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ROBUST 300 °C WIRE INSULATION SYSTEM

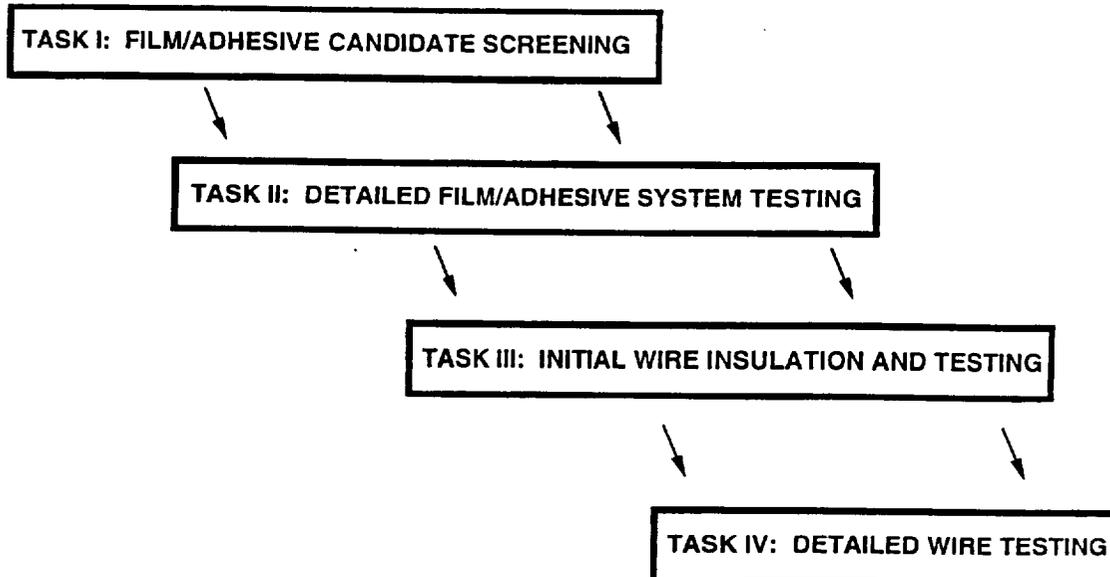
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N94- 28699

OBJECTIVE

IDENTIFY, DEVELOP AND DEMONSTRATE AN OPTIMUM WIRE INSULATION SYSTEM CAPABLE OF CONTINUOUS OPERATION AT 300°C WHICH POSSESSES A COMBINATION OF SUPERIOR ELECTRICAL (AC OR DC), MECHANICAL, AND PHYSICAL PROPERTIES OVER KAPTON[®] DERIVED INSULATIONS DESCRIBED IN MIL-W-81381 AND THOSE HYBRID CONSTRUCTIONS IDENTIFIED IN AIR FORCE CONTRACT F33615-89-C-5606 COMMONLY KNOWN AS TKT CONSTRUCTIONS.

APPROACH



FILM/ADHESIVE CANDIDATE SCREENING

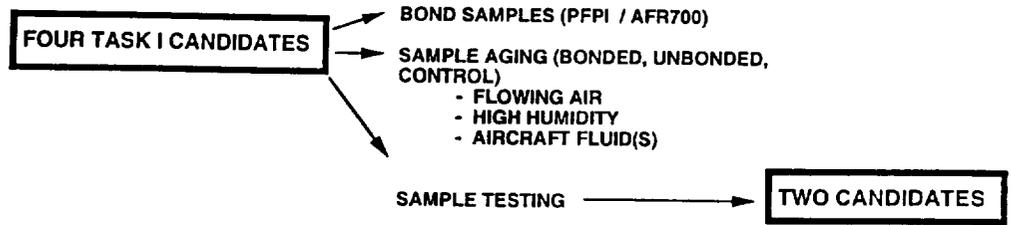
DESIGN OF EXPERIMENTS (DOX) APPROACH FOR CANDIDATE SELECTION

- MINIMUM OF SIX CANDIDATES
- CAST FILM CANDIDATES
- DETERMINE KEY ELECTRICAL AND MECHANICAL PROPERTIES

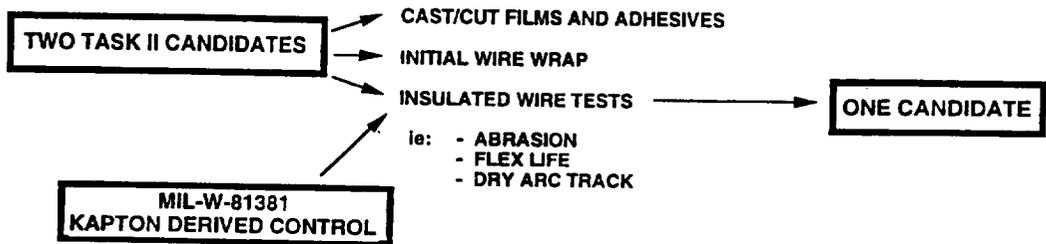
TASK I PROPERTIES

TABLE I: PROPOSED TASK I SCREENING PROPERTIES TO BE DETERMINED	
Property to be Determined	Method of Determination
Electrical	
Dielectric Constant at 400 Hz and 1000 Hz at RT, 280°C, and 300°C	ASTM D-150
Dissipation Factor at conditions stated above	ASTM D-150
Breakdown Voltage (AC at 60 Hz and DC) at RT, 280°C, and 300°C	ASTM D-149
Arc Tracking at RT	ASTM-495-84
Mechanical	
Tensile strength, elongation to break, and modulus at RT, 280°C, and 300°C	ASTM D-882-64T
Lap shear tensile strengths at RT, 280°C, and 300°C	Modification to above tensile method
Dynamic work loss (tan delta)	Rheometrics dynamic analyzer from < -100°C to + 500°C

