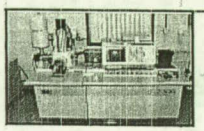
Materials and Process Engineering

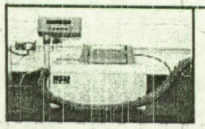
Material Analysis and Laboratory Operation

Microscopy



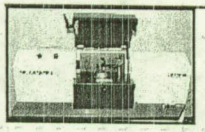
The M&P Lab offers state-of-the-art microscopy including SEM, FT-IR, Raman, Polarized Light, Bright-Field/Dark-Field, and Fluorescence to provide elemental, molecular, and visual characterization.

Thermal Analysis



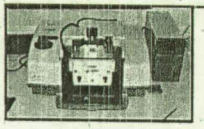
Thermal analysis capability includes DMA, DSC, DTA, and TGA. In addition, thermal analysis can be combined with FT-IR spectroscopy.

Atomic Spectroscopy



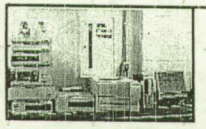
The atomic spectroscopy equipment includes Optical Emission Spectroscopy for alloys and Inductively Coupled Plasma for metals determination in non-metallic samples.

Infrared Spectroscopy



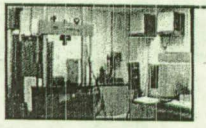
M&P has expert capabilities in Fourier Transform Infra Red Spectrometry and Thermal Gravimetric Analysis.

Chromatography



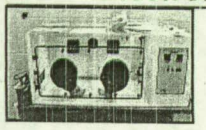
The M&P lab is equipped to perform various chromatographic analyses for analysis of complex mixtures including GC, GC-MS, HPLC, and GPC for polymer analysis.

Physical Analysis



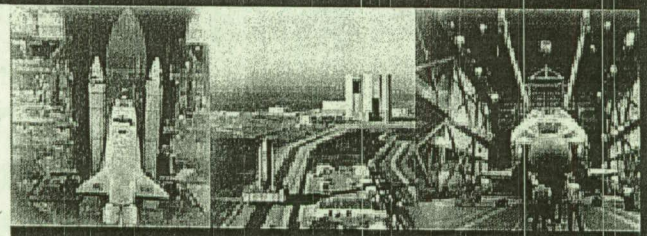
The M&P physical testing lab contains a wide variety of physical test equipment including multiple mechanical test machines.

Electrostatic Discharge Testing



Materials can be characterized in terms of their susceptibility to or generation of electrostatic discharge using M&P's ESD test facilities.

Materials and Process Engineering



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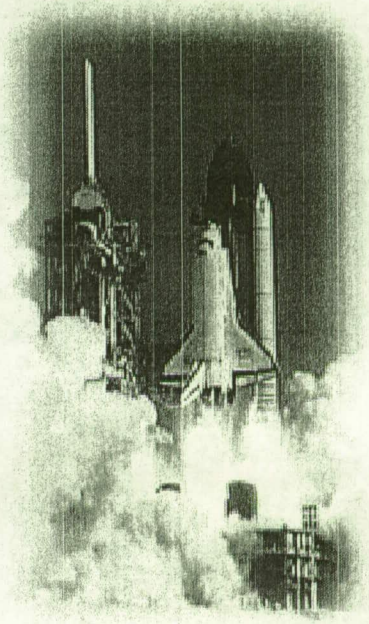
VAB, KSC	321-861-1361
PEMD, MSFC	256-544-2824

LAB WORK REQUEST FORMS
321-853-9439

Materials and Process Engineering

Specialty Engineering and Technical Services



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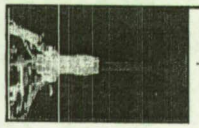
Materials and Process Engineering

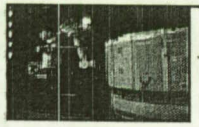
Thermal Protection and Coatings Systems

Marshall Conversion Coating



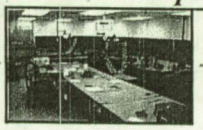
Marshall Convergent Coating is an environmentally compliant TPS material that covers the external surface of the Solid Rocket Boosters.

TPS Research Cell



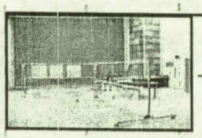
M&P operates an automated and environmentally controlled TPS material spray cell *dedicated* to material research, development and qualification.

TPS Sample Prep. and Evaluation



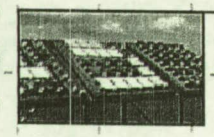
Preparation of test samples and the processing of trowellable and "bond-in-place" TPS materials as well as sealants, foams, paints and adhesives.

Coatings Systems Lab



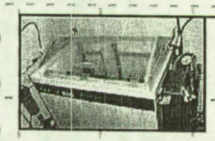
M&P operates a full-feature "thin-film coatings" laboratory that supports all coating qualification programs and anomaly resolutions.

Corrosion System Lab



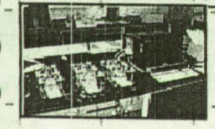
M&P performs real world corrosion testing at the KSC Beach Corrosion Test Site.

Corrosion Simulation



M&P operates numerous test chambers to evaluate materials in corrosive environments which simulate real world conditions.

Electrochemical Impedance Spectroscopy

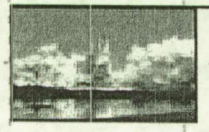


M&P has the capability to analyze a material's response to applied voltage, allowing the study of corrosion and other electrochemical processes.

Materials and Process Engineering

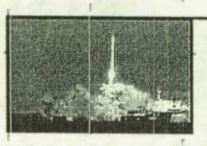
Assured Materials and Technology Development

Assured Materials and Processes



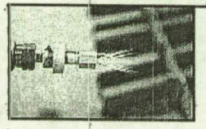
USA Materials and Process Engineering is a NASA recognized leader in the development and qualification of environmentally compliant materials and processes.

Technology Transfer



M&P is committed to Technology Transfer; from environmental compliance to thermal protection system materials for the Titan IV, Sea Launch and Delta IV programs.

New Coating Removal Technology

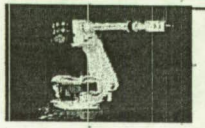


M&P has been involved with the implementation of environmentally friendly and cost effective cryogenic cleaning processes at KSC.

Automated Material Feed Systems

Automated systems provide microprocessor control of real-time constituent material feed rates, resulting in near zero variation in on-demand material formulations.

Robotic Programming



M&P employs robotic processing in the application of large-area TPS materials and the removal of paint, sealant, foam, and TPS materials.

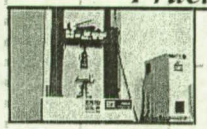
Large Scale System Integration

M&P implemented automated, large-scale systems for NASA at MSFC and KSC, for the Air Force and Lockheed Martin at Pueblo, Colorado, and for Boeing in Seattle, Washington.

Materials and Process Engineering

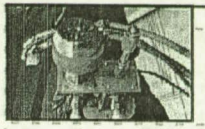
Productivity Enhancement and Materials Research

Fracture Toughness Testing



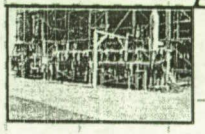
Fracture toughness and fatigue crack growth rate determination using standard ASTM methods. In addition, M&P can perform tension, compression, and fatigue testing.

