In-house Fabrication of Temperature Sensitive Paint
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MOTIVATION
Temperature Sensitive Paint (TSP) is major method of measuring boundary layer transition and heat transfer.
TSP is accurate and cheaper alternative to conventional tube measurement techniques
However, use of commercial available TSP is limited by cost and time factors.

GOAL
Develop Standard Operating Procedure for fabrication of TSP in house for Aerospace Research
Study illumination and response time of fabricated TSP with commercial TSP and CFD Simulations
Implement fabricated TSP as cost effective alternative with future fabrication of Pressure Sensi-

BACKGROUND
Developed to replace old method of thermocouples.
TSP uses optical sensors such as CMOS camera to measure temperature on small and remote surfaces
Based on quenching of luminescent molecules which are sensitive to local temperature.

CURRENT DESIGN
Based on literature research, Europium (III) tris (thenoyltrifluoroacetylacetonato) diethy-
maninophenyl (EuTTA) chosen as Lumino-

Excitation wavelength of UV light and emission wavelength of 612 nm allowed for use available CMOS CCD camera.
Oxygen binder was chosen to be Model Airplane Dope and Dope Thinner.
Standard Operating Procedure was developed to meet the Nitrogen storage requirement of EuTTA as well as Acetone and Dope’s chemical requirements during the fabrication of paint.
Cost analysis determined that in house fabricated TSP will cost 10% of the com-


PROGRESS
Standard Operating procedure has been developed, accounting for safety and chemical risks.
Data capturing test section was used to test and record results for commercially available TSP.
Fabrication of in-house TSP is in process and will be tested to prove its effectiveness.
In-house TSP will be calibrated to adjust for intensity ratios and compared with commercial TSP.
Right shows the results of commercial TSP with temperature varia-

FUTURE/ TEAM
Repeat the experiment by developing in house Pressure Sensitive Paint.
Transition fabrication process of TSP to College of Engineering to reduce errors associated with exposure to UV light.
Perform experiment on aircraft model using wind tunnel and compare with CFD simulation results.

Dr Ricklick is an Assistant Professor of AE with research focus on Jet Impingement behavior.
Mayur is a senior in AE with experience as engine test engineer and experimental research.