



Engineering

Research Project: abstract and introduction examples

Abstract: example (Civil and Mechanical Engineering)

In the United States, more than 1 in every 12 fire fatalities occurs in a passenger road vehicle; vehicle fires claim roughly 1200 injuries, \$1.3 billion in property loss, and 490 lives annually. Very little progress has been made over the last several decades to confront the hazards of vehicle fires, but recently researchers and standards organizations have begun addressing these challenges. A literature review of the progress made and methods of reducing fire severity through technologies and standards was conducted. NFPA 556 is one proposed standard aimed at mitigating the hazards to occupants of vehicle fires; it was used to analyze the fire retardancy of a new, fire-resistant acoustic insulation material through small, bench, and large-scale testing. The feasibility of the use of this material in new vehicles for the reduction of losses was assessed through a cost-benefit analysis. Upon review of the results, it was determined that the new insulation did not pass all the requirements of NFPA 556. However, the standard does include stringent requirements, so the improved performance of the material should not be underappreciated. Based on the literature search and experiments, this standard, in combination with other fire protection technologies, provides a basis for improved vehicle fire safety.

Background /
context

Problem/gap

Methods/purpose

Findings

Conclusion
(interpretation
and significance
of findings)

(Adapted from Patronik, 2008)

Key Phrases

Very little progress	= indicates a gap in knowledge, that needs to be examined
... recently researchers and standards organisations have begun addressing this challenge	= indicates that this issue is considered important to investigate
A literature review was conducted	= method
... it was used to analyse	= method
The feasibility ... was assessed through a cost-benefit analysis	= method
Upon review of the results, it was determined ...	= conclusion
Based on ... provides a basis for improved vehicle fire safety	= the conclusion and significance

Abstract: example (Electrical Engineering)

Following the 2008 severe electricity shortage in South Africa, domestic and industrial users faced incessant periods of blackouts. The rising cost of the fossil electricity has made the solar power an attractive option bearing in mind that the cost of the solar power has plummeted steadily in the past few years. Africa has huge potentials of solar power because of the abundance of direct sunshine in most days of the year. Two main technologies are prevalent in the solar power research: photovoltaic (PV) systems and the concentrated solar power (CSP). In this thesis, a 2.5 kW Residential PV system and a 100 MW Molten Salt Power Tower Concentrated Solar Power were developed. The technical model of the photovoltaic panel and the power electronic circuits that connect it to the grid were also developed with Matlab/Simulink while the economic simulation of the PV, as well as the Concentrated Solar Power were carried out with Systems Advisor Model (SAM) using the climate data of Cape Town. The simulation results of this work compared the cost of PV electricity first with Renewable Energy Feed-in Tariff (REFIT) of National Energy Regulator of South Africa (NERSA), and then with the residential tariff charged by the City of Cape Town. Also the cost of electricity using CSP was compared NERSA's REFIT. Finally the cost of PV electricity was compared with that of CSP. Based on the findings it can be concluded that, with government incentives, CSP and PV are viable technologies; however, electricity produced by CSP is cheaper than that of the PV.

Background.

Statement of problem

Methods used

Findings / conclusion

(Adapted from Chukwuka, 2013)

Introduction: example

In the United States, more than 1 in every 12 fire fatalities occurs in passenger road vehicles; these fires can develop and spread for a number of reasons, such as ruptured flammable or combustible liquid containers, vehicle contents from occupants, and vehicle components (insulation, fabric, plastics). Depending on the data used, passenger vehicle fires claim between \$700 million to \$2 billion worth of property loss and nearly 500 human lives in a given year. Within the last decade, research into the vehicle fire problem has developed, leading experts and researchers in the automotive industry and fire protection to begin tackling the vehicle fire problem through statistical and technological research.

Background / context
Note how the writer has problematised the background, suggesting a need to investigate.

Through the analysis of actual vehicle fires as well as large-scale tests, researchers have been able to identify critical issues with vehicles related to fires and their propagation. Two major issues have been identified through this research: pool fires under the vehicle and engine compartment fires represent the most detrimental of the fire scenarios. *In this thesis, research will concentrate on* the engine compartment fire scenario. Fire propagation through the firewall separating the engine and passenger compartments represents a *critical area for improvement* in vehicle fire safety based on data provided. Both heat transfer through this barrier as well as flame penetration *are critical issues for review and resolution*; materials and methods to prevent both these penetration mechanisms are two of the many steps needed to reduce the severity of vehicle fires and their potential to harm occupants. Thus, the *objectives of this thesis are* to analyse current state of vehicle fire issues and research through a literature search and review and to subject a new acoustic insulation to the requirements of NFPA 556 and determine its viability in vehicle manufacture from experimental and cost-benefit results.

Brief reference to previous research
This will be expanded on in the literature review

Focus / aim
Note how the writer highlighted the gap in current research and thus the need to undertake the study

It is important to stress that changing one or two materials in a vehicle will not drastically improve the fire safety of the vehicle. However, as a whole, if enough materials are required to meet new, more stringent standards, then their cumulative effect would decrease the fire hazard to occupants. Product testing is an essential part of this process.

Limitations of study is acknowledged and the significance of the study is highlighted

Through various small bench and large-scale experiments, the fire performance of a new fire retardant acoustical insulation product has been evaluated and compared to the standards proposed by NFPA 556. These experiments focused on the acoustical insulation's role as a fire barrier in the firewall of vehicles. Following a systematic review of the literature, this report presents the experiments and their results, comparing the process and results to the proposed standards and research. Additionally, the results of a cost-benefit analysis, which was conducted to determine the feasibility of adding this new fire retardant acoustic insulation to new vehicles, are presented.

A brief description of the methods and outline for the research paper



Chukwuka, C.O. (2013). *A study of the solar energy systems and storage devices*. [Doctoral thesis, University of Cape Town].

Patronik, E.A. (2008). *An analysis of vehicle fires and potential methods to reduce their severity through more stringent material standards*. [Doctoral thesis, University of Maryland]. UMI Dissertations Publishing.