APPENDIX B – System Requirements

Application:

The objective of the Activities-based Cost Estimator (ACE) tool, as specified by NGSS, is to extract weld information from CAD files and export that data into XML formatted files to feed TeamCenter analysis and planning efforts. The following requirements were set by NGSS.

Business Requirements

- The tool will extract weld attributes that will enable NGSS to accurately budget and schedule work
- The tool will support these cost and time estimations that are performed within the Team Center Manufacturing system
- Pilot application will be the NGSS-New Orleans panel line
- System Owner (group in charge of installation and system maintenance) will be NGIT
- System Users (group that will execute the tool) will be Production Planning and Industrial Engineering
- The system should not be Navy program specific
- Essential: Need to develop acquisition cost of the tool, components include
    - Initial implementation cost
    - Maintenance costs
    - Future support costs
- Documentation supplied to NGSS IT
- Maintenance and future support of development will be contracted out

Functional Requirements

- Assume all seams/joints to be welded
- Need to count the number of standard parts in addition to the length of weld, no need to specify orientation and type for these welds
- Needs to import information from the following CAD formats:
    - Essential: Intergraph (can be converted to *.dxf or *.igs)
    - Essential: CATIA V5
    - Preferred: Pro-E, AutoCAD, ShipConstructor
- Import from single or multiple files

- Extract weld information from following construction stages
    - Between two individual parts
    - Welds within a structural unit
    - Welds to join previously welded assemblies
- The tool will deliver the following information:
    - Weld Length
    - Weld Orientation
        - Horizontal
        - Vertical (defined as any weld >30° from horizontal)
        - Overhand
    - Weld Size – this will not be done automatically, user will need to specify weld size interactively
    - Weld Process: Fillet or Butt
- Weld orientation is dependent on the orientation of part. Need the ability to specify
    - Primary orientation of part during welding
    - Alternative orientations to optimize horizontal welding
    - Specify weld orientation for select group of subcomponents
- Code needs to classify weld orientation based on direction of gravity. Possibly check multiple orientations and use rule to optimally classify as many welds as possible as horizontal
- Extracted data should be exported in an XML format
- Preferred: also export data in printable report.
- Present extracted data at multiple levels
    - Each individual weld
    - Roll-up of weld information at input file level and specified group
- Possible part/process attributes in CAD
    - Weld symbol – kept in the requirement, but may not be used since majority of file formats do not include weld specifications.
    - Individual part names
    - Part hierarchy from part naming convention
    - Standard part identification from part naming convention
- Ability to apply rules to the extracted information. Possible rules include:
    - Weld Orientation: rules for defining the weld orientation, e.g. welds >30° from horizontal is considered vertical
- Interactive capability to
    - Read in a file
    - Read in multiple files
    - Export information in XML format

  - Select a weld
  - Specify weld attributes for single weld (includes size, type , orientation and rule)
  - Select multiple welds and specify size, type, orientation, weld rule, and/or query accumulated weld length
  - Query weld attributes for single, selected weld
  - Turn on/off identified weld for export
  - Select construction stage for consideration (weld all components or consider single object)

- Ability to consider one file that has been read into the program as
  - A collection of component parts to be welded
  - Single object where no internal joints are welded
- Construction hierarchy handled by part naming convention
- Primary mode of operation: User Interactive

Non-Functional Requirements

- System initially applied to NGSS-New Orleans panel line
- Data exported in XML format
- No current requirement to directly interface with:
  - Product Data Manager
  - Team Center Manufacturing
- No development requirements from NGIT
- Run on a Microsoft Windows PC platform (2000, XP)