

# REPORT DOCUMENTATION PAGE

Form Approved  
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing this collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.

<b>1. REPORT DATE (DD-MM-YYYY)</b> 17 March 2003		<b>2. REPORT TYPE</b> Technical Manual		<b>3. DATES COVERED (From - To)</b>	
<b>4. TITLE AND SUBTITLE</b>  Chopped Fiber Discontinuously Reinforced Aluminum				<b>5a. CONTRACT NUMBER</b> F04611-01-0027	
				<b>5b. GRANT NUMBER</b>	
				<b>5c. PROGRAM ELEMENT NUMBER</b>	
<b>6. AUTHOR(S)</b>  Karin Karg, David Powell				<b>5d. PROJECT NUMBER</b> 3005	
				<b>5e. TASK NUMBER</b> 01PJ	
				<b>5f. WORK UNIT NUMBER</b>	
<b>7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)</b>  Tritron Systems, Inc. 200 Turnpike Road Chelmsford, MA 01824				<b>8. PERFORMING ORGANIZATION REPORT NUMBER</b>	
<b>9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)</b>  Air Force Research Laboratory (AFMC) AFRL/PRS 5 Pollux Drive Edwards AFB CA 93524-7048				<b>10. SPONSOR/MONITOR'S ACRONYM(S)</b>	
				<b>11. SPONSOR/MONITOR'S NUMBER(S)</b> AFRL-PR-ED-TM-2003-068	
<b>12. DISTRIBUTION / AVAILABILITY STATEMENT</b>  Approved for public release; distribution unlimited.					
<b>13. SUPPLEMENTARY NOTES</b>					
<b>14. ABSTRACT</b>  <div style="text-align: right; border: 1px solid black; padding: 5px; font-size: 2em; font-weight: bold;">20031003 095</div>					
<b>15. SUBJECT TERMS</b>					
<b>16. SECURITY CLASSIFICATION OF:</b>			<b>17. LIMITATION OF ABSTRACT</b>	<b>18. NUMBER OF PAGES</b>	<b>19a. NAME OF RESPONSIBLE PERSON</b>
<b>a. REPORT</b> Unclassified	<b>b. ABSTRACT</b> Unclassified	<b>c. THIS PAGE</b> Unclassified	A		Sheila Benner
					<b>19b. TELEPHONE NUMBER (include area code)</b> (661) 275-5693

Standard Form 298 (Rev. 8-98)  
Prescribed by ANSI Std. Z39.18

Best Available Copy

(FILE)

MEMORANDUM FOR PRS (In-House Publication)

FROM: PROI (STINFO)

17 Mar 2003

SUBJECT: Authorization for Release of Technical Information, Control Number: **AFRL-PR-ED-TM-2003-068**  
Karin Karg & David Powell (Triton Systems, Inc.), "Chopped Fiber Discontinuously Reinforced Aluminum"

