3D Printing In Collision Repair

Task Force Report

To All Stakeholders & Industry

Overview of the Progress of the 3D in Auto Task Force

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1. Executive Summary

We are pleased to present our report of the 3D in Auto Task Force, showcasing our findings in exploring and advancing the integration of 3D printing technologies within the automotive and collision repair industry. This report provides an overview of our initiatives, key highlights, and initial recommendations. Our efforts have been focused on engaging with industry stakeholders, conducting research on 3D printing applications, and identifying key areas for improvement. We are also addressing the risks associated with using poor quality 3D printed auto parts and proposing a framework for a regulatory body to endorse and monitor the use of 3D printed automotive parts. The industry's collaboration and support have been instrumental in driving our progress, and we look forward to continued success in the upcoming quarters.

2. Introduction

The integration of 3D printing in the automotive industry offers immense opportunities, but it also presents challenges that must be addressed to ensure safety, quality, and reliability. The 3D in Auto Task Force was established with the primary objective of harnessing the full potential of 3D printing technologies within the automotive sector, through a safe and regulated supply chain model. In this report, we share our findings, research, key recommendations, and the importance of collaboration among industry stakeholders in shaping the future of 3D printing in the automotive industry.

3. Task Force Establishment and Engagement

Since our establishment, we have actively engaged with industry stakeholders to gain valuable insights and feedback. The Task Force features representation from leading global business and industry associations focused on auto collision repair. Our collaborative efforts have helped shape the direction and focus of our initiatives. We would like to extend our gratitude to all stakeholders and the industry for their valuable contributions and support.

4. OEM Adoption 3d Printed Parts

The catalyst for the task force and the journey to date has been the rapid adoption of 3D printing for end-use parts by Original Equipment Manufacturers (OEMs) in recent years and how we can bridge the gap to bring this technology and on-demand parts to the collision repair sector through a safe and regulated 3D supply chain.

OEMs in the automotive industry have led the way in 3D printing, embarking on a transformative journey by incorporating 3D printing technology for the production of end-use parts. This paradigm shift is revolutionizing traditional manufacturing processes and

yielding substantial benefits. Some of the leading manufacturers have set up 3D printing production facilities, focusing on short-run manufacturing or the design of complex parts.

3D printing, also known as additive manufacturing, offers OEMs several advantages. First and foremost, it allows for the production of complex geometries and intricate designs that were previously impossible or cost-prohibitive with conventional methods. This leads to enhanced performance, reduced weight, and improved fuel efficiency of vehicles.

Moreover, 3D printing enables a significant reduction in lead times and inventory costs. Manufacturers can produce parts on demand, eliminating the need for extensive warehousing and minimizing supply chain disruptions. This responsiveness enhances OEMs' ability to adapt to evolving market demands and design changes.

Furthermore, the environmental impact of manufacturing is substantially reduced through 3D printing. The technology minimizes material waste by utilizing only the necessary amounts of raw materials and recycling excess material, also reducing the logistics footprint. This aligns with the growing focus on sustainability in the automotive industry.

The adoption and utilization of 3D printing pave the way forward for this same technology and materials of parts to be utilized in the collision and auto repair sector and the core objective of the Task Force.

5. Industry Research and Exploration

"Our extensive research delved into the current utilization and opportunities of 3D printing within the automotive supply and repair sectors, revealing promising prospects. Notably, 3D printing exhibits transformative potential in the collision industry, especially in manufacturing smaller short-run plastic components, in favor of traditional large-volume injection molding manufacturing. In addition, items like repair kits for headlights, sensor cradles for bumper covers, and high-value clips are very favorable for 3D printing applications. Additionally, it can address the need for smaller, discontinued, or out-of-stock parts that would otherwise require high-volume production through traditional methods."

Furthermore, we discovered the potential to utilize 3D printing for designing new attachment-style repair kits, currently unavailable for purchase through any supply

chain. These kits enable the repair of more components, particularly in cases like headlights with broken or missing tabs.

These innovative solutions could be distributed through an OEM or aftermarket supply model. The additive manufacturing approach not only enhances aftermarket offerings but also aligns supply channels and repair parts with OEM standards in certain models, potentially paving the way for in-house desktop printers in larger collision centers or those that support a hub-and-spoke model.

