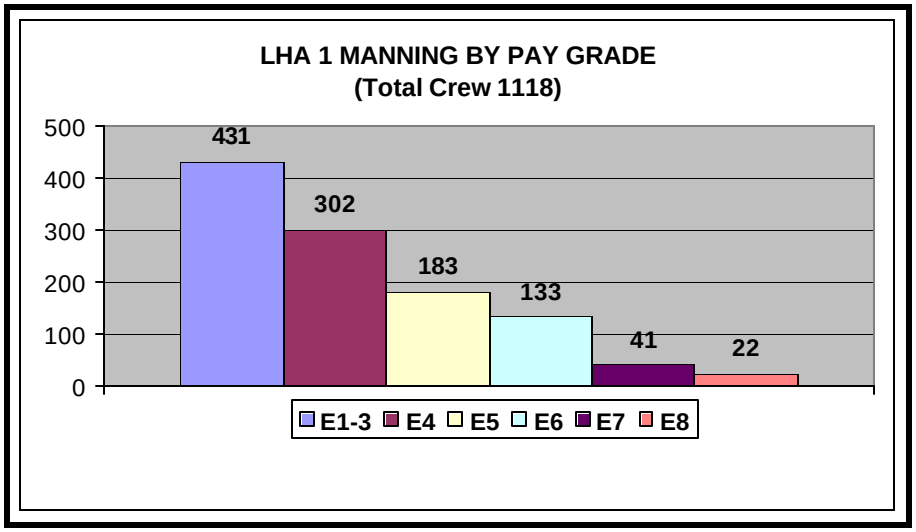

Figure XII-1: LHA 1 manning by pay grade.

In the LHA manning, 277 or 25% of the ship's crew is in a non-designated status. Onboard an LPD, 101 or 26% of the total crew falls into this category (Naval Center for Cost Analysis, 2002). Non-designated personnel are sailors, who, after completing basic training, attended apprentice training in any of four basic areas: Fireman, Airman, Seaman, or Construction Electrician. Personnel in this category have the option of selecting a rate within their basic apprentice area. Personnel in the pay grades of E-1 through E-4 are usually under training in their respective rates. Maintenance performed on equipment by these pay grades is generally restricted to basic Preventive Maintenance System maintenance and minor preservation.

The manning by division onboard the LHA is illustrated in figure XII-3. In this graph, the main propulsion division composed of Machinist's Mates has the highest number of personnel with 88. This illustrates the high manpower requirements for steam propulsion systems. The next largest division is S-2 with 79 personnel. This division is composed mainly of Mess Management Specialist and Ship's Hotel Serviceman personnel. The CO Division is composed of the Aviation Ordnance rate and occupies the third place with 75. This division handles aviation ordnance and maintains the ship's magazines. Divisions in the Air Department follow closely in manpower requirements. From the three divisions that compose the department, V-1 has the highest number of

