

# Tube Life Calculator

Integrity & Remaining Life Assessment



FHInfinity Analyzers

**Tube Life Calculator**® is a specialized integrity assessment tool within FHInfinity® designed to evaluate the remaining useful life of heater tubes subjected to high-temperature creep and stress rupture. By leveraging the comprehensive material database specified in API 530, this module allows engineers to quantify accumulated damage from historical operating conditions and project future performance under varying process constraints.

| Operating Period | Duration | Operating Pressure | Operating Temperature | Beginning Thickness | End Thickness |
|------------------|----------|--------------------|-----------------------|---------------------|---------------|
| Period 1         | 1.3      | 3960               | 649                   | 0.681               | 0.64          |
| Period 2         | 0.6      | 4270               | 665                   | 0.64                | 0.62          |
| Period 3         | 2.1      | 4070               | 660                   | 0.62                | 0.551         |

## Key Technical Features

**API 530 Compliance:** Utilizes standardized Larson-Miller Parameter (LMP) curves for all alloy materials listed in API 530, ensuring industry-accepted accuracy.

**Flexible Strength Basis:** Users can select between *Minimum*, *Average*, or *Adjusted Average* rupture strength curves, allowing for customized risk assessment and design conservatism.

**Dual-Mode Assessment:**

- **Accumulated Damage:** Calculates the fraction of life consumed based on historical operating periods (temperature, pressure, duration).
- **Projected Damage:** Predicts remaining life by simulating future operating conditions, including corrosion rates and thickness reduction over time.
- **Combined Damage Model:** Integrates both historical wear and future projections to provide a holistic view of tube integrity, accounting for wall thinning and stress increases.

## Operational Workflow

- **Define Tube Properties:** Select material grade (e.g., ASTM A271) and input geometric data (outside diameter, initial thickness).
- **Input Operation History:** Enter discrete operating periods with specific temperatures, pressures, and durations to calculate past damage accumulation.
- **Set Future Conditions:** Define future operating parameters, corrosion rates, and minimum allowable thickness to project remaining service life.
- **Run Assessment:** The solver computes the Larson-Miller Parameter for each period, determining the life used fraction and total accumulated damage.