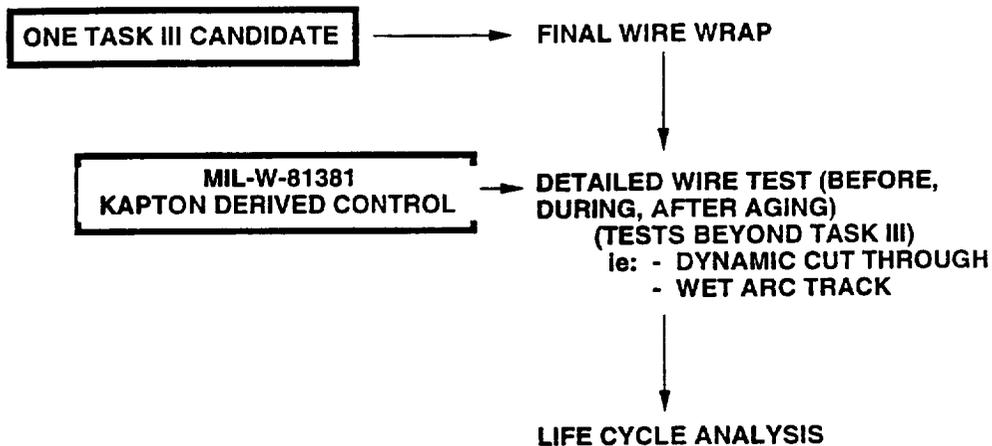
DETAILED FILM/ADHESIVE SYSTEM TESTING



INITIAL WIRE INSULATION AND TEST



DETAILED WIRE TESTING



NASA ENVIRONMENTS

PRESSURIZED MODULE

- PROPOSED MATERIAL HAS SUCCESSFULLY COMPLETED LONG TERM AGING TESTS IN OXYGEN IN PREVIOUS AF PROGRAM

TRANS-ATMOSPHERIC VEHICLE

- PROPOSED MATERIAL HAS SUCCESSFULLY COMPLETED VACUUM, UV AGING, AND TEMPERATURE TESTS IN PREVIOUS AF PROGRAM
- HAVE NOT DONE COMBINED TESTS (ie: PLASMA EFFECTS)

LUNAR AND MARTIAN

- POLYIMIDES KNOWN FOR RADIATION RESISTANCE

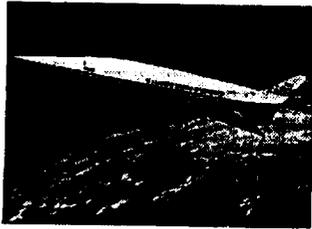
LEO/GEO

- WL HAS SPACE TESTED FILM SAMPLES WHICH ARE BEING DELIVERED FOR TEST AND ANALYSIS

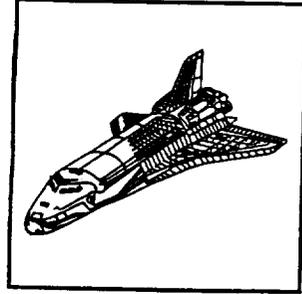
ADDITIONAL NOTES

- PROPOSED SYSTEM SHOULD NOT BE AFFECTED BY GRAVITY
- EXISTING POLYIMIDE TECHNOLOGY ALREADY EXCEEDS LIFETIME REQUIREMENTS
- 160 VDC SHOULD BE FEASIBLE BASED ON BDV TESTS

NASA APPROACH



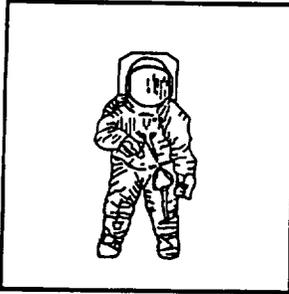
**TASK I:
NASA OPERATIONAL ENVIRONMENTS**



**TASK II:
INSULATION TEST AND ANALYSIS**

**TASK III:
WIRING SYSTEMS TECHNOLOGY**

**TASK IV:
MANAGEMENT PLANNING**



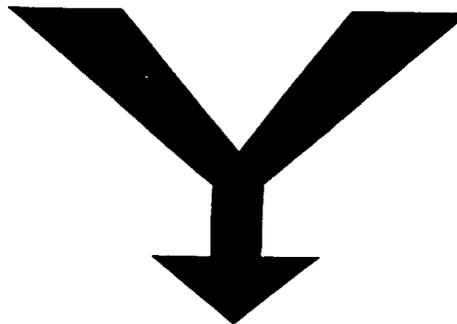
CONCLUSIONS

OPPORTUNITIES EXIST FOR COOPERATIVE NASA/AIR FORCE EFFORTS

- INSULATION CONTRACT IS FLEXIBLE BUT ALREADY ADDRESSES NASA CONCERNS/ISSUES
- GENERIC AIR FORCE ELECTRICAL LOAD MANAGEMENT TECHNOLOGY IS APPLICABLE

NASA

AFMC
AIR FORCE MATERIEL COMMAND





SESSION II

WIRING APPLICATIONS AND STANDARDS

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