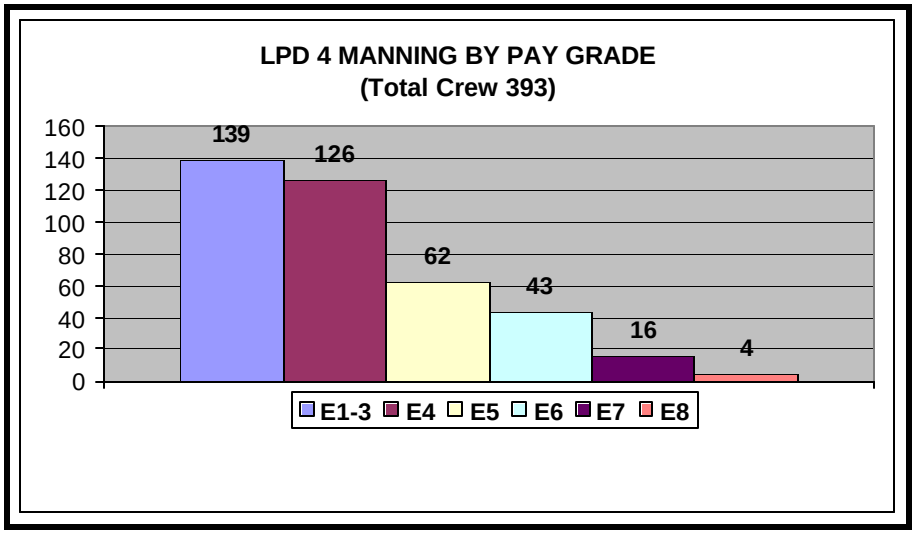

Figure XII-2: LPD 4 manning by pay grade.

personnel, followed by V-3 and V-4. Aviation Boatswain's Mates make up V-1 and V-3 Divisions, while Aviation Boatswain's Mates Fuels compose V-4 Division. Composed of Boatswain's Mates, 1st Division occupies the fourth place with 60 personnel. This division is mostly tasked with the ship's preservation, maintenance and operation of deck equipment and underway replenishment stations. Repair Division composed mainly of Hull Technicians, and Damage Controlman has 47. This division is tasked with conducting repairs to the ship's structure and maintenance, operation of damage control equipment, and providing the first line of defense against fires and flooding.

Figure XII-4 illustrates the manning by division onboard an LPD 4 class ship. Compared to the LHA the results show a very similar picture of the manning distribution onboard this ship. The main difference between the LPD and LHA manning schemes is that onboard the LPD, 1st Division has the greatest number of personnel with 46, followed by M and B (now Main Propulsion Division) Division in the Engineering Department with 37 and 34 respectively. The S-2 division in the Supply Department follows closely with 34 personnel.

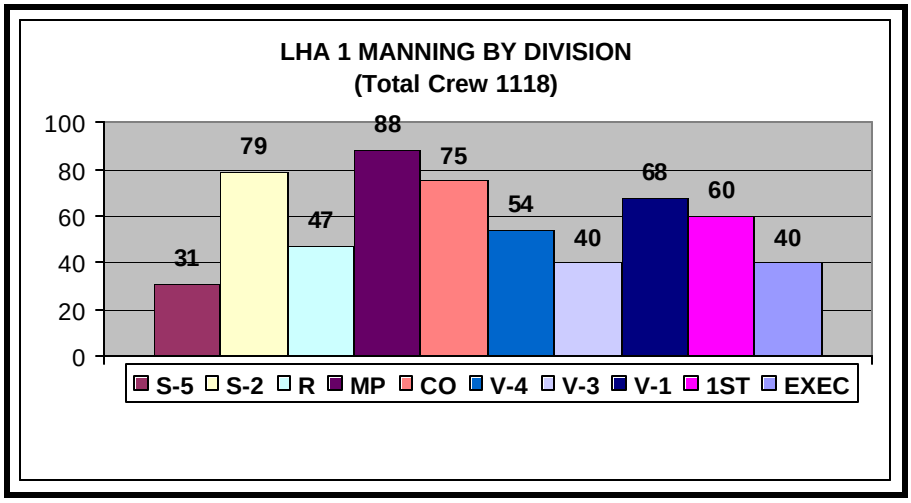

Figure XII-3: LHA 1 manning by division.

