A computer model for life cycle costing (LCC) and life cycle assessment (LCA) of shipyard blasting and painting was developed to provide shipyards with an integrated system that will result in waste minimization, cost optimization, increased environmental compliance, and optimized use of resources. This system uses standard LCC and LCA logistics for computing costs and resource requirements.

**What Does the Computer Model Offer?**
- Identifies all important parameters required for LCC and LCA of shipyard blasting and painting operations.
- Calculates direct, indirect, and societal costs for all stages (cradle-to-grave) of blasting and painting operations.
- Determines the most economic and most environmentally friendly alternatives for painting and surface preparation using dry abrasive blasting methods.

**Important Features of the LCC/LCA Computer Model**

**Advanced Graphical User Interface:**
The graphical user interface has been designed to take advantage of common program interfaces, which minimizes the time required to learn the system. It includes frames on:
- Equipment
- Parameters related to blasting and painting operations
- Direct costs
- Indirect costs
• Societal costs
• Costs summaries
• Trends
• Reports
• Help file

Equipment
This LCC/LCA computer model enables the user to select the physical equipment used and to modify their corresponding specifications based on information supplied by the manufacturers for blasting and painting equipment.

The user can select:
• Different parts of equipment
• Costs of equipment as well as their parts
• Add, update, and modify costs and equipment
• Supplier’s information
• Add new suppliers
• Suppliers and their corresponding products

Parameters Related to the Blasting and Painting Operation
This section enables the entry or calculation of the following variables:
• Blasting materials and paints
• Number of uses in the case of blasting
• Available operating pressures and feed rates
• Productivity for selective operating conditions
• Physical location of the plant
• Labor costs
• Energy costs
Indirect Costs
According to the shipyard size (large, medium, and small), the user can select the permit fees, record keeping costs and the compliance costs. This information has to be entered one time in the database for the selected facility.
This section covers the following for both painting and blasting operations:
• Permit fees, record keeping and compliance costs
• Add/modify or delete the outdated information
• Emission costs and expected pollutants
• Summary of total indirect costs
• Disposal costs
• Waste generation rates

Societal Costs
This is one of the most innovative features in this LCC/LCA computer model for blasting and painting operations. This section determines the equivalent monetary value of the impact caused by pollutants released into the environment. It allows the user to determine the possible range of costs for various pollutants according to their hazard values. Moreover, the user has the option to enter/modify his/her information on societal/environmental costs based on the blasting materials or paints.
This section deals with the following parameters:
• List of related pollutants
• Two possible alternative lists for their selection
• Add/modify or delete options
• Summary of total societal costs
• Amount or percentage of generated pollutants
Summary of Costs
Reports for blasting analysis include abrasive types, process conditions, direct costs, indirect costs, and societal costs. Reports for painting analysis include paint types, application methods, direct costs, indirect costs, and societal costs.

Anticipated Benefits
The LCC/LCA computer model:
- Identifies alternative blasting materials and operating conditions that minimize direct costs (materials, labor, energy, and equipment), indirect costs (waste handling/disposal costs, permit/compliance costs), and societal costs (equivalent monetary value of the impact caused by the pollutants/waste released into the environment)
- Identifies the paint application methods which result in the lowest direct, indirect, and societal costs
- Achieves compliance as the best alternatives are quickly analyzed, which helps in their implementation
- Shipyard can use the three cost categories in selecting the most suitable alternatives to match their site specific conditions
- Currently available information is included in the computer model, which saves time and efforts by shipyards
- The computer model enables the entry of new information and/or modification of existing information if shipyards wish to use either their own research data or other data when available