

# NASA NDE Program

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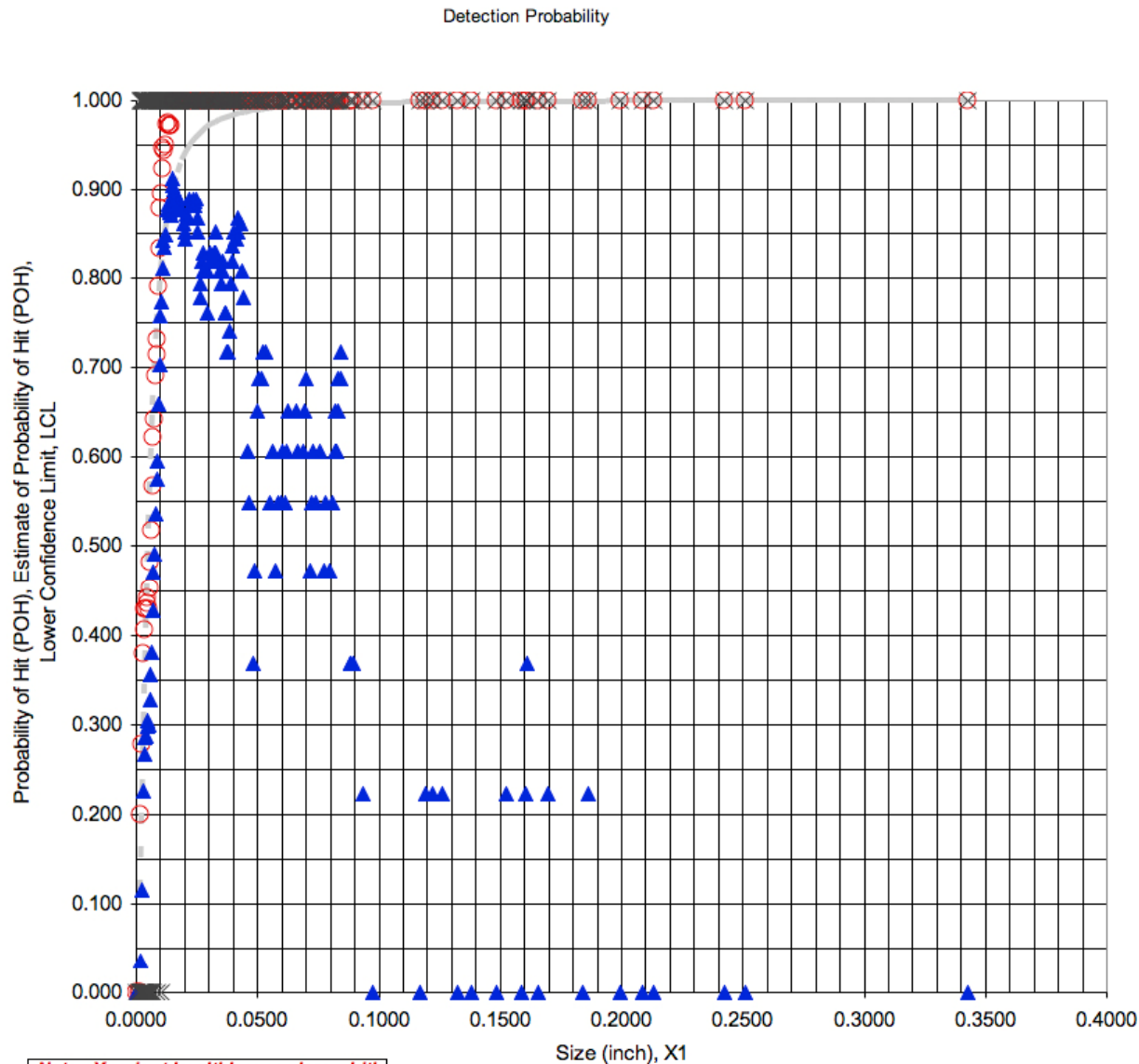
NNWG Newsletter
Electric Field Imaging for Wiring
Defect Depth Measurement Using White Light Interferometry
NDE Integrated into Advance COPV Manufacturing
Computational Simulations of On-orbit Thermography
Material Characterization in the Microwave and Millimeter Wave Bands
Micro-Focus Xray Computed Tomography for Exploration Component Inspections
Defect Standards for Nonmetallic Advanced Materials
Arc Weld NDE for Exploration Components with Emphasis on Portable Phased Array Ultrasonics
NDE for Space Shuttle Tiles
Carbon Composite Stress Rupture NDE Development
Real-time Digital Radiography Upgrade
Wireless Passive Corrosive Environment Sensors
Induction Thermography / Shearography of Composite Structures
In-Situ NDE Characterization of Composite Material Micromechanics and Composite Overwrapped Pressure Vessel Health Monitoring
Corrosion Under Paint and Hidden Areas
Fracture Critical POD Process Validation