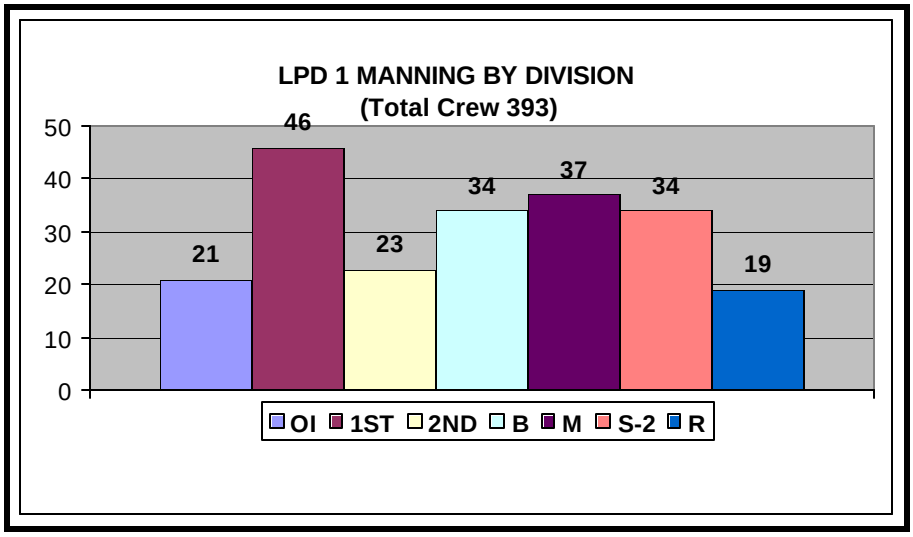

Figure XII-4: LPD 4 manning by division.

3. Proposed Manning

In the proposed manning scheme for the TSSE conceptual design, reduced manning was an integral part of the design philosophy. That meant that every system considered to be part of the ship had to address reduced manning requirements. Reduced manning and automation systems were selected especially for Engineering, Supply and logistics support, and Air Departments.

The TSSE conceptual design has a total complement of 724 personnel. Figure XII-5 shows the breakdown in personnel by pay grade. The column labeled E-4, actually reflects the manning of pay grades E-4 and below, but due to insufficient time, the TSSE team was unable to further identify the exact number of personnel within these pay grades.

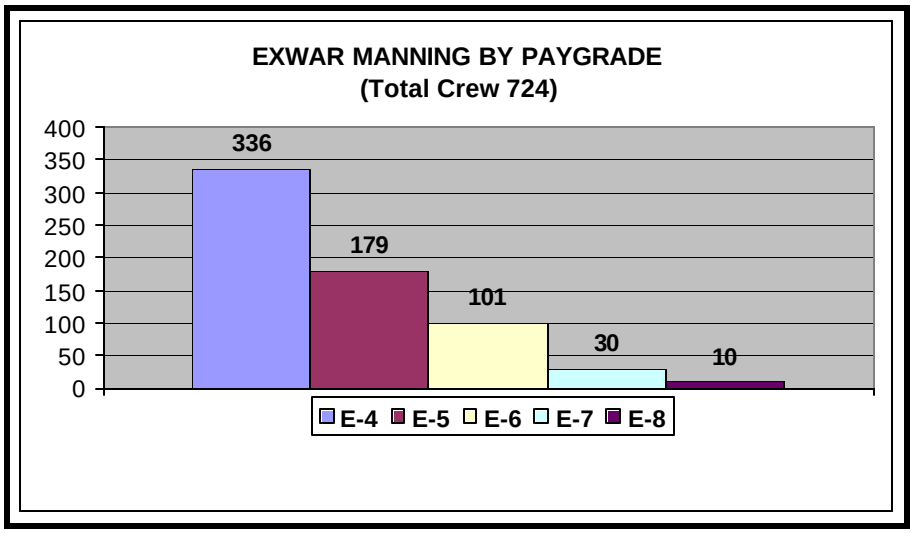

Figure XII-5: ExWar manning by pay grade.

One extremely important assumption the TSSE team made was that every single sailor reporting to the ship would be fully qualified and trained in his or her watchstation. According to Task Force Excellence through Commitment to Education and Learning (EXCEL), a revolution in personnel training will take place because:

- The complexity of our missions and technologies are growing at an unparalleled rate.
- Over the next several years many of our most experienced people will be retiring.
- Our sailors expect to learn and grow.
- It is our responsibility to make sure our people are the best trained and most prepared.
- Today, there are extraordinary educational opportunities in the commercial and academic sectors (Task Force EXCEL website, 2002).

