

# Shelf Life Prediction & Service Life Prediction

ARDL's shelf life prediction service determines how long a product or component can age in storage and still remain fit for use in service conditions. This time period is calculated by measuring the amount of degradation that occurs during the aging process. Predicting shelf life helps improve the fundamental understanding of chemical mechanisms at work in aging polymers.

ARDL's service life prediction capability is based on innovative testing and analytical techniques to predict the life of a product or component in actual service conditions. Predicting service life enables you to understand and benchmark product life cycles in the field.

## Predictive Testing for:

- Failure and Fatigue Resistance on: Belts, Engine Mounts, Gaskets, Hoses, Oilfield Packers, Seals, Shaft Seals, Tires, Wiper Blades and More
- New Product Design – Structural and Material
- Shelf Life of Products
- Service Life of Engineering Parts and Medical Devices

## Using the Combined Techniques of:

### *Shelf Life Prediction:*

- Arrhenius Techniques (Based on Accelerated Aging)
- Diffusion Limited Oxidation Model
- Statistical Life Prediction Approach
- Ultrasensitive Oxygen Consumption Measurement

### *Service Life Prediction:*

- Dynamic and Vibration Studies

### *Service and Shelf Life Prediction:*

- Field and Laboratory Data Collection
- Finite Element Analysis
- Fracture Mechanics
- Physical, Chemical and Thermal Analysis (FTIR, NMR, GC/MS)
- Dynamic Mechanical Analysis (DMA)
- Compression Stress Relaxation (CSR)
- Time-Temperature Superposition (WLF) Methodology



## Predictive Testing and the FDA Approval Process

The FDA approval process is demanding and rigorous. Timely FDA approval is critical to your success and ARDL makes it easier for you. As an industry expert in materials and device testing, ARDL can help you minimize these risks.

Our in-house lab and services can provide you with technical support for Investigational Device Exemption (IDE) Submissions.

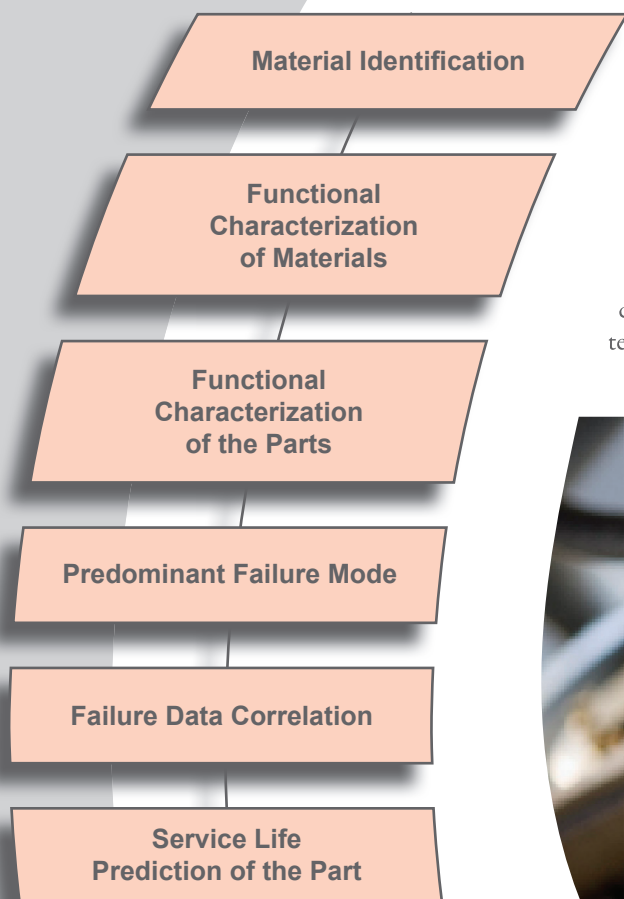


**Rubber. Plastic. Latex.**

# Shelf Life Prediction & Service Life Prediction (cont.)

## Methodology

ARDL's methodology is shown in the figure to the left. The first step is to define the function(s) of the elastomer component. Based on the function, a failure criterion must be established. The failure criterion may be defined as an unacceptable change in the function which causes a particular failure. Changes may be in stress relaxation, stiffness/modulus, creep, tear resistance, swelling, dielectric properties, etc. The underlying mechanism involved in this change must be determined by an accelerated laboratory test at different levels of severity and at different time intervals. It is important to keep the accelerated test condition similar to the service condition and perform the test at multiple temperatures higher than the average service temperature.



ARDL has the experience, expertise and resources to be your laboratory for shelf life prediction and service life prediction.



2887 Gilchrist Rd. | Akron, Ohio 44305 | [answers@ardl.com](mailto:answers@ardl.com)  
Toll Free (866) 778-ARDL | Worldwide (330) 794-6600 | Fax (330) 794-6610  
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