



RESEARCH FOUNDATION

RESEARCH FOR THE NFPA MISSION

STUDENT PROJECT PROSPECTUS

Hazards associated with laser ablation process

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Background: Laser ablation process is a subtractive technique consisting of the fabrication of micropatterns through the removal (ablation) of small fractions of a substrate material under the action of a focused pulsed laser beam. Laser ablation processes are implemented for various applications such as manufacturing parts, servicing existing parts including cleaning and removal of paint from large aerospace components or large aircrafts. A laser light is applied on the material surface to vaporize the coating in varying degrees of pyrolyzation. Further understanding of the byproducts released from the laser ablated paint removal process is needed to determine if hazards such as combustible dusts and/or flammable vapors are present.

Research Goal: The project goal is to conduct a literature review of the laser ablation process and identify any related hazards. This should consider various applications of laser ablation processes and specifically determine the presence of combustible dust and/or flammable vapor byproducts.

Project Tasks: This project includes the following tasks:

Task 1: Literature review:

- Conduct a literature review of laser ablation processes to describe the process, its applications, and the affiliated hazards associated with the process. The literature review should include reviewing published peer-reviewed journal articles, conference proceedings, technical reports, and other technically valid sources.
- Review applicable codes and standards to summarize the safety requirements while conducting laser ablation processes.

Task 2: Hazard Assessment: Conduct a hazard assessment to:

- Identify the hazards associated with the byproducts (i.e., combustible dusts, flammable vapors) produced from the laser ablation process and their potential for suspension in the work environment
- Determine the ignition potential of any suspended product near the laser or heated surface.
- Identify the typical surface temperatures experienced during this process.
- Review the work environment in which laser ablation processes are performed to identify any hazards to the shared environment in which these operations are conducted.

Task 3: Final Report: Develop a draft final report including the findings from tasks 1 & 2. Review the draft report with the project panel and submit a final report after considering the panel's comments.

Schedule: This research project is scheduled to be completed within 6 months of project initiation.

How this information will be used: Project deliverables will be useful for relevant NFPA Technical Committees such as NFPA Standards on combustible dusts and NFPA's standard for laser fire protection, NFPA 115.