Hydrolaser Spray Cell



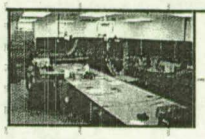
Hydrolaser technology is a robotically controlled, precision stripping operation that removes non-metallic coatings from SRB hardware in preparation for refurbishment.

Improved Hot Gas Facility



M&P has access to MSFC's one-of-a-kind flight thermal test and evaluation facility. All M&P TPS and related materials are evaluated at MSFC's IHGF.

Material Lay-Up

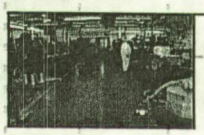


M&P manages a non-metallics material lay-up laboratory that provides for the comprehensive assessment of materials and their application processes.

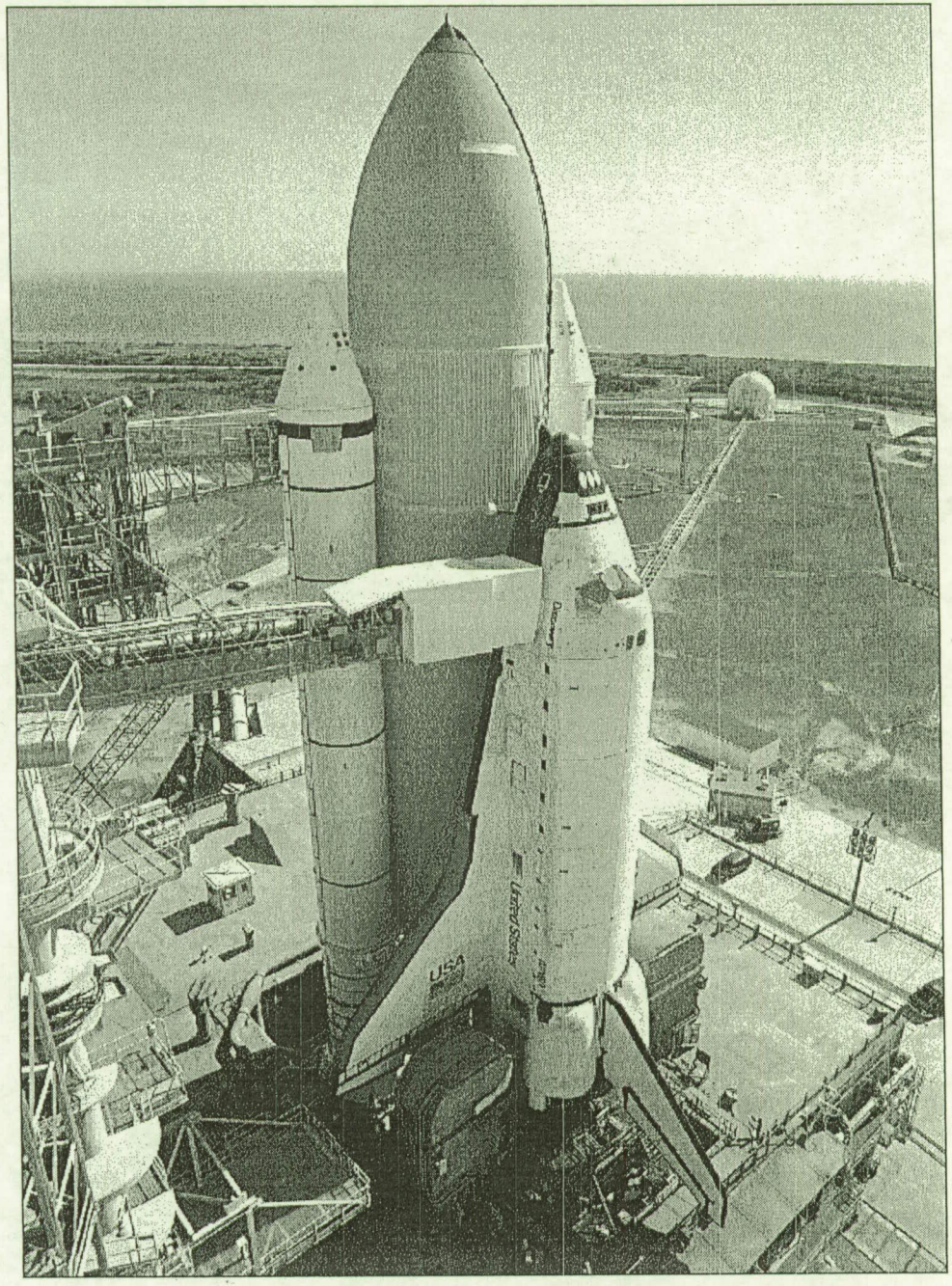
Composite Lay-Up

M&P has access to MSFC's state-of-the-art composites lay-up laboratory and uses this resource for the development and qualification of composite materials.

Model Shop



M&P has access to model shops which offer the ability to fabricate specialized tooling and test fixtures and perform high tolerance sample preparation.



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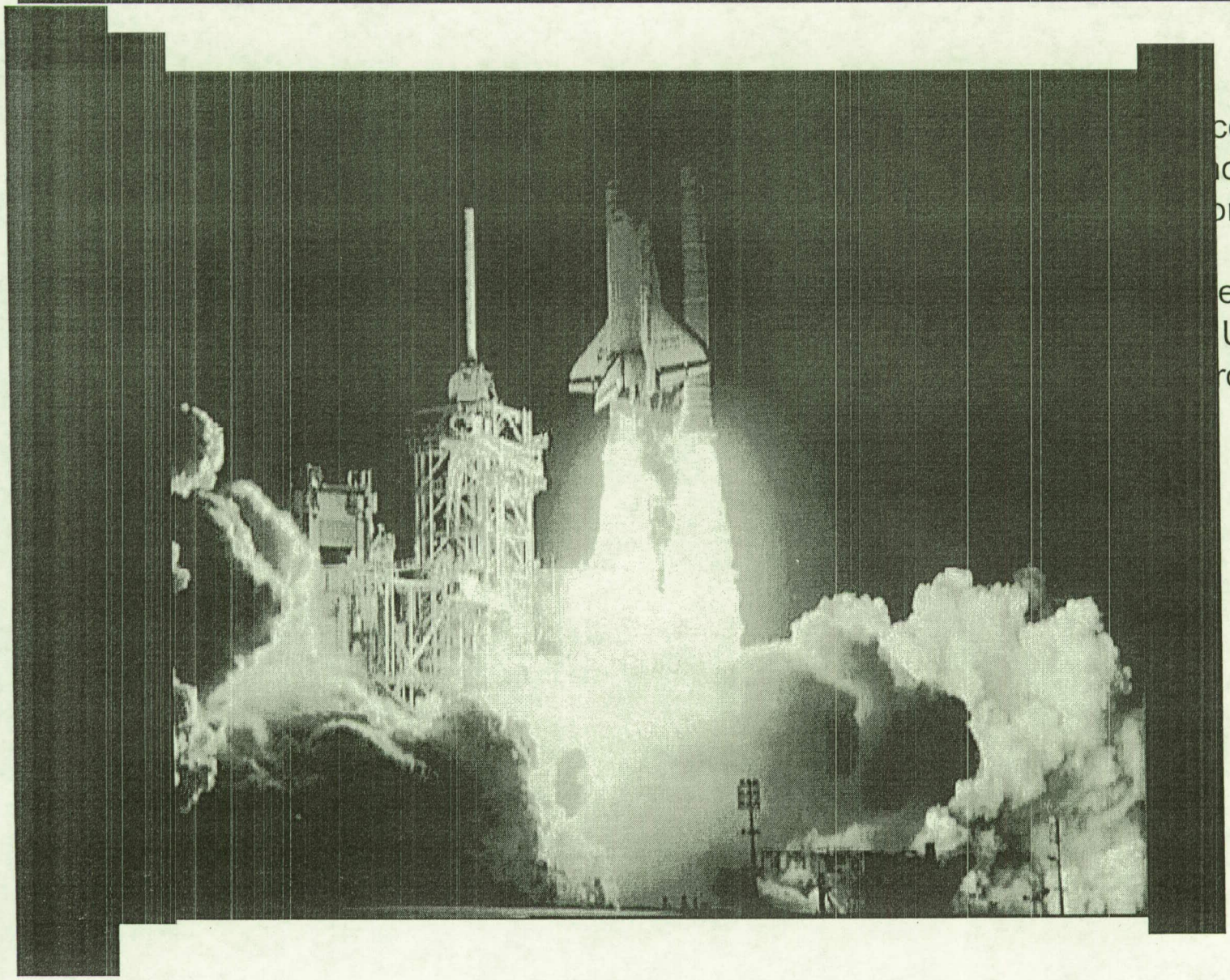
USA Materials and Process Engineering