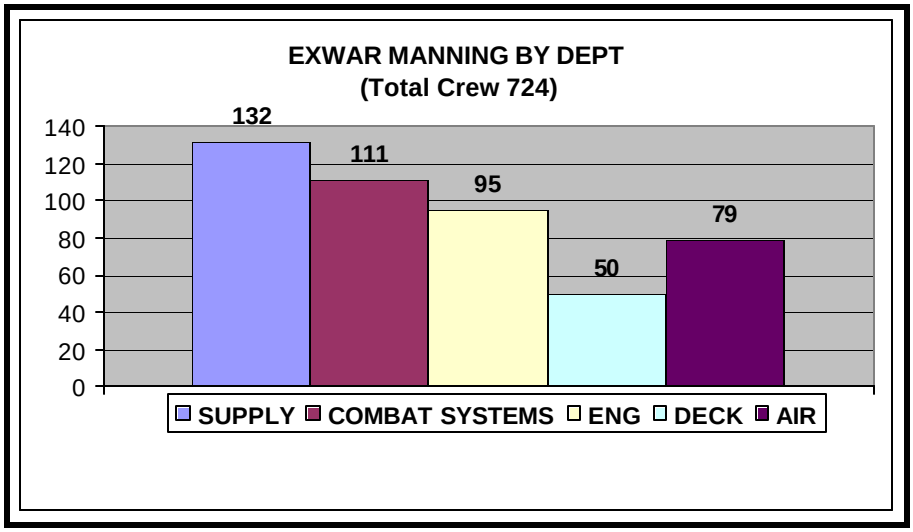

Figure XII-6: ExWar manning by department.

Figure XII-6 illustrates the TSSE concept design manning by department. Due to the logistic nature of its mission, the supply department has the greatest number of personnel with 132, followed Combat Systems, Engineering, and Air Departments with 111, 95, and 79 personnel, respectively.

According to the TSSE report, the three departments that made the most use of automation were Supply, Engineering, and Air Departments. These departments also had the greatest decrease in manning. New technologies such as automated store rooms and magazines, electric drive, integrated power distribution, robotics, and advanced preservation reduced manning in these departments.

C. CREW VOLUME REQUIREMENTS

1. Analysis Data

Crew volume requirements data was used from OPNAVINST 9640.1A, Shipboard Habitability Program, section T9640-AB-DDT-010-HAB, Shipboard Habitability Design Criteria Manual. Calculations and data in this manual were used to calculate berthing, head, and messing facilities volumes.

Figure XII-7 shows the crew volume requirements for each ship class. The LHD has the highest volume requirement with 228,726 ft^3, followed by LHA and TSSE conceptual design with 216,892 and 127, 450 ft^3, respectively. To place these numbers

into context, the total cargo capacity for the LHD is 101,000 ft^3, while the palletized cargo capacity for the LHA is 116,900 ft^3. The designed warehouse capacity for the TSSE concept design is 819,000 ft^3. In other words, the crew volume requirement for the LHD is 2.26 greater than its effective cargo volume, while the crew volume requirement in an LHA is 1.84 greater than its effective cargo volume. The crew volume requirement for the TSSE conceptual design is only 15.5% of its total stores cargo capacity.