Jeigh  
55327

**For Oral Presentation to Prospective Commercial Partners (possibly Internat'al) (Statement A)**

---



# **Triton Systems, Inc.**

## **Structural Materials Group**

### **Contact Information:**

**Polymer Matrix Composites: Dave Powell— Director, Structural Materials**  
**978.250.4200 x 214**



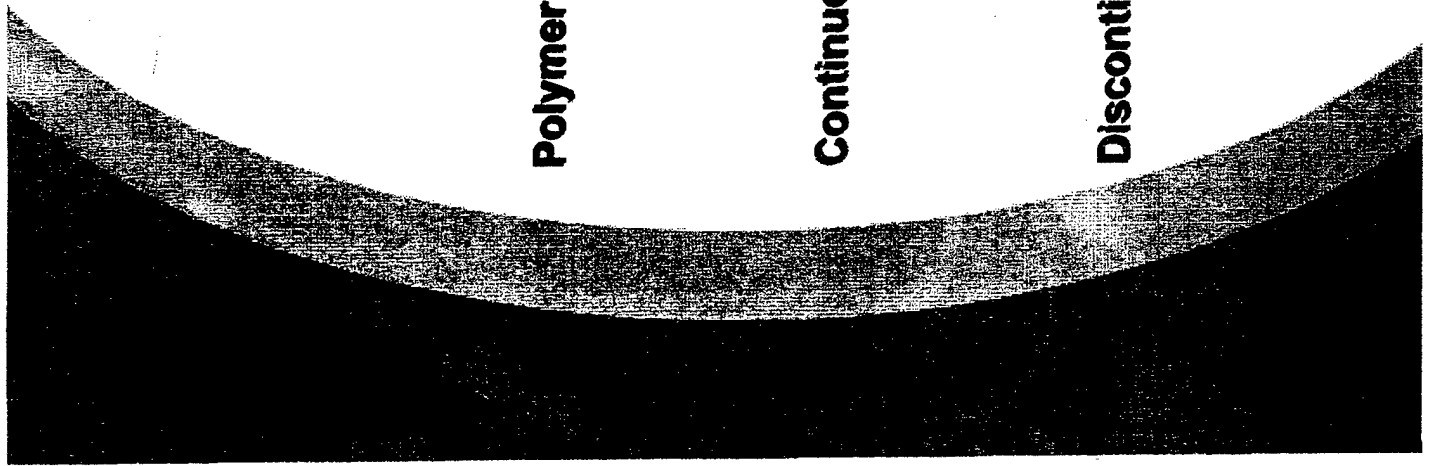
**Continuous Reinforced Aluminum Composites: Jim Burnett**  
**978.250.4200 x 137**



**Discontinuous Reinforced Aluminum Composites: Karin M. Karg**  
**978.250.4200 x 201**



**DISTRIBUTION STATEMENT A**  
Approved for Public Release  
Distribution Unlimited



# Chopped Fiber Discontinuous Reinforced Aluminum

## Data available to date:

- Tensile testing of Triton's Chopped Fiber Discontinuous Reinforced Aluminum
  - using Triton's Enhanced Pressure Infiltration Casting™ Process
  - using Standard Foundry Process Parameters

· Triton estimates process refinement will enable an additional 10% improvement in properties

## Testing in process:

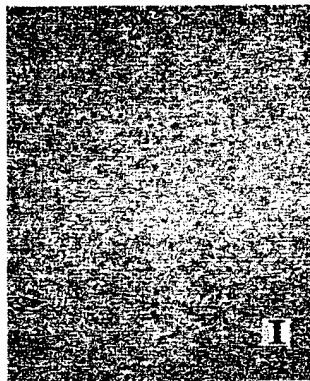
- Fatigue
- Elevated Temperature Tensile Testing
- CTE



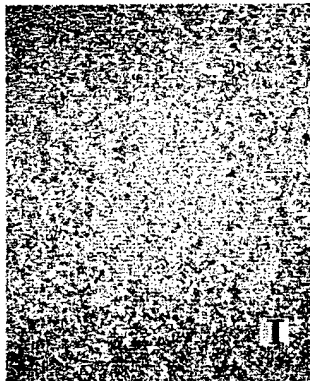
Triton Systems, Inc.

# Chopped Fiber Discontinuous Reinforced Aluminum

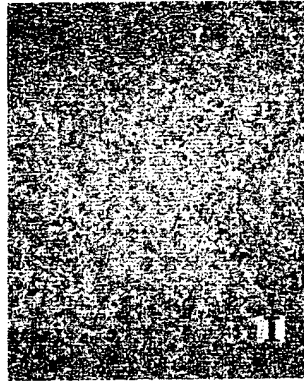
VF%	UTS(MPa)	YS(MPa)	%elong
15	492	350	1.1
15	467	361	1.3
15	433	245	0.9
20	509	370	1.3
20	463	259	1.7
20	412	268	0.9
25	546	296	2.0
25	541	346	1.7
25	524	333	1.6



Front, 50x



Longitudinal, 50x



Thru, 50x

- Test results using cast aluminum reinforced with discontinuous chopped fibers
- High pressure casting process (EPIC™)
- Isotropic
- Process refinement will increase properties >10%