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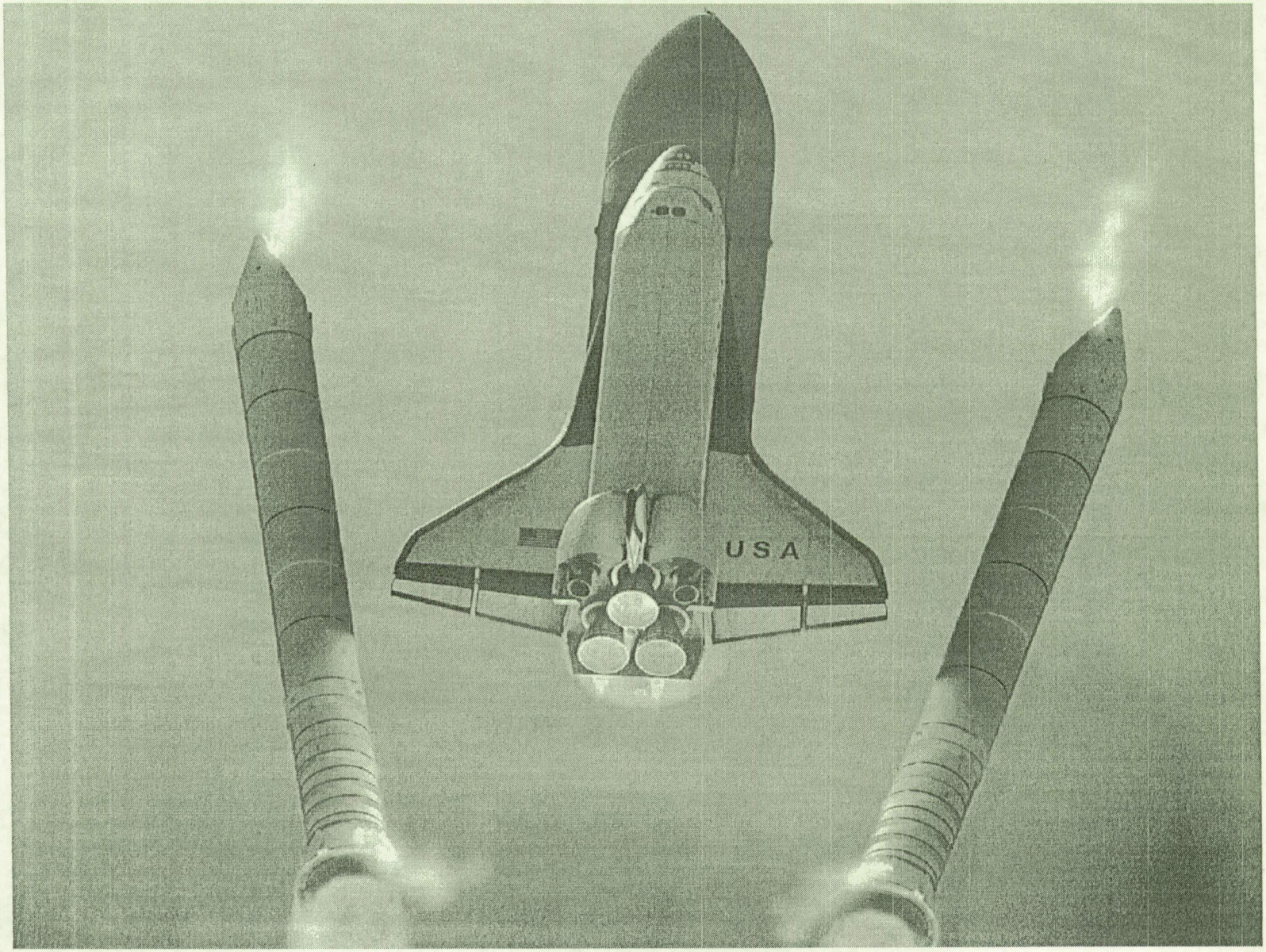

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M&P Laboratory Capabilities -- Materials Analysis

