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Lightweight Composites

The article explains how lighter composite materials will improve handling, performance and safety in new production cars that implement this technology. In detail, the article dives into what companies like Chevy, Hyundai, Ford, and Jeep have done with this new composite technology to make their cars safer and acquire improved performance. It also covers how these materials will improve manufacturing time, lower production cost, limit corrosion, increase damage resistance, decrease noise/vibrations/harshness (NVH) from the road, and give the designers of the car more freedom to do what they want.

The most apparent rhetoric used in this article would be rational appeals. Common sense is one of the first rational appeals used by the author. After explaining how lightweight materials will be used in major components, the author continues to use common sense to explain how weight loss can be taken a step further as an indirect benefit. As Malnati states, "Another indirect benefit is so-called 'mass decompounding.' By reducing the weight of a hood or decklid/liftgate, for example, other mass can be removed from the assembly by going to lighter hinges, latches and struts, helping cut mass and costs further" (Malnati Para. 3). This statement, because the audience is mostly made up of engineers who are experienced in this field, would be common sense to the targeted audience. This specific use of rhetoric is used multiple times throughout the article. For example, as stated by Malnati in paragraph 12 "Replacing aluminum with a composite reduced wheel weight by 27 kg (59.5 lbs.) per car and lowered rotational inertia by 40%, thereby providing faster, more responsive steering, and improved acceleration and braking." This statement proves her point that composite materials can be used to increase

performance by reducing mass. The reader can use reason and common sense to come to the conclusion that less weight will give the car the ability to stop and turn quicker. Imbedded in this statement is the use of hard evidence; this is the most used type of rhetoric throughout Malnati's article.

As previously stated, another rational appeal used by the author is hard evidence. As an example, Malnati states that "The new tough class a grade, which CSP calls TCA Ultra lite, has a specific gravity (SG) of 1.2, a value the company says is 28% lighter than its TCA lite 1.6-Sg, mid-density grade, and 43% lighter than conventional 1.9-SG SMC" (Malnati Para. 5). This excerpt is a fair example of both a testimony and a statistic. The author is using information that the company has stated either directly to her or in a public announcement. This source is also where the author got her statistics. The source of the information increases the credibility of her article because she used a statement directly from the company that creates the product. She continuously uses this method of collecting sources throughout the article.

The author also likes to use hard evidence as a rational appeal. One example of a fact in her article would be when she states "…has reduced mass an average of 9 kg (20 lbs.) on a total of 21 exterior body-panel assemblies for 2016 model year Chevrolet corvette sports cars from Detroit-based general Motors co. Reportedly, this was accomplished without lowering mechanical performance or necessitating process or tooling changes" (Malnati Para. 4). This is a concrete fact because it can be proved again and again. Malnati has many facts like this scattered throughout her article which increases her article's credibility.

There are also a few uses of emotional appeals in Malnati's article. The article was written by composite material professionals and its intended audience are also composite material professionals who are going to put the information that they get from the article to use

in their lines of work. However, because this article also talks about the automobile industry, she also makes an effort in trying to connect with them. This is where she is able to use emotional appeals to her advantage in her article. She first builds a bridge with the auto industry by stating something that the people want to hear. All car enthusiast and automobile engineers know that when the car is lighter, the better the car will handle, the sooner the car will stop, and the faster the car will accelerate. This is why in the first paragraph of Malnati's article, she starts by saying "Lightweighting is the mantra du jour in the automotive industry these days, especially for those designing and producing parts." By reading this first line of Malnati's article, the car enthusiasts are automatically invested in knowing what kind of materials can be used and what these materials can be used for. The automobile engineers are also invested, as it not only refers to their line of work, but also because the article directly calls them out in the first line. She has now connected on an emotional level with her audience; both groups of people are now devoted in reading what Malnati is going to say.

Emotions aside, there are a few parts of the article that do not quite make sense to some car enthusiasts and potentially automobile engineers. This leads the reader to suggest some of her article contains a few logical fallacies. However, the only part of the article that may be a logical fallacy would be when Malnati's states:

> Generally, they also benefit from far greater design freedom (including parts consolidation with reduced assembly time and costs, and carryover savings in inventory storage/tracking and warranty claims); elimination of corrosion (and occasionally the paint and primer that protect against it); increased damage resistance (and often improved crashworthiness); lower noise/vibration/harshness (NVH) for a quieter ride; lower tooling and part-production costs (Malnati Para. 2).

The only concern this statement creates is when Malnati talks about cost. Take carbon fiber for example; this composite material happens to be one of the most used in racing and high end performance cars. However, carbon fiber is not cheap; sometimes it can take longer in the production stage of building automobile parts to work with carbon fiber than other materials (Carbon Fiber Construction - /Inside Koenigsegg).

Briefly stated in the beginning of the analysis, the organization that this article was written by is very credible. The article was posted by Plastics Engineering, which is a magazine company that "informs professionals with news and in-depth reporting on state-of-the-art and emerging technologies that impact the R &D and processing of plastic products" (Our Audience). As for the author, Peggy Malnati has been working in the plastics and composites industry since 1984. She "primarily covers automotive and ground transportation as well as infrastructure" (Author Bio). However, the only part that does not make sense is that Peggy Malnati has been working for a different company since 2005; this leads to the question of why Peggy Malnati would have an article in a different magazine company. It is most likely thought that Malnati only did one article for Plastics Engineering, or that it was not written for Plastics Engineering and they are using it in their magazine simply for additional information on the subject.

The author does a very good job at explaining how lighter composites will improve handling, performance, and safety in new production cars that implement composite technology. Throughout her article, Malnati gives the reader good and reliable examples for every one of her claims. Her claims being that composite materials can lower weight, improve handling and performance, and increase the safety on automobiles. Malnati uses rational appeals, emotional appeals, and a couple logical fallacies throughout her article. Her use of hard evidence, reason

and common sense, bridge building, and the rare case of logical fallacies, make her article well supported and easily accepted not only in the automobile industry, but also in the academic community as well.

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