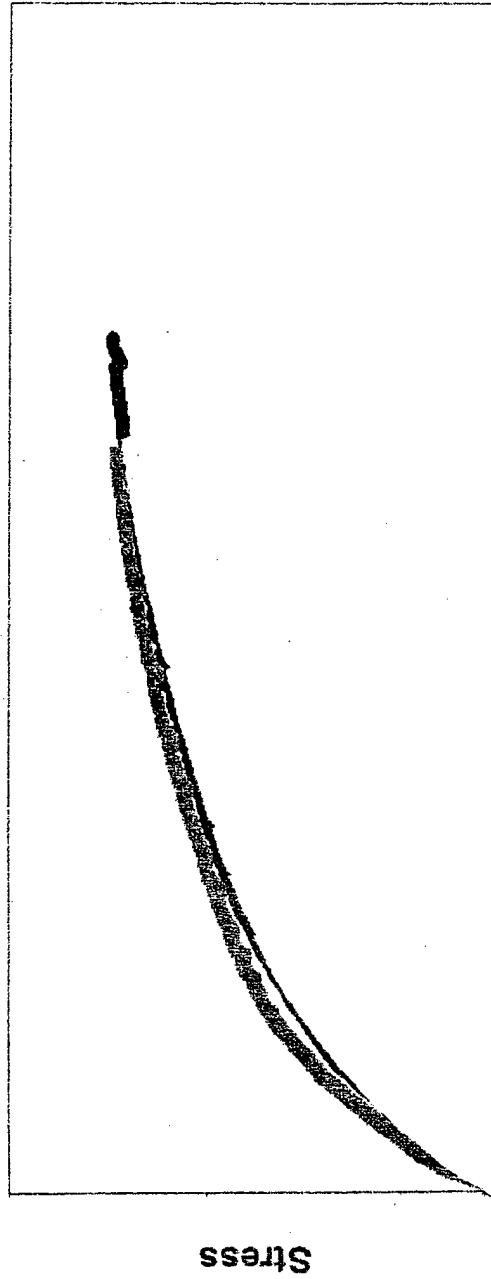
**Triton is currently refining process:**

- ⇒ improve properties and conduct materials characterization
- ⇒ Transition to Standard Foundry Investment Casting process



Triton Systems, Inc.

# Chopped Fiber Discontinuous Reinforced Aluminum



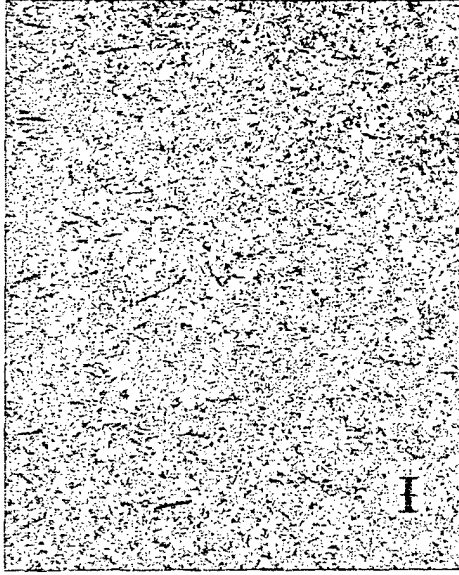
Strain



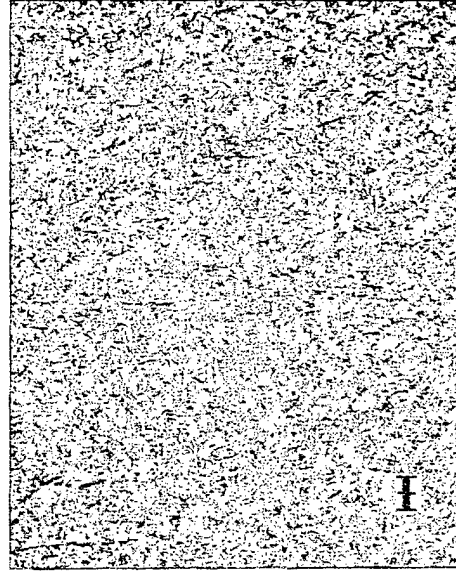
Triton Systems, Inc.