Scanning Electron Microscope

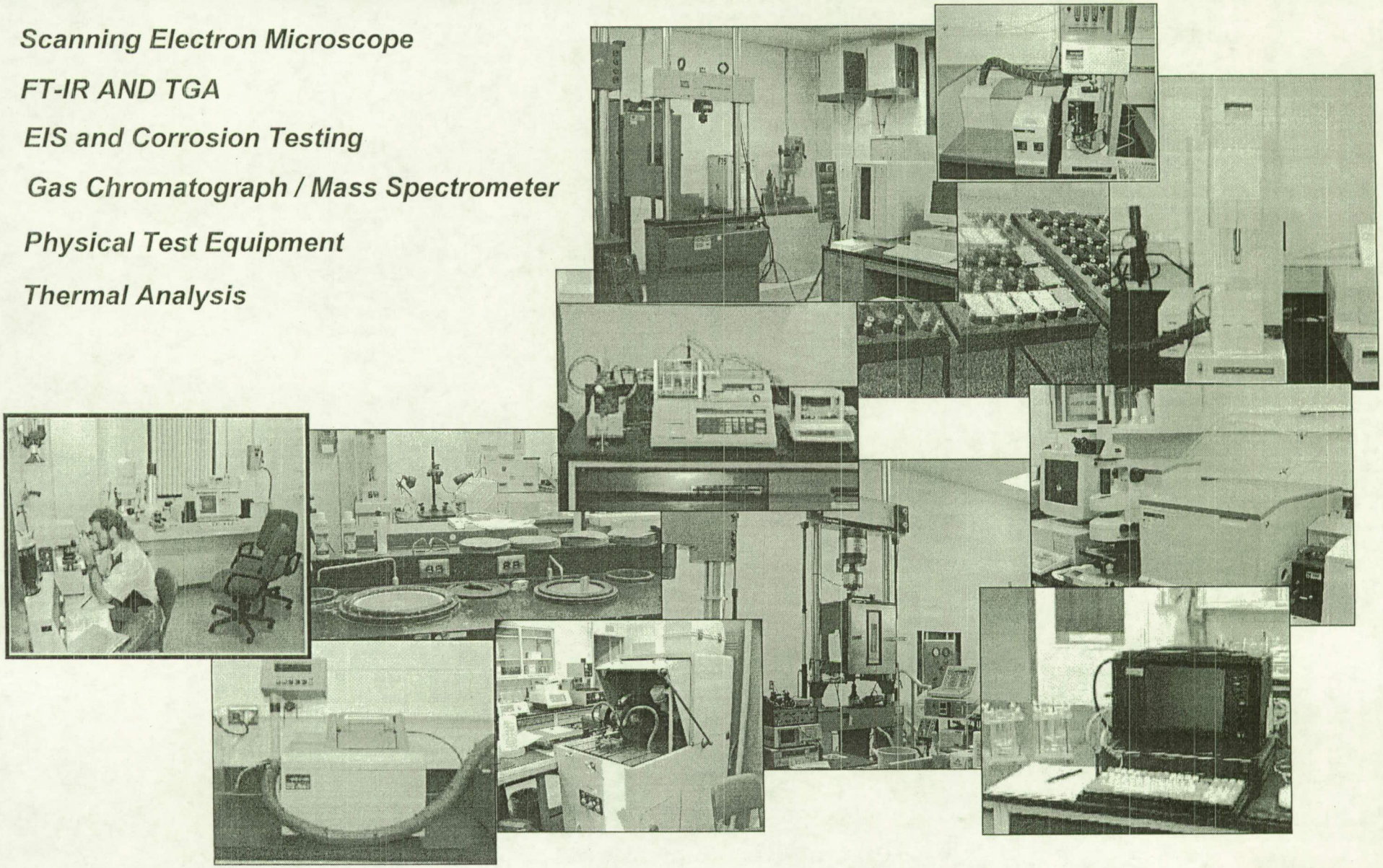
FT-IR AND TGA

EIS and Corrosion Testing

Gas Chromatograph / Mass Spectrometer

Physical Test Equipment

Thermal Analysis



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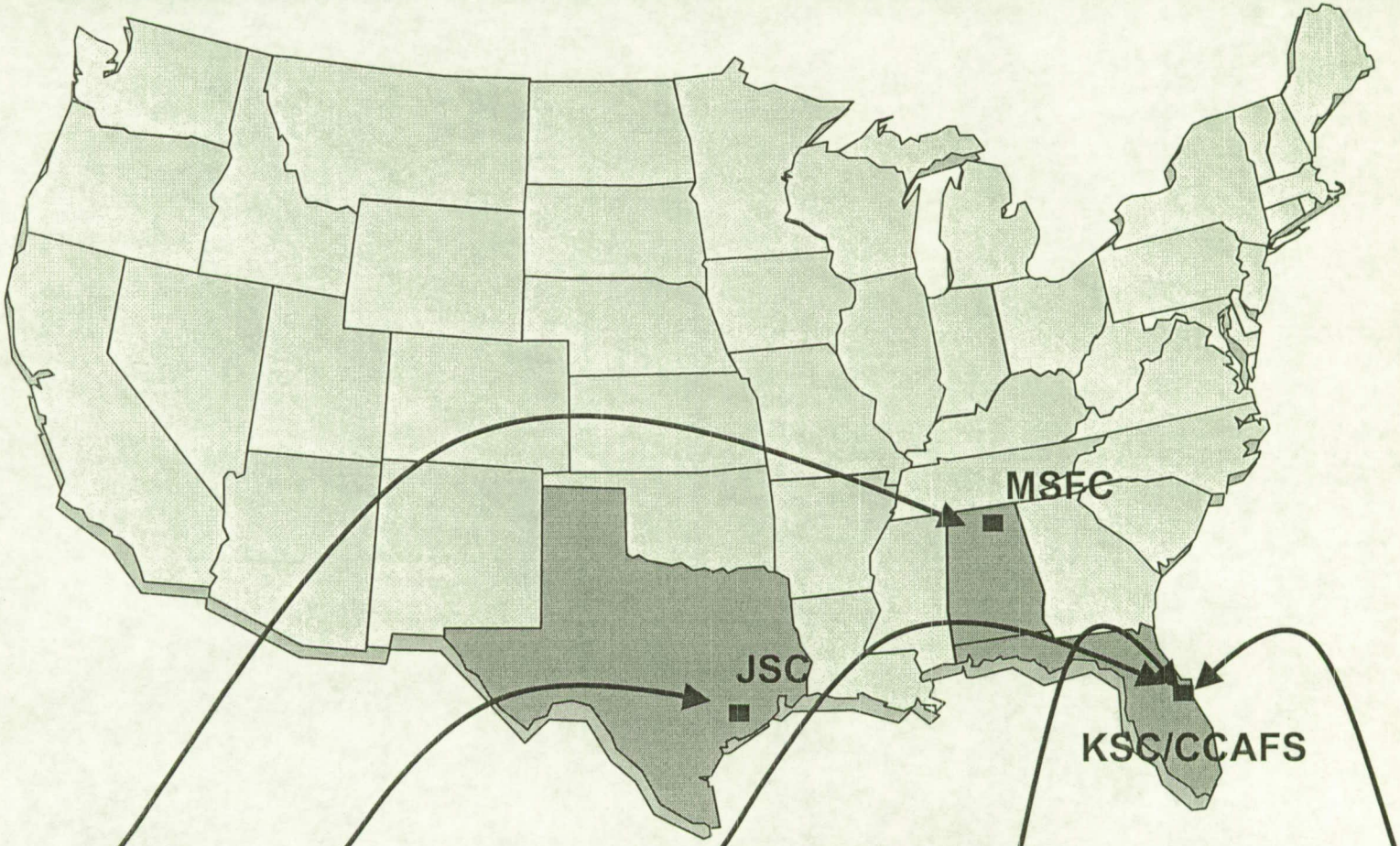
USA Materials and Process Engineering



MSFC — PEMD	JSC CAU and VHMS	KSC — ARF SRB	CCAFS — Hgr N M&P Labs	KSC — OPF/VAB GO and Orbiter