It was both exciting and somewhat concerning to observe the growing enthusiasm surrounding 3D printing in the automotive parts industry, along with the claims made by emerging providers, some of which lack substantial data or credibility to support their assertions about part performance. This hype and the proliferation of such claims on online platforms contribute to misunderstandings regarding the safe and regulated application of 3D printing in this industry, generating both excitement and concerns.

Nevertheless, focusing on the collision and auto repair sector, before we can move towards the future potential, a pressing concern emerged during our investigation. It necessitates immediate attention to avoid an influx of substandard, unregulated parts from unverified or unlicensed sources attempting to capitalize on 3D printing. Addressing this issue collectively as an industry is paramount to fully harness the benefits 3D printing can offer to the collision market. Both aspects are highlighted within the report.

Our findings were derived from referrals, personal dialogues, media sources, conference engagements, and meticulous physical inspections of parts. Additionally, we procured components from various outlets, including online platforms and industry suppliers. Furthermore, our task force visited prominent entities such as IBIS Global, HP's Barcelona Facility, Thatcham Research, ADAC Automotive, Carhart Products, Boyd Group, and I-CAR, where we gleaned invaluable insights and explored potential collaborations to advance our objectives.

6. 3D Printing & New Opportunities

The integration of 3D printing into the collision repair industry presents exciting possibilities that can revolutionize vehicle restoration, benefiting all stakeholders, from insurers and repair centers to OEMs. Notably, repairing damaged parts with missing components through 3D printing reduces waste, landfill utilization, and costs while elevating repair quality. Insurers stand to gain from reduced claim payouts, expedited settlements, and heightened customer satisfaction.

6.1: Collision Repair Centers

The adoption of 3D printing technology in the collision repair industry brings about a multitude of advantages. One of the foremost benefits is the acceleration of repair processes. With 3D printing, repair centers can significantly expedite the turnaround time for fixing damaged vehicles. This not only satisfies customers' desire for swift service but also enhances the overall efficiency of the repair process.

Reducing cycle time is another critical advantage. Collision repair centers can streamline their operations, from ordering parts to actual repairs, thanks to the availability of 3D-designed repair kits for damaged or missing components. These kits enable a quicker and more precise restoration of vehicles, minimizing downtime and improving resource utilization.

Furthermore, the increasing availability of 3D-designed repair kits means that repair centers can address a broader range of damaged parts. This versatility expands their service offerings and can attract a more extensive customer base seeking efficient, cost-effective, and environmentally friendly solutions.

Embracing 3D printing also aligns with environmental sustainability goals. By repairing damaged parts using 3D technology, repair centers reduce the volume of automotive waste sent to landfills and curb the need for manufacturing and disposing of new replacement components.

6.2 Vehicle Salvage and Part Recyclers

The integration of 3D printing benefits vehicle salvage and recyclers in several key ways. Firstly, it allows them to salvage parts that were once discarded due to missing or damaged plastic components, extending their usability. Additionally, 3D printing enables the creation of repair kits, attracting customers seeking sustainable repair solutions.

In summary, the incorporation of 3D printing technology empowers vehicle salvage and part recyclers to diversify their offerings, recover more parts, and contribute to a more sustainable automotive supply chain. This approach not only maximizes the value of salvaged vehicles but also aligns with environmental objectives while improving the business viability of recyclers by expanding their product portfolio.

6.3 Auto Parts Suppliers OEM & AM

The integration of 3D printing technology has a transformative impact on both Original Equipment Manufacturers (OEMs) and After Market parts suppliers. It revolutionizes their business landscape in several key ways.

Firstly, it enables suppliers to eliminate the need for extensive inventories, particularly for slow-moving or niche components. This not only reduces the financial burden of warehousing but also minimizes the risk of overproduction.

Secondly, by partnering with repair centers to provide certified 3D-printed replacement parts, suppliers can create new revenue streams. The on-demand production of these parts meets repair centers' immediate needs, enhancing overall profitability.

Moreover, the shift to 3D printing aligns with sustainability goals by reducing the environmental impact associated with traditional mass production and excess inventory. This contributes to broader sustainability objectives.

Furthermore, 3D printing allows suppliers to manufacture individual replacement parts more cost-effectively than producing entire assemblies, leading to improved profit margins. This benefits both suppliers and repair centers.

In summary, 3D printing empowers parts suppliers to optimize operations, reduce costs, embrace sustainability, and generate new income sources. This fosters a mutually beneficial relationship with repair centers and revolutionizes the way OEMs and aftermarket suppliers do business.