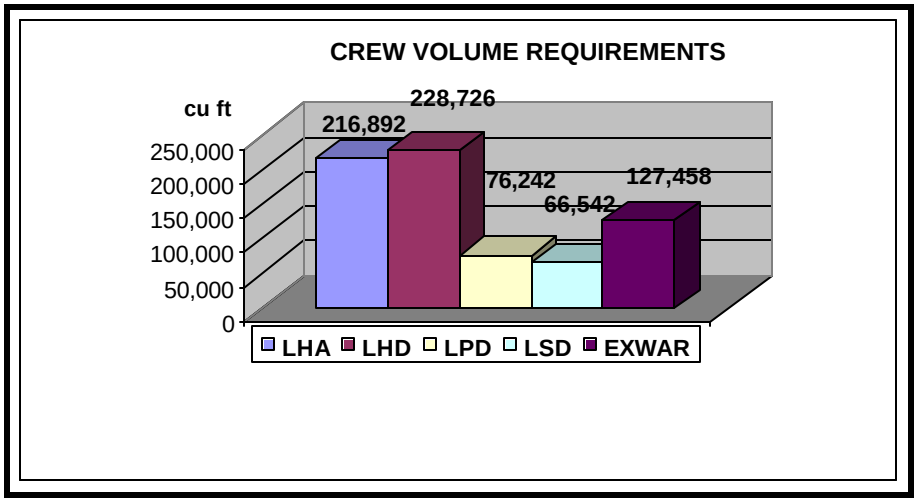

Figure XII-7: Crew volume requirements.

D. MANNING COST

1. Analysis Data

Manning costs were used from the Cost of Manpower Estimating Tool (COMET) software version 2.0. Figure XII-8 illustrates the average yearly cost broken down by pay grade. The cost includes direct and variable indirect costs. Direct cost includes items such as military compensation (basic pay), enlistment and reenlistment bonuses, etc. Variable indirect costs include expenditures in training, medical and dental support, etc.