# Chopped Fiber Discontinuous Reinforced Aluminum

- Early test results using A356 reinforced with chopped fibers
- Typical Foundry Process Parameters
- Cast 170mm x 100mm x 6.5 mm panel
- Isotropic
- Consistent structure (over panel)
- Process refinement increase properties >10%



Longitudinal 200x,  
Top of Panel



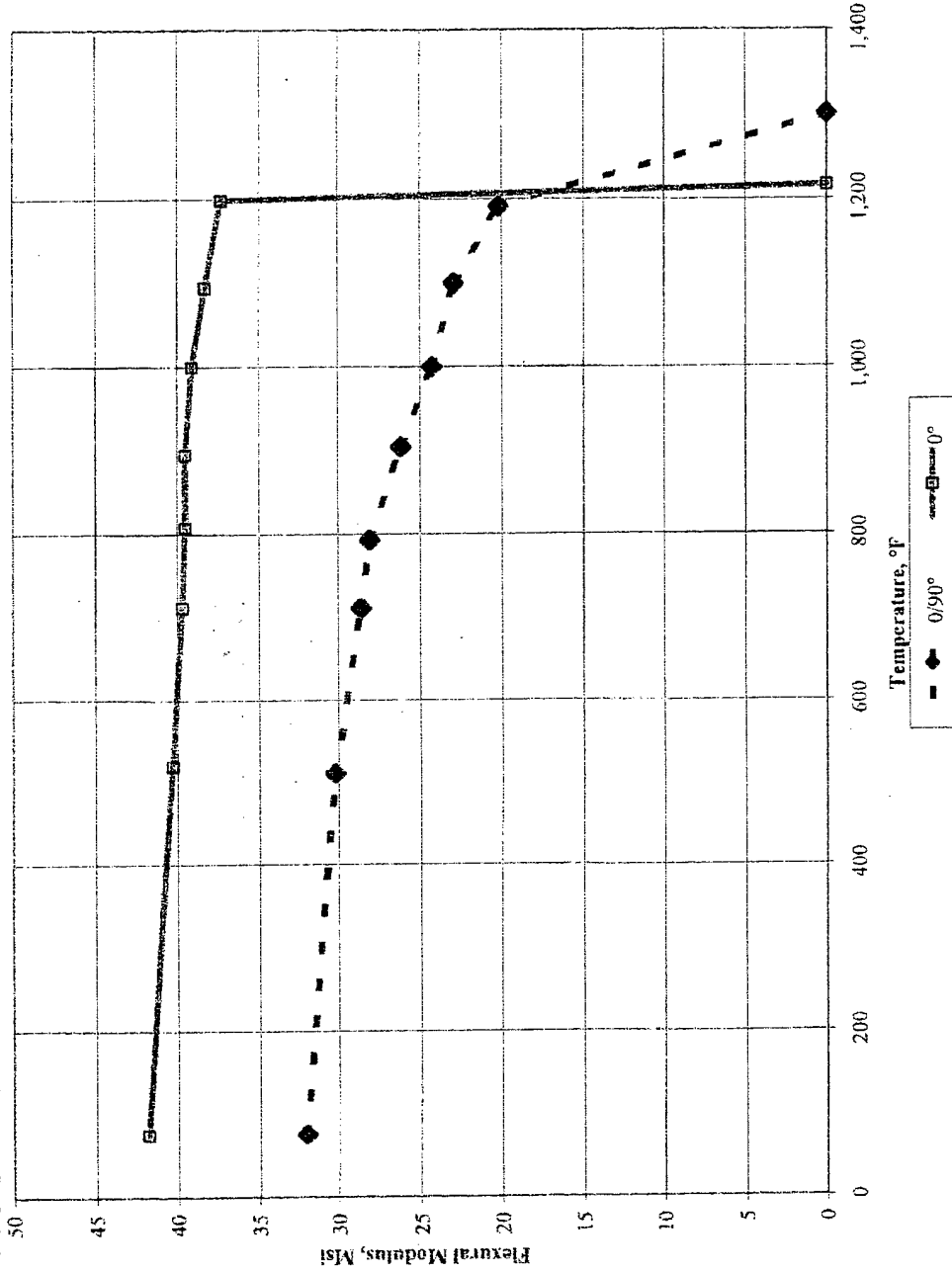
Longitudinal 200x,  
Bottom of Panel



UTS(MPa)	YS(MPa)	%elong