6.4 Insurance Companies

Incorporating 3D printing technology into the automotive repair process has significant implications for insurance companies. This transformation offers a pathway to reduce the cycle time and the total cost of repair, benefiting insurers, collision shops, and policyholders.

As 3D printing makes it increasingly feasible to repair damaged parts using repair kits or replace out-of-stock or discontinued parts by adopting 3D printing solutions.

Furthermore, the streamlined repair process facilitated by 3D printing leads to reduced repair cycle times. Traditional methods of sourcing, ordering, and shipping replacement parts can be time-consuming, causing delays in vehicle repairs. In contrast, 3D printing enables on-demand production of required parts, significantly accelerating the repair timeline. Quicker repairs not only enhance customer satisfaction but also contribute to lower car rental expenses. Insured individuals experience shorter periods of vehicle unavailability, resulting in reduced rental costs borne by insurers.

6.5 Discontinued or Out-of-Stock Parts

One of the compelling advantages of 3D printing, especially when coupled with reverse engineering through 3D scanning, lies in its capacity to recreate components that are either missing or reverse engineer obsolescent. This unique capability enables the reproduction of parts that may have been discontinued, are exceptionally rare, deemed collectible, or simply unavailable in stock.

This facet of 3D printing transcends the limitations imposed by conventional manufacturing processes, offering a sustainable and cost-effective solution to address the challenges posed by sourcing or replicating parts that have become scarce or obsolete. It not only ensures the preservation of vintage or historical vehicles but also extends the lifespan of such cars, underscoring the adaptability and resilience that 3D printing brings to various industries.

6.6 Environment – Reduce Waste & Manufacturing

Leveraging 3D printing for car parts repair, including headlights, yields significant environmental advantages. Firstly, it alleviates the strain on landfills by extending the lifespan of existing components, reducing the need for new replacements. Additionally, 3D printing significantly diminishes the carbon footprint associated with traditional manufacturing, which entails resource extraction, energy-intensive production, and long-distance shipping. In contrast, 3D printing consumes fewer resources and energy, often incorporating recycled materials. By locally producing parts on demand, transportation emissions are minimized.

3D printing also fosters innovation within the industry, enabling unique repair solutions and pushing boundaries.

7: Poor Quality 3D Printed Collision Parts

By far the most concerning aspect of the journey to date has been how widespread the use of low-grade materials and 3D printers in the collision repair processes. As professionals and members of the community, it was alarming to witness and hear how all levels of the collision repair supply chain were being affected by such parts. It seems to be occurring at an alarming rate. Some people with low-end “hobbyist grade” printers and materials seem to think they can use parts from these printers as replacement parts on vehicles, replacing broken headlight tabs, for example, or to start a 3D printing auto parts supply business. We have listed some examples of how this high potential technology will create a flow of financial, safety, and resource-draining issues for all aspects of the insurance, consumers, and collision shops if it is not managed correctly.

7.1: Supply Chain – Online Parts Market

We conducted an exercise where we purchased various headlight tabs from online auto suppliers and sites like eBay and auto part websites. What we found was a growing trend of parts supplied that were 3D printed, though they had not been listed as such. More alarming was that some of these 3D printed parts were of such poor quality that they resembled a cardboard-looking headlight tab. They exhibited extremely poor surface finishing as the result of using low-resolution, low-grade scanners to perform reverse engineering functions. The tabs were so flimsy, and some even arrived already damaged or broken, many of these meant for late model local USA and European prestige models.

There were notably also suppliers of 3d printed parts, such as headlight tabs that have taken steps to provide a higher quality product and align with industry standards though very little information was available on the 3d systems used, material types, or was their test data on such components, with also minimal product range.

7.2: Headlight Reconditioners

This element was the most surprising to us—the level of 3D printing usage in businesses such as headlight reconditioners. It's evident that businesses in these profiles are utilizing 3D printing to create repair tabs for headlights, intended to function as generic replacements instead of OEM parts. However, they often use lower-grade materials and printers, or they either glue these tabs on or employ entry-level polypropylene material for welding on tabs. The concerning aspect is that many of these businesses, in most cases, see no issue with their practices. They possess little to no understanding that such materials and parts are not designed for end use in cars, but rather for hobbyist or prototyping purposes. As time passes, these parts on headlights,

as exemplified here, will deteriorate, leading to eventual failure. We estimate that there could be thousands, if not tens of thousands, of such parts on cars driving around the USA and around the world that will slowly break away.