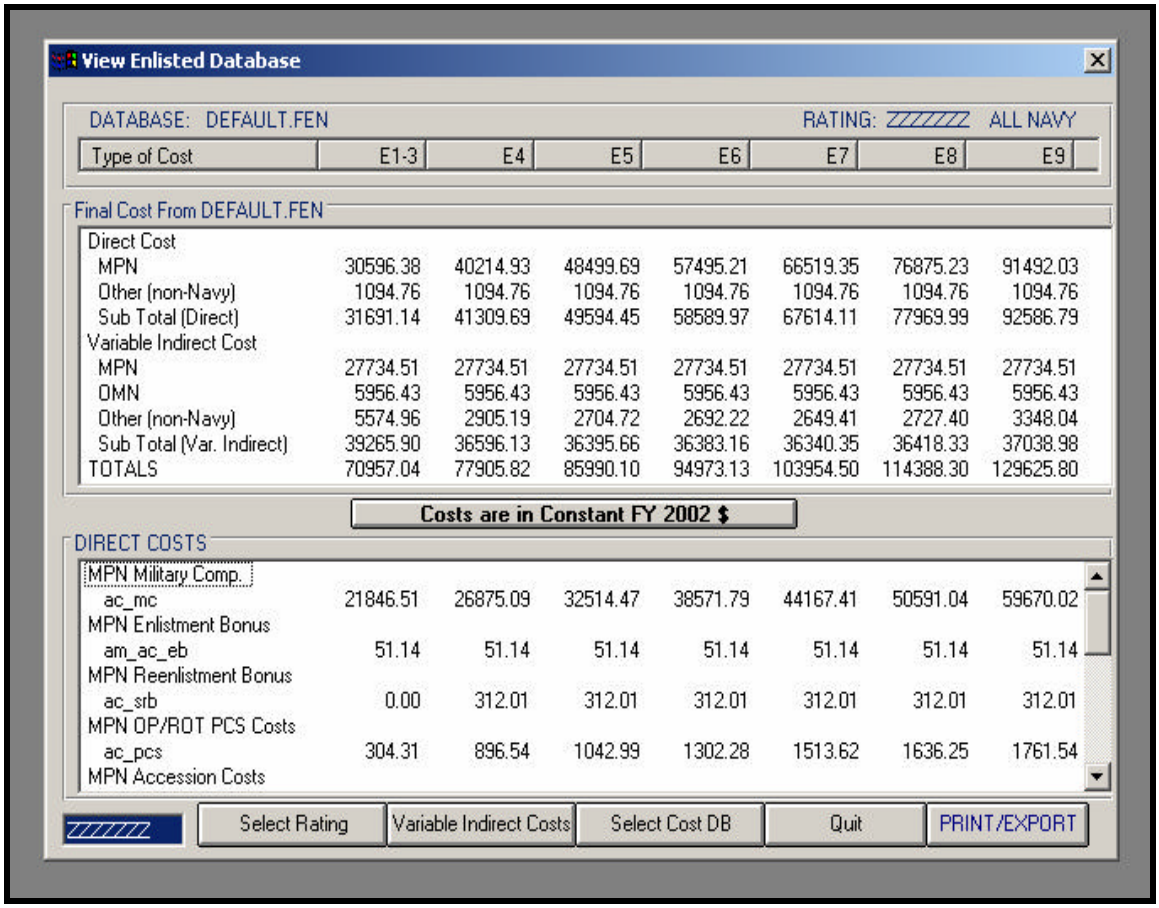

Figure XII-8: Yearly enlisted expenditures (2002) (Source: Naval Center for Cost Analysis. Cost of Manpower Estimating Tool COMET Version 2.0).

Manning cost estimates were calculated for the year 2002, and illustrated in Figure XII-9. The yearly manning cost for the LHD and the LHA are $95.3 and $90 million respectively. The manning cost for the TSSE concept deign is $55.5 million, while the LPD and the LSD are $31.6 and $27.6 million in that order. Despite the fact that the TSSE design displaces over 80,000 long tons, twice the displacements of an LHA and LHD, reduced manning allows it to operate at $35.5 million less than an LHA and $40 million less than an LHD.

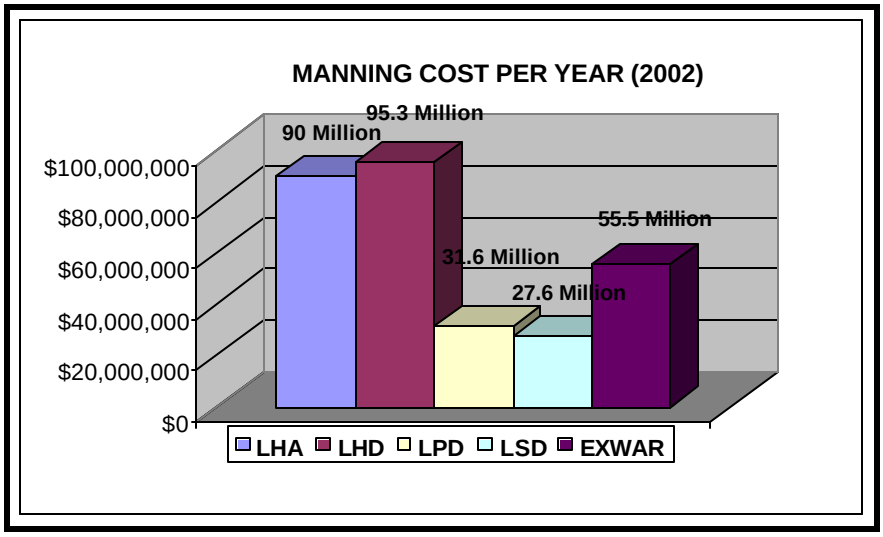

Figure XII-9: Ship manning cost per year.

Figure XII-10 shows the yearly manning cost of a TSSE conceptual Sea Base composed of six ships, and the yearly manning cost (only ship's company) for an afloat MEB composed of three LHAs, three LHDs, four LPDs, and five LSDs. The manning cost for an aggregated force of 15 ships is considerably larger than the manning cost of the conceptual Sea Base. In fact, the manning price tag for the conceptual Sea Base is only 40.6% of the manning cost of an actual afloat MEB.

