

## PETROSTAR QUALITY CONTROL PROGRAM (API 600/ISO 10434)

The Petrostar Quality Control Program was implemented to set the quality control standards for pressure boundary castings, and to ensure a consistent supply of quality castings to Petrostar.

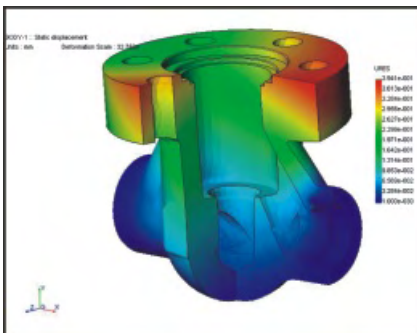
1. X-Ray Sample (pattern) Approval Process;
2. X-Ray Monitoring Program;
3. Casting Monitoring Program.

## SAMPLE CASTINGS

Before castings are released for production, the Petrostar NDE Inspector Level III, evaluates and approves the submitted X-ray films (100% coverage) as per API 600

## X-RAY MONITORING:

Random X-ray monitoring requires that castings taken every six months from each vendor, randomly by size and quantity sets and X-rayed per B16.34 requirement.

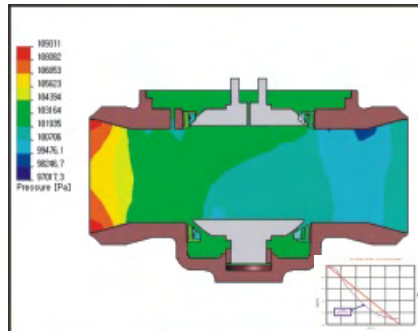


Pro-Engineering model casting simulation program.

If casting fails to meet the X-ray requirements of B16.34, Petrostar Senior Metallurgist will issue a corrective action request to the vendor, including recommendations for detailed methoding change and re-X-ray.

## CASTING MONITORING:

Rejected castings due to defects such as hydro-test leakage, porosity, inclusions, shrinkage indication discovered by X-ray or machining, are entered into the computer, as part of the statistical control of each vendor.



Fluid Mechanics Analysis of a top entry ball valve body.

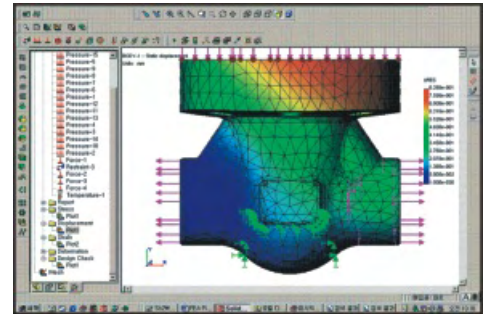
## FINITE ELEMENT ANALYSIS

Petrostar applies Finite Element Analysis for assistance at it's design facilities.

Working together with foundry engineers and our designers, we continue improving the internal integrity of castings, to X-Ray Level II or better as a general standard.

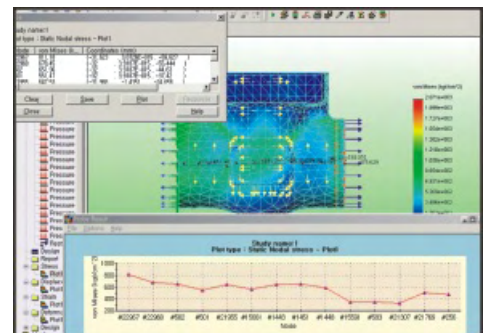


No shrinkage on a forged steel gate valve body simulation.



Finite Element Analysis of a forged steel globe valve body.

Finite Element Analysis can be applied to the design of valves with different materials.



Finite Element Analysis of a forged steel gate valve body.

## Benefits to Petrostar customers and to the foundries:

- Shorter delivery time,
- Higher quality of commercial castings,
- Optimum methoding system,
- Elimination of trial at sample approval,
- Improves the internal integrity of castings (RT level 2 or better) at pattern approval,
- Optimizes the metal flow and solidification pattern,
- Predicts internal defects,
- Reduces scrap,
- Optimizes the design of the castings,
- Solves problems such as shrinkage and porosity, without test castings,
- Reduces NDE (X-ray) upgrading.