7.3: Collision Repair Facilities - MSO

We have read an article about a USA-based MSO that is using 3D printing to make replacement parts, and surprisingly there was no information provided on the type of material or printers they were using. As we dug deeper and spoke to a wide range of industry people, some of whom had reached out to advise how they are using 3D printing in their business, we found out that this MSO was not an isolated case, and another overseas-based MSO is also using similar lower-grade materials and printers to repair prestige headlights. We feel if there was ever a case of the industry needing urgent attention, then education and training on such a matter would be the calling cards. It was clear that the level of understanding by the auto industry is so low that it's creating a concern for not just our industry but the consumer as well.

7.4: New entry-level 3D Printers & Material

The increasing influx of entry-level, low-grade 3D printers and new materials into the market, along with unverified claims of producing high-quality 3D printed parts, poses a grave concern. While this excitement and innovation hold potential for future benefits in parts, materials, or 3D printers, the short-term uncertainties outweigh the potential opportunities, especially when it comes to ensuring that end parts meet a yet-to-be-established standard for vehicle repairs.

We are witnessing frequent posts on platforms like LinkedIn and at exhibitions showcasing these lesser-known entry-level printers producing automotive parts for end use, which is quite concerning.

This trend can mislead both consumers and the collision repair industry, often lacking the expertise to distinguish between genuine quality and subpar 3D systems. Without historical data, case studies, or evidence to support these claims, the risk of using unreliable 3D printed components rises substantially. Such misrepresentation not only jeopardizes safety but also leads to financial repercussions and a loss of trust within the industry, highlighting the urgent need for standardized quality control and informed decision-making in the adoption of 3D printing technologies.

8. The Risks of Using Poor Quality 3D Printed Auto Parts

We explored the risks associated with using poor-quality 3D printed auto parts in an unregulated environment. These risks include:

Safety Concerns: Poorly manufactured 3D-printed parts may compromise vehicle safety. Low-quality materials or incorrect printing parameters can lead to structural weaknesses, affecting the performance of critical components.

Incompatibility: Ill-fitted or substandard 3D printed parts can result in improper assembly, causing issues with the vehicle's overall functionality. Compatibility and fitment are crucial for reliable repairs.

Longevity: Low-quality 3D printed parts may deteriorate rapidly, reducing their lifespan and necessitating frequent replacements. This leads to increased costs and inconvenience for vehicle owners.

Warranty and Insurance Implications: The use of non-OEM endorsed 3D printed parts can void warranties and create insurance complications, potentially resulting in higher repair costs for vehicle owners.

Legal Liability: Collision repair centers and suppliers using poor quality 3D printed parts may face legal liabilities in the event of accidents or failures caused by these parts.

8.1 Impact on Collision Repair Shops

Collision repair shops face significant challenges when dealing with poor quality 3D printed auto parts:

Reputation Damage: Using subpar parts can damage a shop's reputation, leading to customer dissatisfaction and a loss of trust in the quality of repairs.

Increased Labor Costs: Ill-fitting or low-quality 3D printed parts may require additional labor to modify or ensure proper fitment, increasing repair costs.

Safety and Liability: Shops may be held liable for accidents or injuries resulting from the use of substandard 3D printed parts in repairs.

8.2 Impact on Insurance Companies

Insurance companies encounter several issues related to poor quality 3D printed parts:

Claims and Settlements: Increased claims and settlement costs can result from accidents caused by the failure of substandard 3D printed parts. This can lead to higher premiums for policyholders.

Regulatory Compliance: Insurers may face regulatory challenges if they endorse or approve the use of 3D printed parts that do not meet safety and quality standards.

Reputation and Trust: The use of low-quality parts can erode trust between insurers and policyholders, affecting customer retention and satisfaction.

8.3 Impact on Policyholders' Safety

Policyholders can be adversely affected by the use of poor quality 3D printed auto parts:

Safety: Substandard parts may compromise the safety of the repaired vehicle, putting the policyholder and passengers at risk.

Costs: Policyholders may incur additional repair costs or face insurance claim disputes if 3D printed parts fail or do not meet OEM standards.

Inconvenience: Frequent part replacements due to poor quality can lead to vehicle downtime and inconvenience for policyholders.

