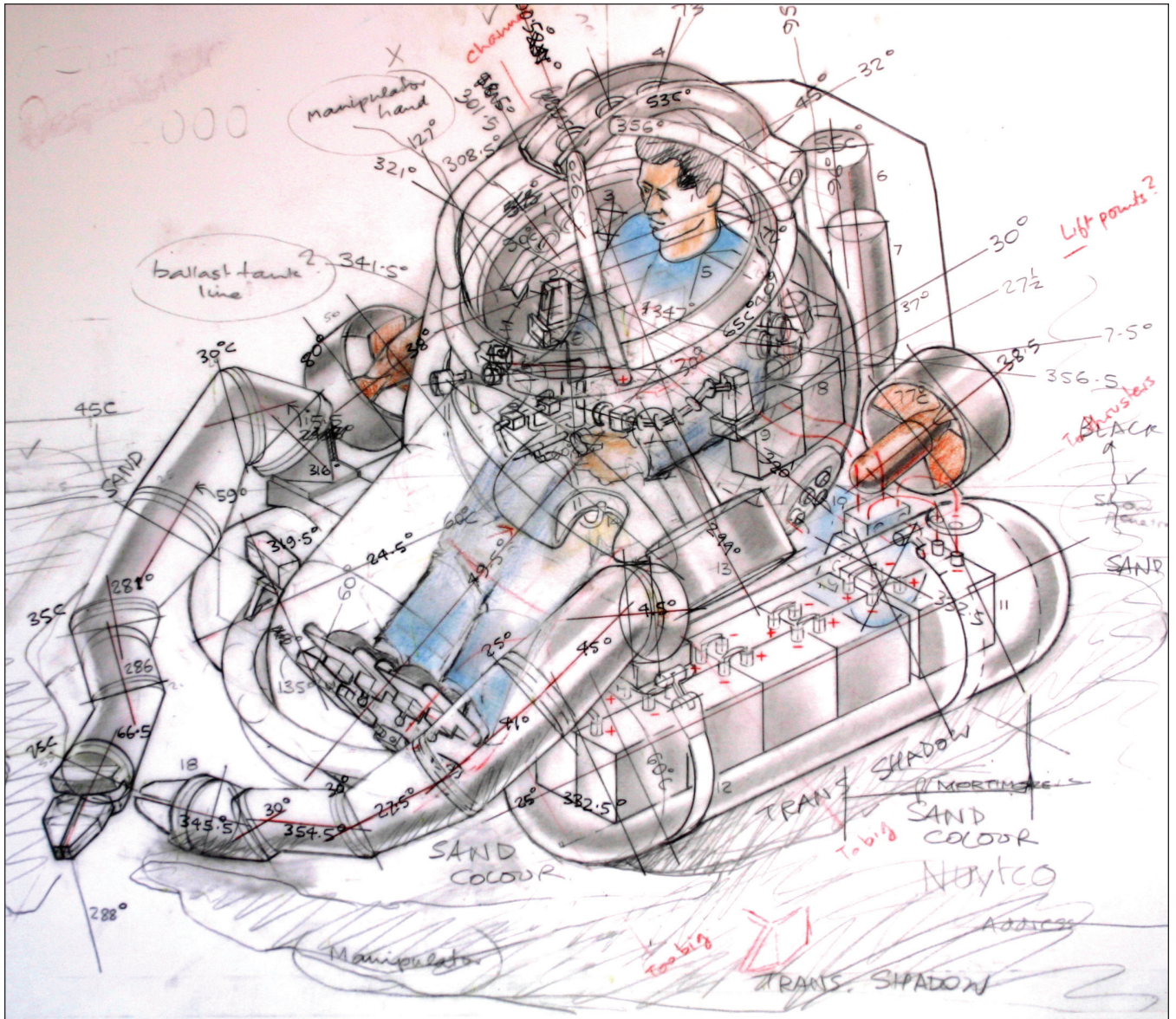


# Chapter 2



# Design Toolkit

## Chapter 2: Design Toolkit

### Stories From Real Life: Quest for a Ship of Gold

#### Chapter Outline

1. **Introduction**
2. **Common Design Challenges**
  - 2.1. Strategies for Successful Projects and Missions
  - 2.2. Strategy A: Keep Your Eye on the Mission
  - 2.3. Strategy B: Build an Effective Team
  - 2.4. Strategy C: Be Proactive about Project Planning, Management, and Safety
  - 2.5. Strategy D: Think in Terms of Systems
  - 2.6. Strategy E: Use the Design Spiral
  - 2.7. Strategy F: Research, Research, Research
  - 2.8. Strategy G: Build and Test Prototypes
3. **A Design Methodology for Underwater Vehicles**
  - 3.1. Stage 1: Accepting the Mission
  - 3.2. Stage 2: Crafting a Mission Statement
  - 3.3. Stage 3: Identifying the Mission Tasks
  - 3.4. Stage 4: Establishing Performance Requirements
  - 3.5. Stage 5: Identifying Constraints
  - 3.6. Stage 6: Listing Vehicle Systems
  - 3.7. Stage 7: Generating the Concept Design
  - 3.8. Stage 8: Fabricating the Vehicle
  - 3.9. Stage 9: Conducting Sea Trials
  - 3.10. Stage 10: Carrying Out Operations
  - 3.11. Stage 11: Evaluating Ops and Writing a Report
4. **Chapter Summary**

#### Chapter Learning Outcomes

##### **Figure 2.1.cover: Concept Drawing of Deep Worker**

*Systematically working through the steps in a design methodology will help you arrive at a realistic concept drawing of your vehicle, such as this one of the Deep Worker submersible.*

*A concept drawing, along with parts lists, cost estimates, and other information you've collected, allows you to assess the feasibility of building it.*

Image courtesy of Phil Nuytten, Nuytco Research, Ltd.

- Describe the major challenges when designing and building an underwater vehicle, regardless of size.
- Describe specific strategies to address common design and building challenges (for example, how to be proactive about team safety), as well as how to keep a project on schedule and within budget.
- Explain the nature and importance of various design strategies, for example:
  - 1) being proactive about project management
  - 2) using the design spiral approach
- Explain how the various design methodology stages, (for example, identifying constraints) help define an underwater vehicle before it ever gets built.