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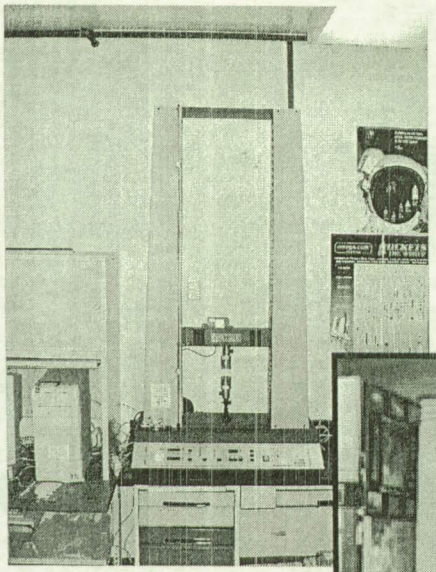
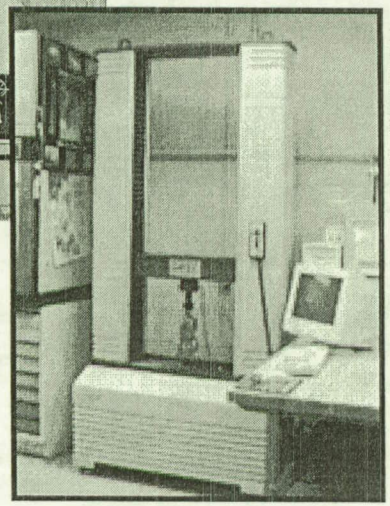
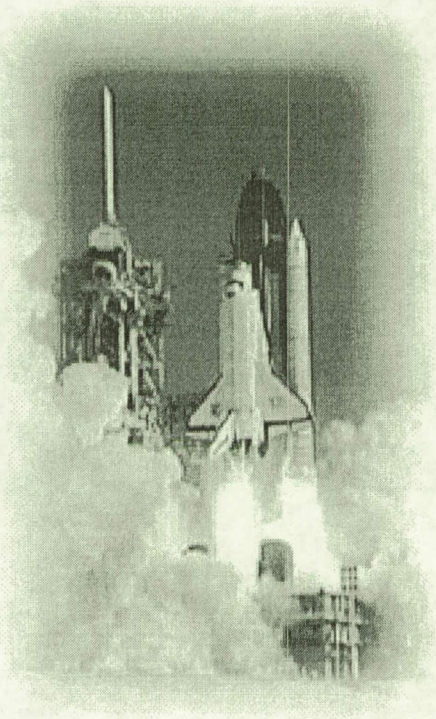
M&P Laboratory Capabilities -- Locations

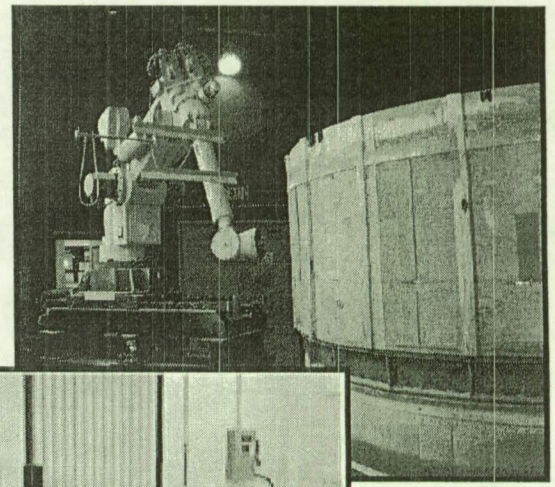


VAB, KSC

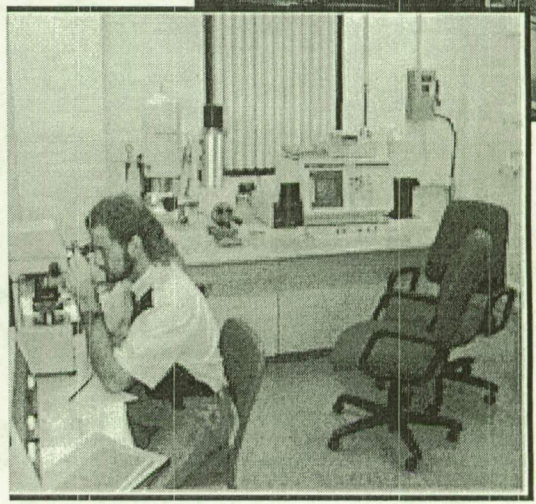


ARF, KSC





PEC, MSFC



Hanger N, CCAFS

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M&P Laboratory Capabilities – TPS & Robotics

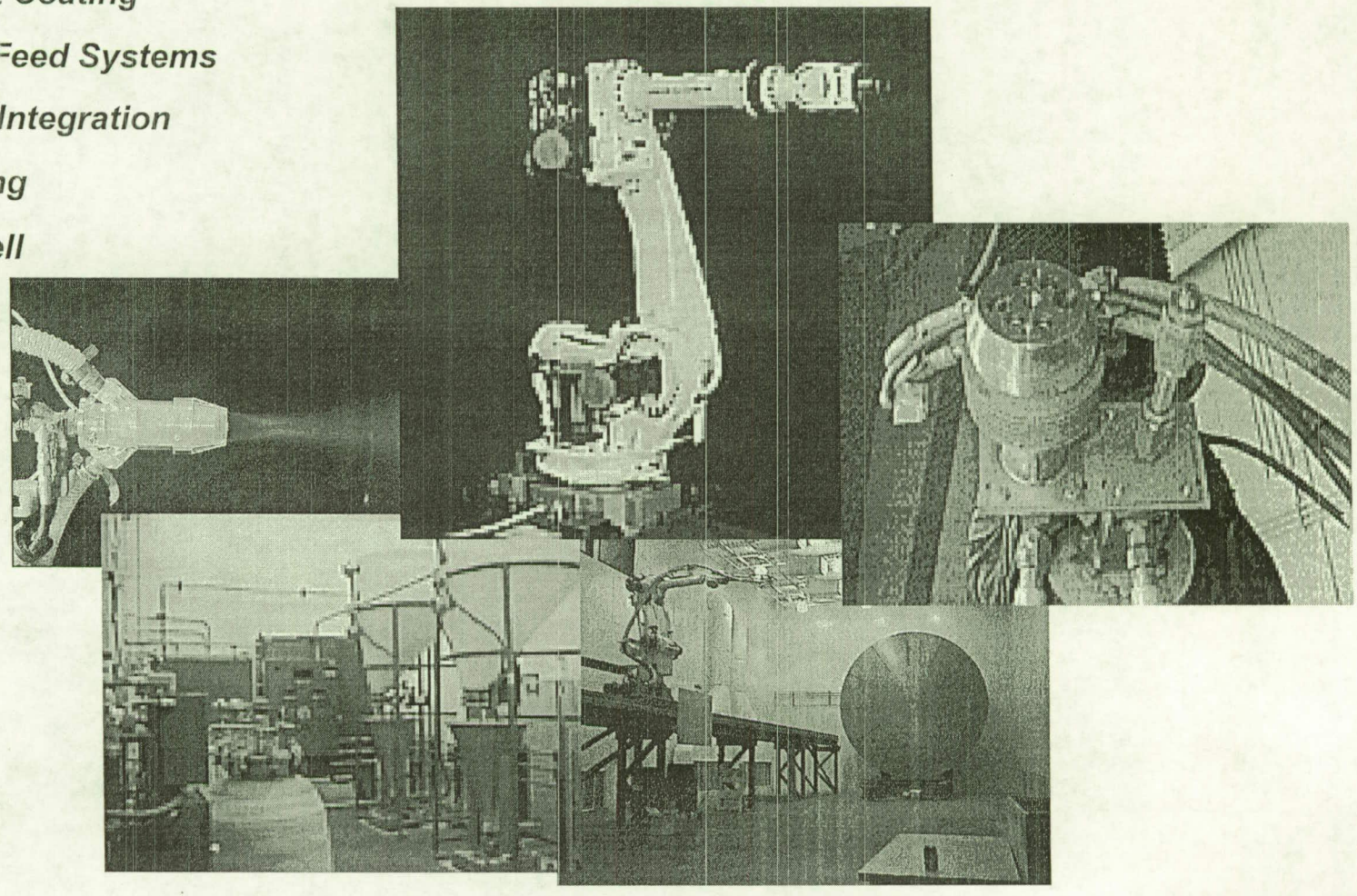
Marshall Convergent Coating

Automated Material Feed Systems

Large Scale System Integration

Robotic Programming

Hydrolaser Spray Cell



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M&P Laboratory Capabilities – Materials Development