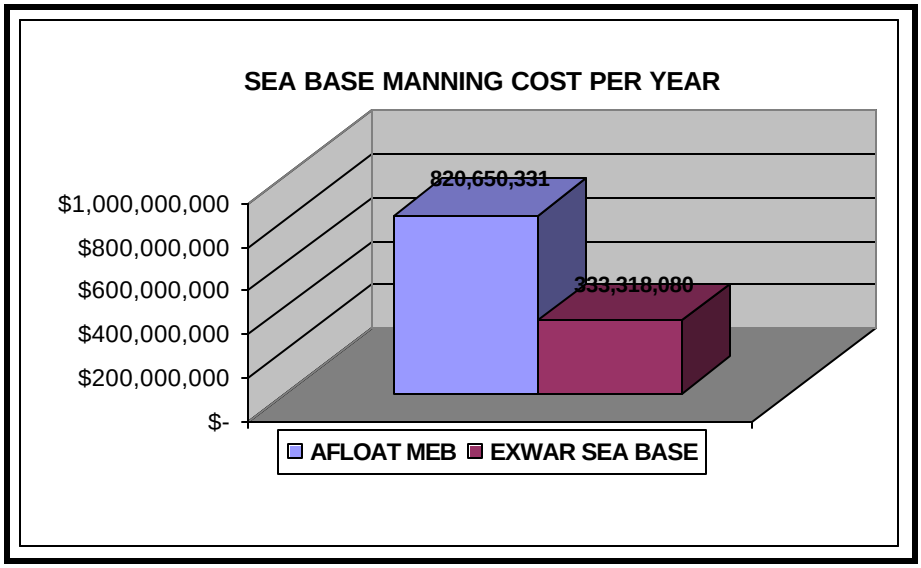

Figure XII-10: EXWAR Sea Base vs. Afloat MEB manning cost.

E. CONCLUSIONS

Reduced manning initiatives have been explored in the U.S. Navy for less than ten years. Only two ships in the Navy, the *USS Yorktown (CG 48)* and the *USS Rushmore (LSD 47)* have implemented this new concept. With only a manning reduction of 10% and reports that software conflicts left the ships dead in the water (Government Computers News, 1998), the Navy claims a total success in the case of the *Yorktown*. In the case of the *Rushmore*, Cedrik Pringle's Naval Postgraduate School thesis evaluated the impact of the Smart Gator concept on the mission readiness of the *Rushmore*, and concluded that the reduction in manpower and the additional training requirements for the crew negatively impacted mission readiness (Pringle, 1998).

It is a fact, as current manning doctrine shows, that on average close to 50% of amphibious ships crew is relatively junior, inexperienced, and their absence would not prevent the ships from getting underway and operating in an efficient manner. Could we get rid of every single E-1 through E-3 aboard these ships? Absolutely not. The answer is because ships like *Yorktown, Rushmore* and the rest of the fleet were not design for reduced manning.

In order for reduce manning to work, it has to be an integral part of the ship's design philosophy. Reduce manning and automation systems, along with new manning doctrines can work, but they have to be planned, integrated, and implemented from conception. Reduced manning will not come easily. Software research is barely scratching the surface of key technologies such as Expert Systems, Decision Support Systems, and Artificial Intelligence. In addition, reduced manning has tremendous implications for the Navy in areas such as recruitment, training, and retention. Finally, there is some institutional resistance that will oppose reduced manning every step of the way.

F. RECOMMENDATIONS

Are there any benefits to reduced manning? Yes, there are benefits in operational costs, decreased volume requirements, increased performance, and efficiency. Should we attempt to implement it as soon as possible? Absolutely not. There is still a long and arduous road ahead, and as mentioned earlier, the process has to be a calculated and

progressive one. We have to start with our people. In order to implement reduced manning the Navy will be required to train sailors to make them smarter, technologically savvy, and technically proficient. With this philosophy, the benefits of a smarter workforce will start paying off way before we fully implement reduced manning.

We need to explore every opportunity, process, task, and ask the question…could we make this happen without human intervention? If the answer is yes, how this change will affect combat effectiveness and performance? What type of technology or doctrinal change will help us make it happen?

Finally, technology insertion is not as bad as portrayed by the media regarding the *Yorktown's* glitches. As a matter of fact, it will be a painful and challenging step towards reduced manning. We need to take a closer look to our most intensive manpower tasks, and ask the questions previously stated. Departments such as Engineering, Supply, and Air are opportunity rich.