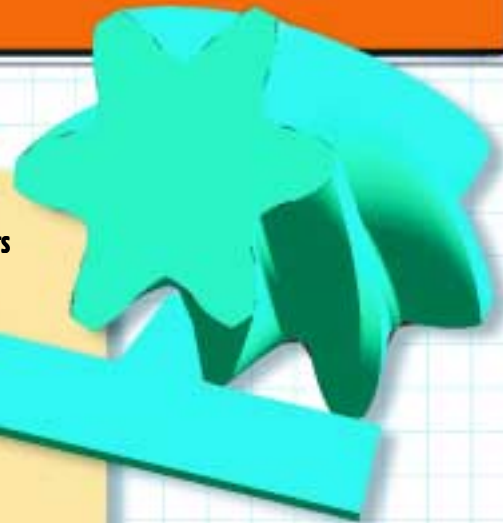




Contact Analysis Software

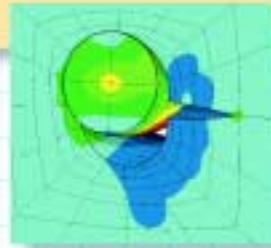
A powerful modelling tool to predict the critical stresses and slip motion of components in contact.

- Accurate prediction of contact stresses and slip;
- Reduced meshing times;
- Accurate wear data prediction;
- Load sequences;
- Integration with BEASY fatigue and crack growth prediction software;
- BEM not FEM.



Automatic Contact Algorithm

BEASY's nonlinear contact algorithm automatically computes the change in position of the contact surfaces and the resulting stress redistribution. The constraint based contact algorithm driving the BEASY analysis computes the appropriate surface contact conditions (eg. open, closed, sliding) and enforces this condition during the iterative solution phase).



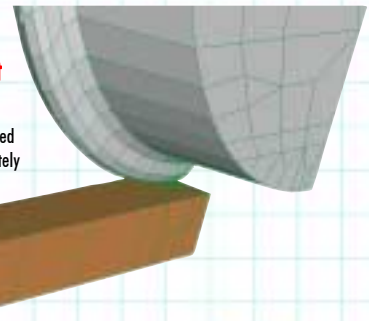
Integration with BEASY's Fatigue & Crack Growth Software

Reduced Meshing Times

BEASY contact analysis takes advantage of the reduced meshing times and increased accuracy of BEM to simplify contact analysis. Both node to node and node to surface contact are supported.

Accurate Prediction of Contact Stresses & Slip

BEASY harnesses the power of a constraint based contact algorithm to efficiently compute accurately results. Rapid convergence even for complex contact geometry.



Load Sequences

Products can be subjected to loading sequences to simulate the in service conditions. Load transfer characteristics as well as detailed stress history are predicted.

Accurate Wear Data Prediction

BEASY provides the information to optimise components for wear. Detailed reports are provided on the contact pressure and slip history.

BEM not FEM

BEASY's BEM technology simplifies contact analysis as only the surfaces have to be defined. The BEM approach is very accurate for contact simulation since contact stress is essentially a surface phenomena where stresses and relative displacements on the contact surfaces are of paramount importance.

BEM reduces the mesh requirements compared with FEM.

Computer Requirements:
Windows 95, 98, NT or
Unix Workstation.

BEASY is compatible with existing modelling tools such as PATRAN and IDEAS.

Windows users can also use BEASY's own modelling tools.





The BEASY Mechanical Design module is being used in the automotive, aerospace, pipeline & pressure vessel, biomedical, consumer product, manufacturing, and electronic industries to reduce design time and improve product quality.

- Contact analysis (single and multiple contact surface capability)
- Thermal stress analysis
- Heat transfer analysis

Application Areas

- Simulation of galvanic corrosion
- Design of cathodic protection systems
- Simulation of electrodeposition and other similar processes
- Electrostatic analysis
- Prediction of current demand
- Marine corrosion control
- Pipeline design and maintenance

Benefits

Improved and More Reliable Design

- Optimisation by simulation
- Optimisation of anode location
- Life Prediction
- Prediction of current densities and potentials on structure surfaces and in electrolyte
- Training simulator for CP design engineers
- Prediction of corrosion rates.
- Prediction of current demand and how it changes with time
- Evaluation of new CP designs
- Investigate new anode types and shapes
- Prediction of anode consumption rate, life expectancy, diameter reduction
- Optimise anode and reference electrode location
- Optimisation of CP retrofit programs

Interference Prediction, Control & Reduction

- Electric field prediction
- Prediction of stray current and interaction of CP systems
- Independent galvanic systems can be defined
- Interaction between the systems can be predicted

Accurate Prediction

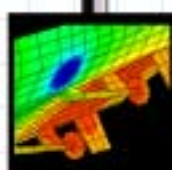
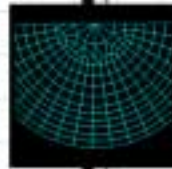
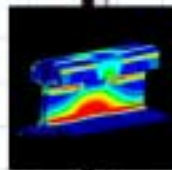
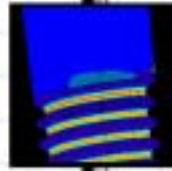
- Evaluation and interpretation of inspection data
- Simulates changes in environmental conditions
- Detailed local models of critical areas of a structure (eg, surface nodes, pile guides etc)
- Global models of large and complex structures
- Simulate build up of calcareous scale

Comprehensive Features

- Impressed and Sacrificial anodes system
- Simple modelling of large ocean regions
- Detailed representation of non linear polarisation
- Time dependent and steady state predictions
- Multiple region analysis to represent electrolytes of differing properties
- Representation of static and time dependent non linear polarisation.
- Flexible structure for polarisation data and simulating various environmental condition parameters.
- Simple representation of field boundaries (eg, infinite boundaries).
- Independent (floating) electrodes can be simulated

Element Library

- Complete range of elements including both discontinuous and continuous elements



- Hierarchical element types allow model refinement without change of mesh
- For three dimensional problems, quadrilaterals and triangles
- For two dimensional and axisymmetric problems isoparametric lines
- All elements have high order shape functions for accurate model representation

Analysis Features

- Comprehensive checking of data and of computer resources required ensures that no analysis runs are wasted
- Local error guides to give clear indication of solution accuracy
- Evaluation of total current balance
- Efficient and economical solution as at many user-specified "internal points" as required
- Step-by-step analysis option allows re-analysis to be carried out after minor changes without recalculation of matrices

Zoning or Substructuring

A model can be split into any number of zones or substructures to represent different components or electrolytes and to improve the run times and use of computer resources.

Interface conditions between zones include:-

- Added current
- Surface resistance (membrane)
- Potential jump
- Polarisation
- Current flow to external source or sink

Boundary Conditions and Loading

- Potential
- Current Density
- External (structure) potential
- Polarisation (as a function of time, current, potential, depth, flow, velocity)
- Linear polarisation
- Point, line and volume current sources

Geometry Features

- Implicit symmetry about any axis
- General zoning and substructuring

Material Properties

- The electrolyte can be represented by zones of differing conductivity/resistivity

Quality Assurance - Verification Tests

The predictive power and capabilities of BEASY have been verified through measurements and comparisons with CP performance data. Full details of verification studies and tests are provided in the User Guide and has been published.

Computer Requirements

Windows 95, 98, NT or Unix Workstation.

Modelling Tools

BEASY is compatible with existing modelling tools such as PATRAN and IDEAS. Windows users can also use BEASY's own modelling tools.