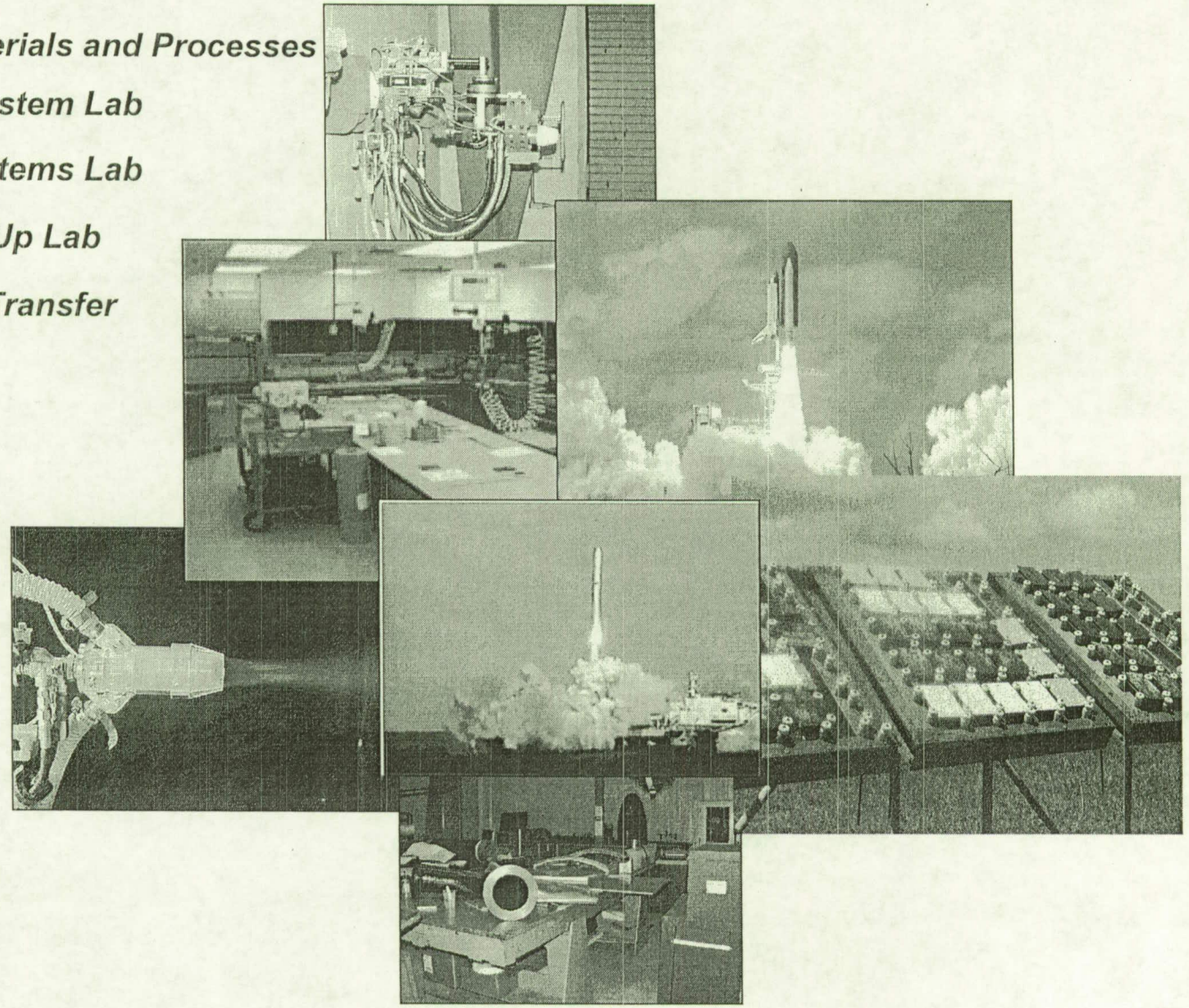
Assured Materials and Processes

Corrosion System Lab

Coatings Systems Lab

Material Lay-Up Lab

Technology Transfer



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M&P Laboratory Capabilities – MSFC PEC