# Nondestructive Evaluation Requirements for Fracture Critical Components

- NASA-STD- (I)- 5009 (public release 9/06)
  - NDE for life cycle planning,
  - document and configuration control,
  - record retention
  - procurement
  - use of POD
  - NDE capability
  - acceptance criteria
  - responsibilities
  - similarity
  - physical standards

# Directed Design of Experiments for Probability of Detection (DOEPOD)

## A8002L data from NTIAC Capabilities Data Book, 1997



Analysis file name: DOEPOD.v1.4.5.4.xls

File Name = **A8002L.XLS**  
 Data Set Name = **A8002L(Eci-a-b5)**  
 Date & Time = 5/9/07 11:30 AM  
 Xpod 90/95 Reached Anywhere? REACHED  
 Classwidth @ 90/95 Xpod = 0.0040 inch  
 Classlength @ 90/95 Xpod = 0.0147 inch  
 Actual Lower Confidence Value = 0.9120  
 Best LCL =  
 Classwidth @ Best LCL = inch  
 Classlength @ Best LCL = inch  
 a(1) [Alpha] = 10.34  
 a(2) [Beta] = 1.94  
 Chi-Square = 0.0023

CASE 1 - 90/95 Xpod is VALIDATED from Xpod to XL when XL and Xm are satisfied. An alternate 90/95 Xpod is available if Xpodopt or Optimum Xpoh (if listed) is also satisfied.