8.4 Impact on Brand Reputation of OEMs and Compromised Vehicle Safety

The use of poor quality 3D printed auto parts can tarnish the reputation of OEMs:

Brand Dilution: Substandard parts may be associated with the vehicle's brand, damaging its reputation for quality and safety.

Compromised Vehicle Safety: The failure of 3D printed parts can compromise vehicle safety, potentially resulting in accidents and injuries.

Loss of Trust: Consumers may lose trust in OEMs if they believe that the use of 3D printed parts compromises vehicle safety and quality.

8.5 Impact on Established Auto Parts Suppliers

The repercussions for established industry-supporting suppliers stemming from the influx of poor-quality and unverified 3D parts are deeply concerning. As these non-regulated and subpar parts, occasionally produced by hobbyist-level 3D enthusiasts, saturate the parts supply market, they exert a significant influence on long-standing and actively engaged parts suppliers. These suppliers have painstakingly built their reputation and relationships within the industry over many years, often contributing to various industry associations and sponsorship programs that foster the growth of our sector. It is imperative that we take action to curb the proliferation of such backyard or novice suppliers who offer no assurances of parts quality or security and pose a risk to the industry as a whole

8.6 Impact on Established and Recognized 3D Printing Providers

Established 3D printing providers that adhere to quality standards may face challenges from competitors producing poor quality parts:

Market Confusion: The proliferation of low-quality 3D printed parts can create confusion among consumers, making it difficult for established providers to differentiate themselves.

Price Pressure: Providers of high-quality 3D printed parts may face pricing pressure from competitors offering cheaper, lower-quality alternatives.

Reputation Maintenance: Maintaining a reputation for quality and reliability becomes challenging in a market flooded with subpar 3D printed parts.

8.7 Financial Burden on All Supply Chain

Cost of Repair Failure: The utilization of poor-quality 3D printed auto parts in the repair process poses a significant financial burden on all parties involved. When a 3D printed part fails, repair shops must rectify the issue and repair the vehicle again, incurring additional labor, material, and operational costs. Consumers, on the other hand, are inconvenienced as they need to take time off and bring the car back for further repairs, potentially leading to lost wages and increased transportation expenses.

Furthermore, insurers face the task of facilitating policyholders in securing rental cars during extended repair periods, resulting in additional expenses. Prolonged repair times may also lead to dissatisfied policyholders who may consider switching insurers due to a negative claims experience. The cost of repair failure, both in terms of financial expenses and potential customer attrition, underscores the importance of using high-quality, regulated 3D printed parts in the automotive repair industry

9. Task Force Recommendations

Our recommendations are focused on addressing the challenges posed by poor quality 3D printed auto parts and establishing a framework for the responsible use of 3D printing in the collision repair industry while educating the industry on the best methods using 3d printing and parts.

9.1 Governing Body Authority Establishment

Creation of Regulatory Body: Establish a regulatory authority or governing body responsible for overseeing the use of 3D-printed auto parts in collision repair.

Quality Control: Empower the regulatory body to define and enforce quality standards, certification processes, and compliance measures for 3D printed parts.

Industry Collaboration: Encourage collaboration among industry stakeholders, including industry associations, insurers, supplies, OEM, collision groups and 3D printing providers, to develop and implement regulations and standards that will provide a safe and transparent supply chain environment using 3d printed parts.

9.2 Standardization and Validation

Establish Quality Standards: Develop industry-wide quality standards and validation protocols for 3D printed auto parts to ensure safety, durability, and compatibility.

Certification Programs: Create certification programs for 3D printing materials and equipment to identify reliable suppliers and manufacturers.

Material Testing: Implement rigorous material testing and validation processes to ensure that 3D-printed parts meet specified standards.

9.3 OEM Endorsement and Regulation

OEM Collaboration: Encourage collaboration between OEMs and 3D printing providers to develop approved repair parts and establish clear guidelines for their use.

Regulatory Oversight: Advocate for regulatory oversight to ensure that 3D printed auto parts meet safety and quality standards, similar to existing regulations for traditional replacement parts.

OEM Certification: Promote OEM certification of 3D printed parts to guarantee their quality and compatibility with specific vehicle models.

9.4 Ban on Using 3D Printed Parts for Repair or Replacement Parts – Non-OEM Endorsed

Prohibition: Prohibit the use of 3D printed parts in collision repair and replacement if they are not endorsed by OEMs or certified by recognized quality standards.