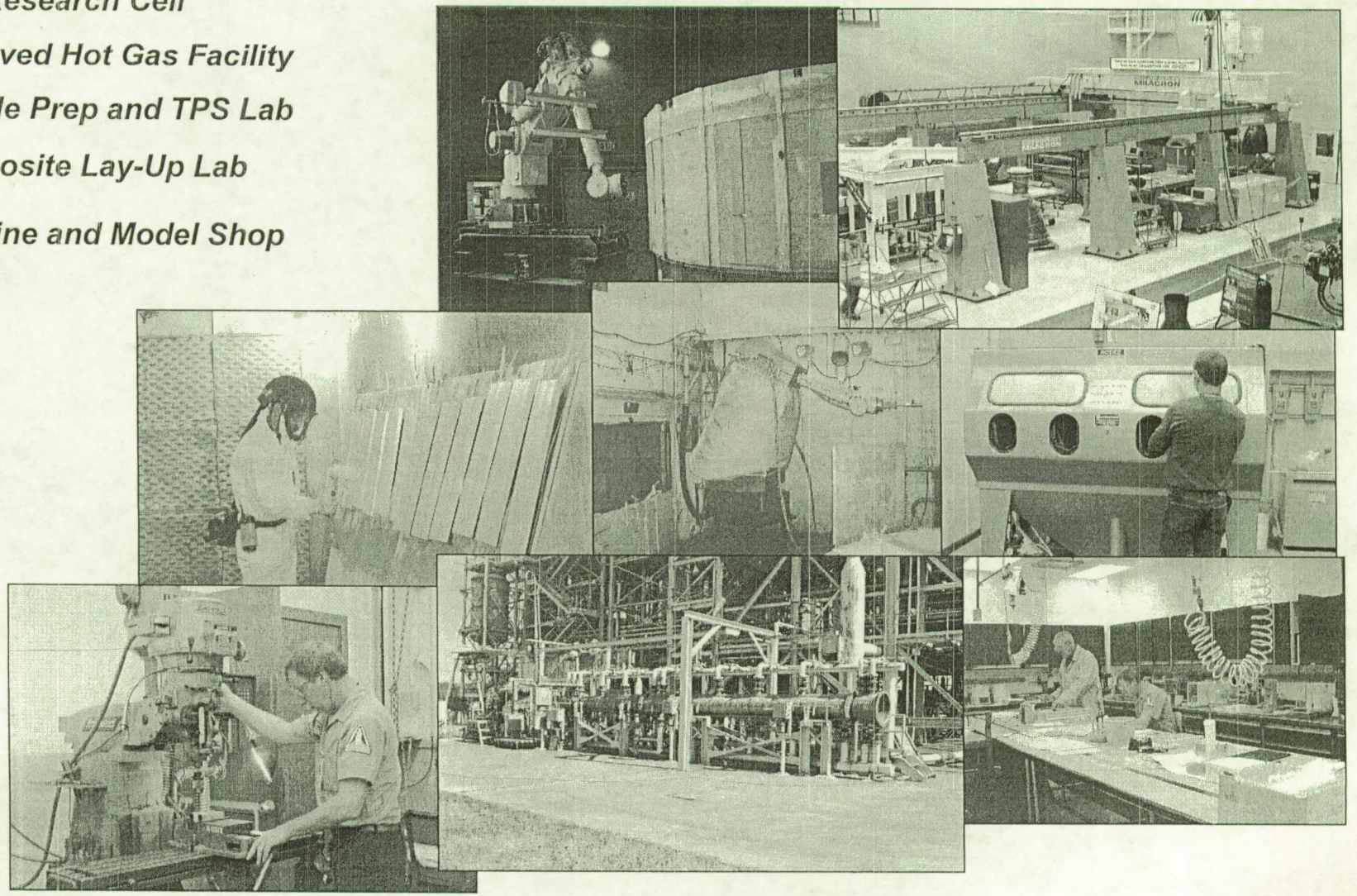
TPS Research Cell

Improved Hot Gas Facility

Sample Prep and TPS Lab

Composite Lay-Up Lab

Machine and Model Shop



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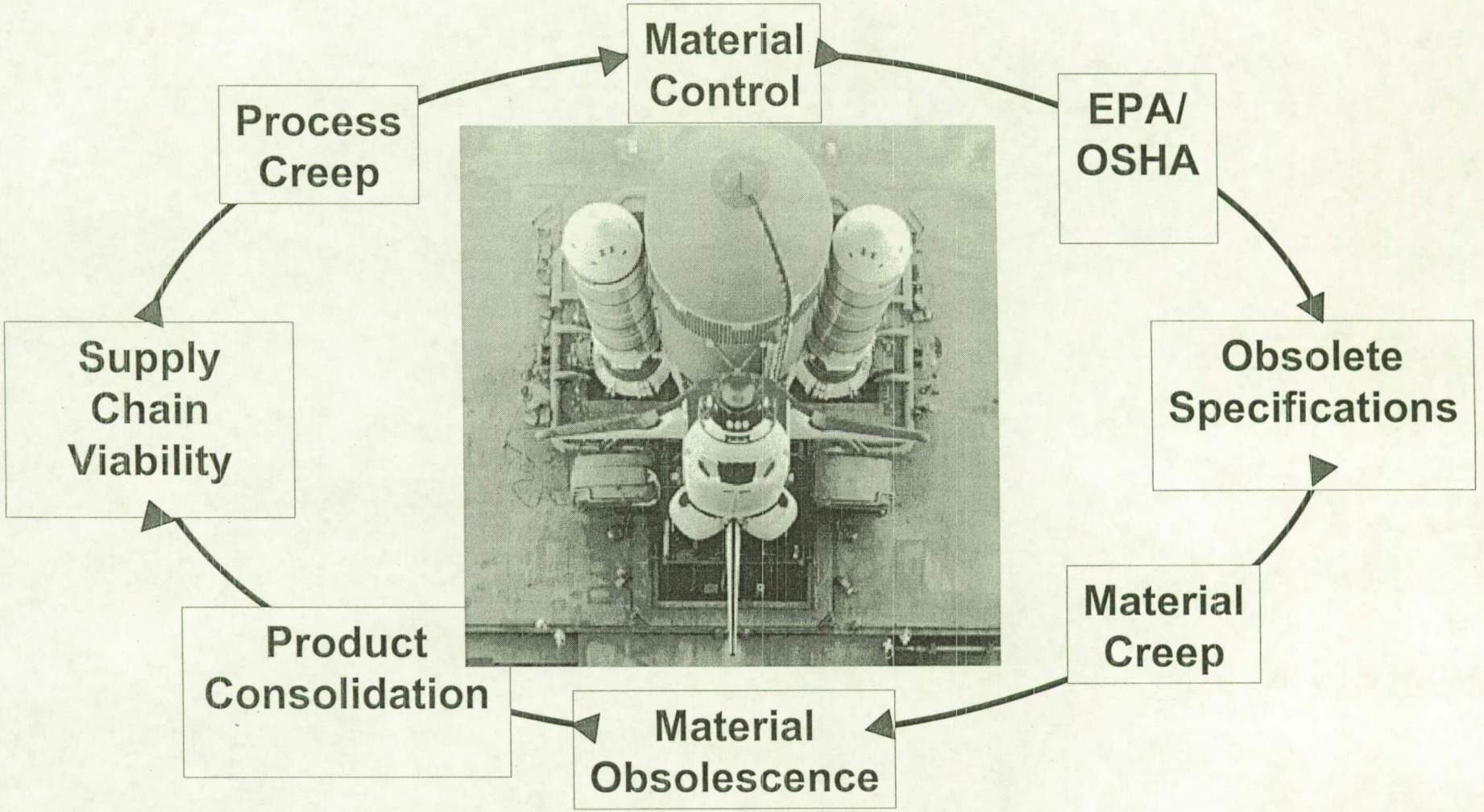
The Next Decade – *Managing Material Change and Obsolescence*



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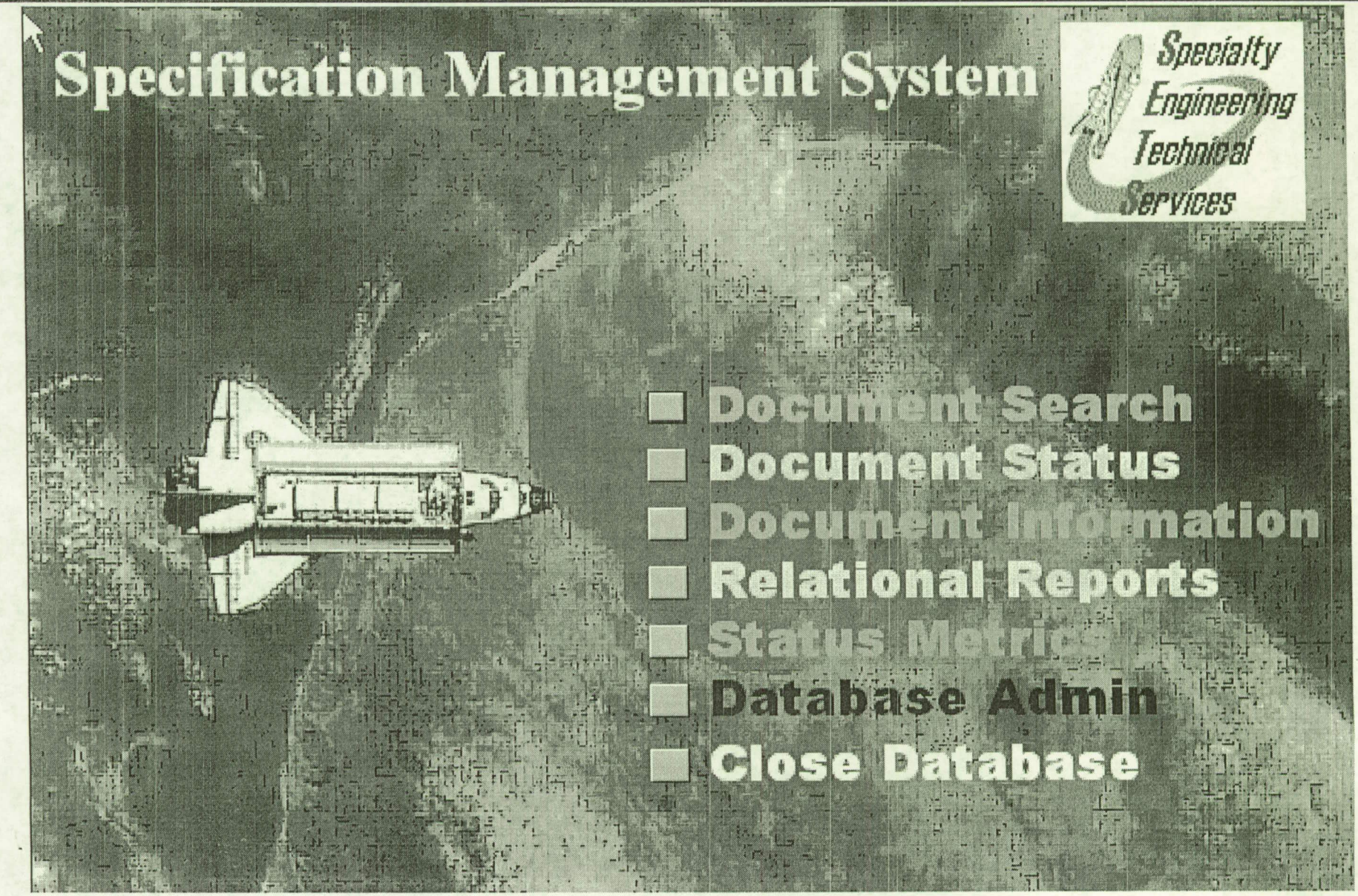
SMS Database Overview