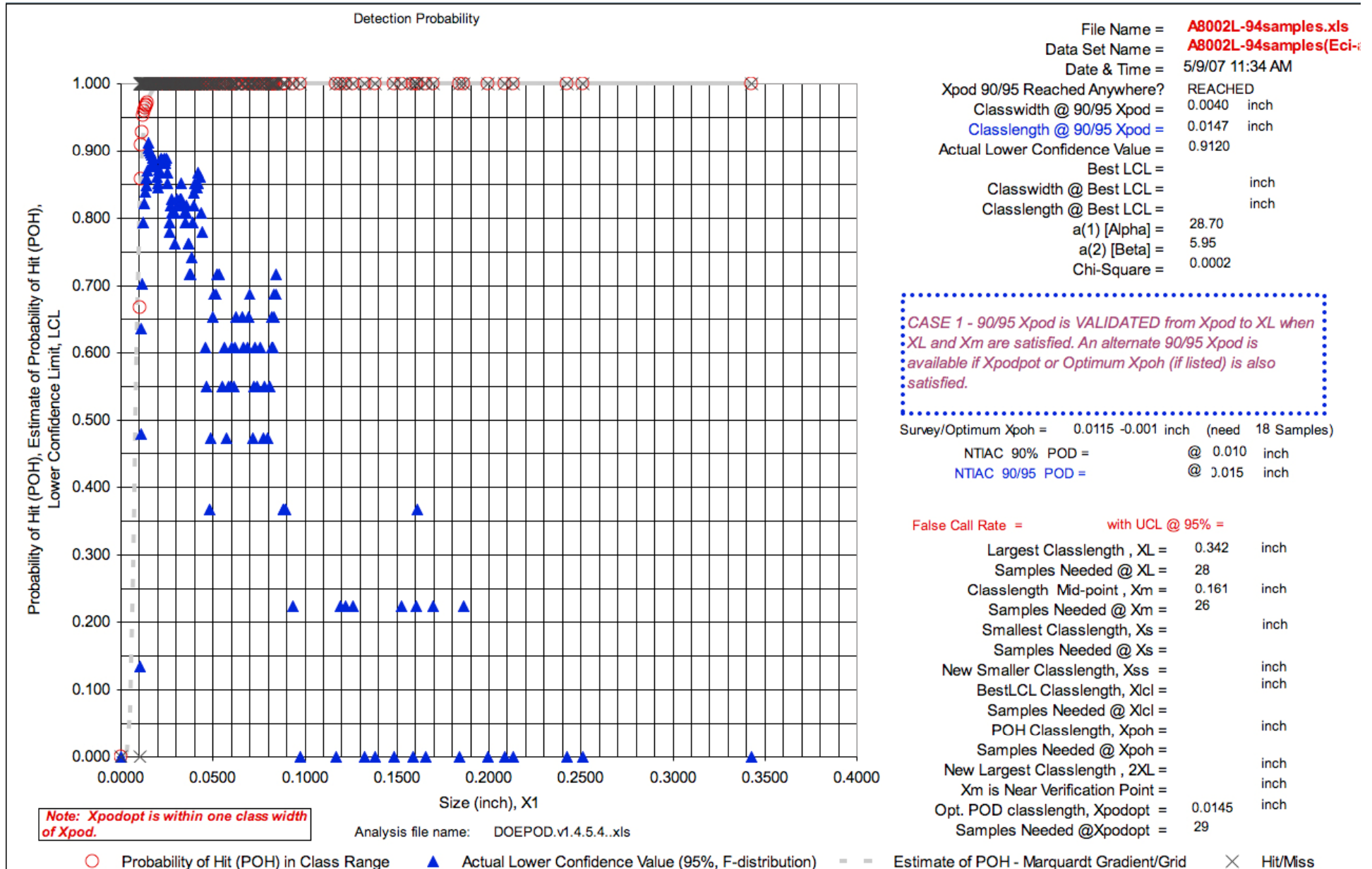
Survey/Optimum Xpoh = 0.0115 -0.001 inch (need 18 Samples)  
 NTIAC 90% POD = 0.942 @ 0.010 inch  
 NTIAC 90/95 POD = 0.952 @ 0.015 inch

False Call Rate = with UCL @ 95% =  
 Largest Classlength, XL = 0.342 inch  
 Samples Needed @ XL = 28  
 Classlength Mid-point, Xm = 0.161 inch  
 Samples Needed @ Xm = 26  
 Smallest Classlength, Xs = inch  
 Samples Needed @ Xs = inch  
 New Smaller Classlength, Xss = inch  
 BestLCL Classlength, Xlcl = inch  
 Samples Needed @ Xlcl = inch  
 POH Classlength, Xpoh = inch  
 Samples Needed @ Xpoh = inch  
 New Largest Classlength, 2XL = inch  
 Xm is Near Verification Point = inch  
 Opt. POD classlength, Xpodopt = 0.0145 inch  
 Samples Needed @Xpodopt = 29

○ Probability of Hit (POH) in Class Range    ▲ Actual Lower Confidence Value (95%, F-distribution)    - - Estimate of POH - Marquardt Gradient/Grid    × Hit/Miss

# Directed Design of Experiments for Probability of Detection (DOEPOD)

## Remove 94 samples from A8002L data



## A8002L data from NTIAC Capabilities Data Book, 1997