343	261	0.9
337	294	0.7
326	279	0.7

# Continuous Reinforced Aluminum Jacket Material

## Flexural Modulus vs. Temperature AMC Structural



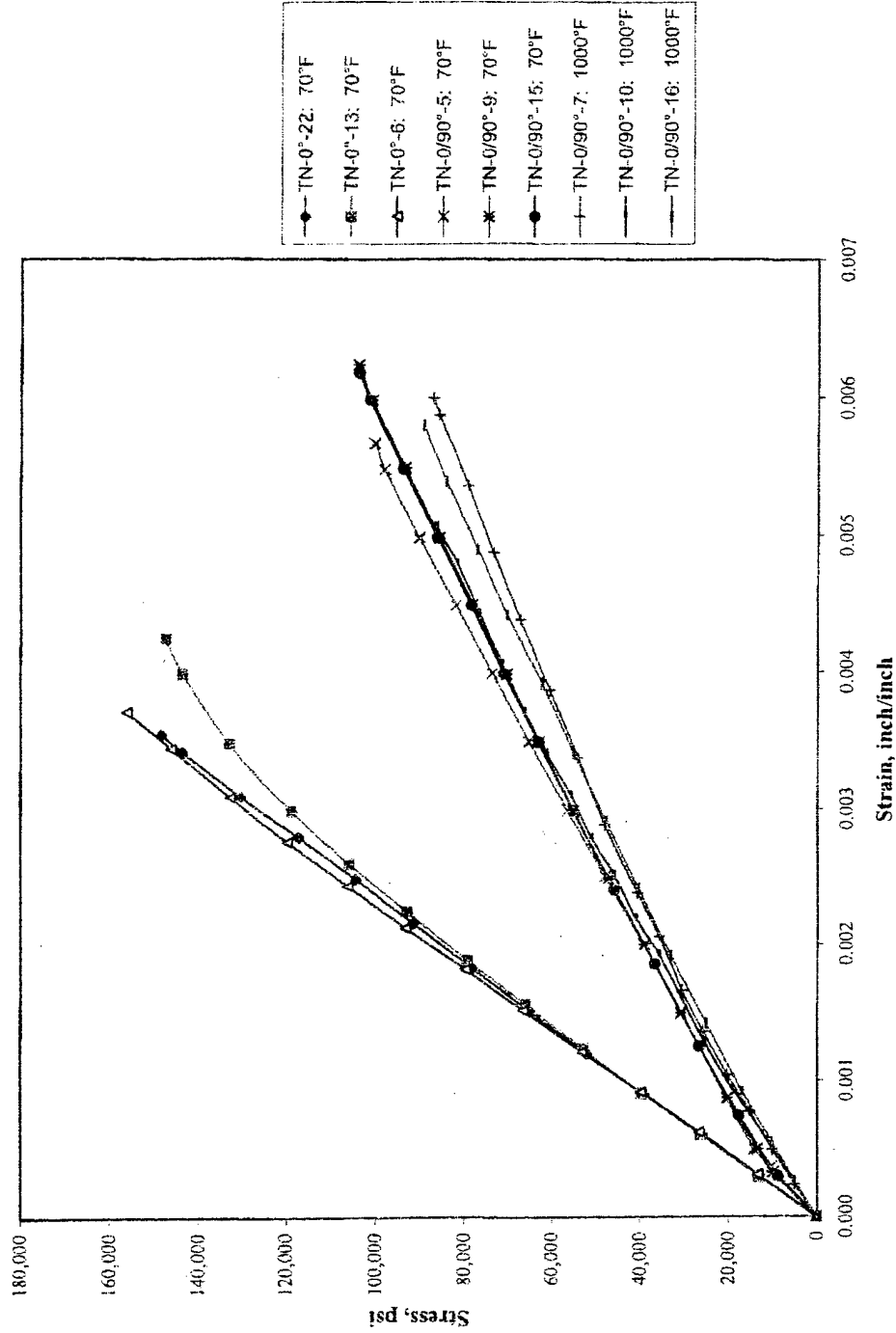
[www.triton-systems.com](http://www.triton-systems.com)

Triton Systems, Inc.

# Continuous Reinforced Aluminum

## AMC Tensile Test Results

Tensile Stress-Strain Response



[www.triton-systems.com](http://www.triton-systems.com)

Triton Systems, Inc.