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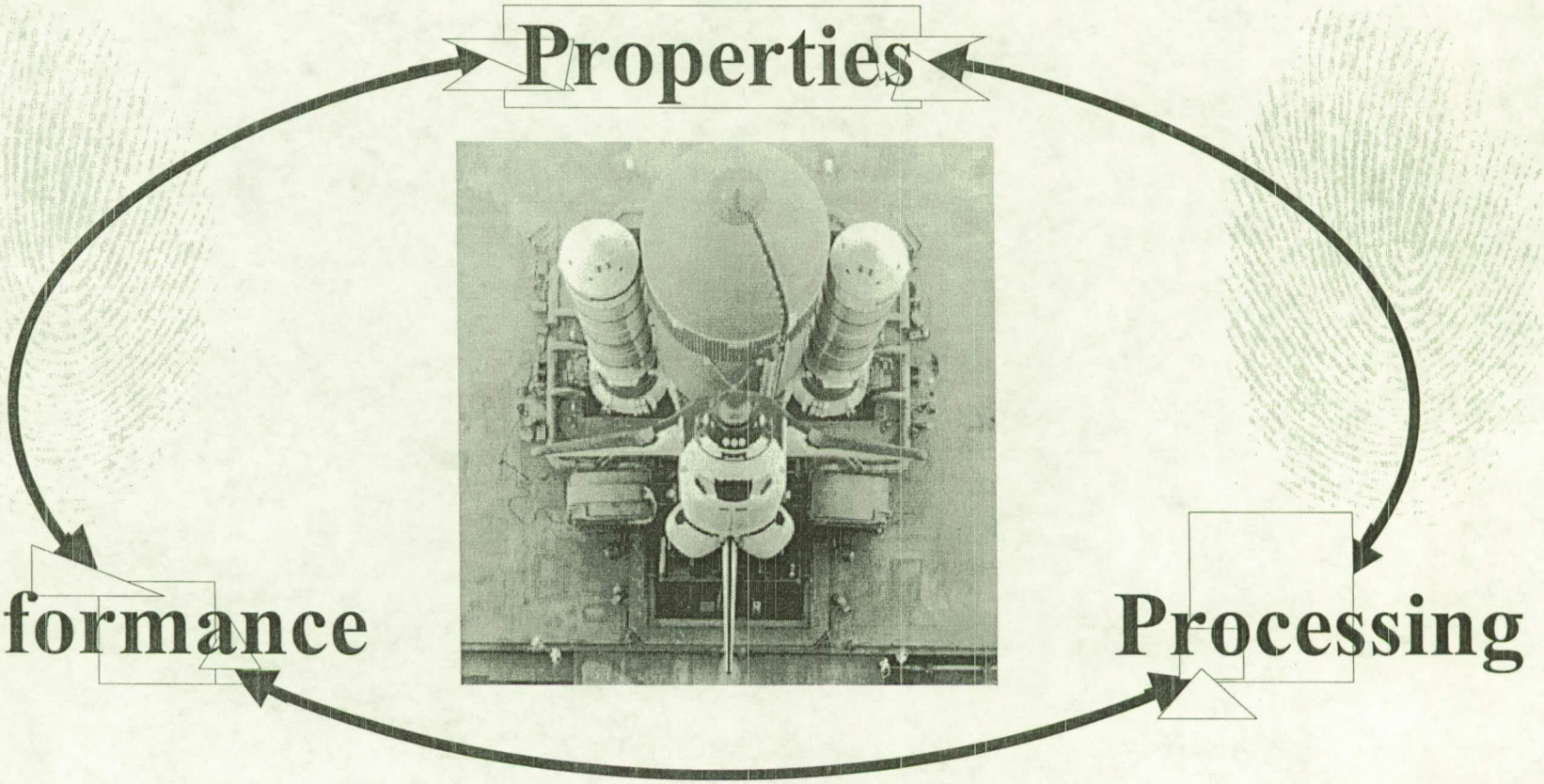
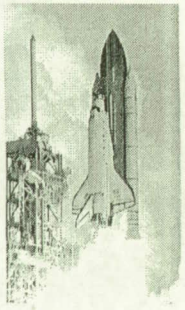
The Next Decade — *Material Fingerprinting*

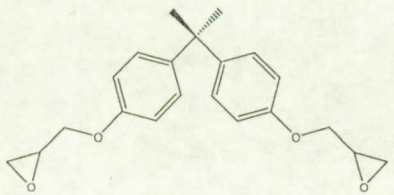
Objectives of Chemical Fingerprinting

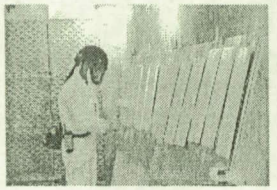
- Enhanced understanding of material composition
- Reduced probability of unexpected and unrecognized changes to critical materials
- Enhanced ability to detect changes in a material due to vendor or subtier supplier changes
- Improved understanding of how a material works, ages, degrades, etc.

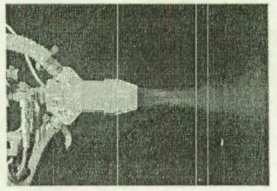
Fingerprinting: Material Science

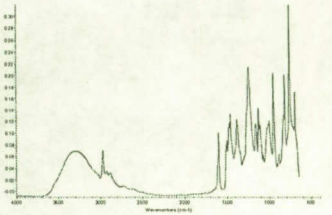


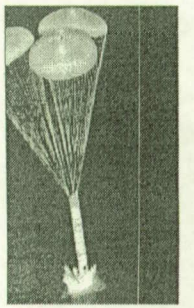












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