Education: Raise awareness among collision repair shops, insurers, and consumers about the risks associated with non-OEM endorsed 3D printed parts.

Enforcement: Enforce penalties for non-compliance with the prohibition on non-endorsed 3D printed parts in collision repair.

9.5 Education and Training

Industry Education: Develop comprehensive educational programs and training initiatives to increase awareness and knowledge about 3D printing technology, quality standards, and best practices.

Certification: Offer certification programs for collision repair professionals and technicians to ensure they are proficient in using 3D printed parts safely and effectively.

Consumer Education: Educate consumers about the importance of using certified or OEM-endorsed 3D printed parts in vehicle repairs and the potential risks associated with substandard parts.

10. Conclusion

In conclusion, the findings and recommendations presented in this report highlight the transformative potential of 3D printing in the automotive and collision repair industry. While the adoption of 3D printing brings with it numerous opportunities for efficiency, cost reduction, and sustainability, it is crucial to address the challenges associated with the use of poor-quality 3D printed auto parts. The risks posed by substandard parts, including safety concerns, incompatibility, and warranty implications, cannot be underestimated. These risks have far-reaching implications for collision repair shops, insurers, policyholders, OEMs, and established 3D printing providers.

The 3D in Auto Task Force recommends a comprehensive approach to mitigate these risks and foster responsible 3D printing practices in the industry.

Furthermore, we recommend a prohibition on the use of 3D printed parts in collision repair and replacement if they are not endorsed by OEMs or certified by recognized quality standards. Education and training initiatives should be developed to increase awareness and knowledge about 3D printing technology, quality standards, and best practices among industry professionals and consumers alike.

To ensure the effective implementation of these recommendations, the establishment of a regulatory body or governing authority is proposed. This body would define and enforce quality standards, certification processes, and compliance measures for 3D printed parts, fostering a safe and transparent supply chain environment.

In conclusion, the responsible integration of 3D printing in the automotive and collision repair industry holds immense promise. However, it is essential to address the current

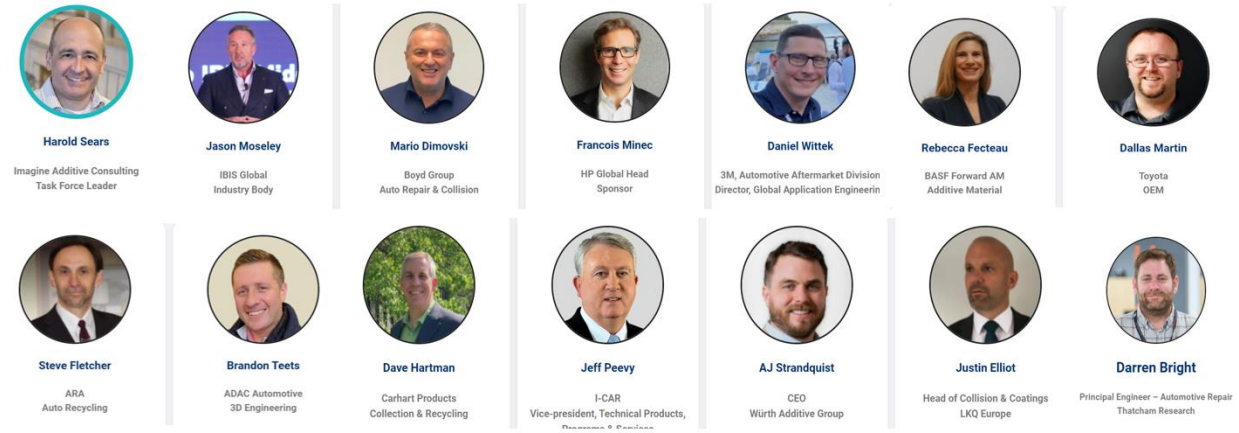
proliferation of poor-quality 3D printed parts to protect the safety and interests of all stakeholders involved.

By following these recommendations, we can harness the benefits of 3D printing while ensuring the highest standards of safety, quality, and reliability in the industry. Collaboration among industry stakeholders is key to achieving these goals and paving the way for a successful and sustainable future for 3D printing in the automotive sector.

11. Appendix: Task Force Members

We express our gratitude to all task force members for their dedication and contributions to our initiatives. The list of task force members and their respective organizations is included in the appendix.

3D Printing in Collision Task Force



Thank you

Harold Sears

Lead

3D Printing in Auto Repair Task Force