



3D Printing Application

Case Study: Airsoft

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Introduction of Airsoft Market

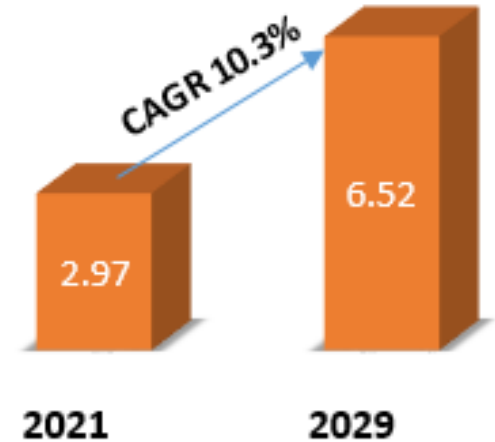
Overview

Replica toy weapons are called airsoft guns that fire plastic bullets through gas, springs, or electrical systems. These are primarily used for recreational purposes in military simulation games (MilSim), where players participate in simulated battles using real military-style weapons and tactics.

Customization Demand

Growing health and fitness concerns are surging the popularity of adventure sports and outdoor recreational activities, especially among young people. That drives the demand for airsoft guns among consumers. Major players are focused on improving the aesthetics, size, and weight of airsoft guns to provide a realistic experience, that is where 3D printing technology is best suited for the growing customized demand.

Opportunities & Potentials



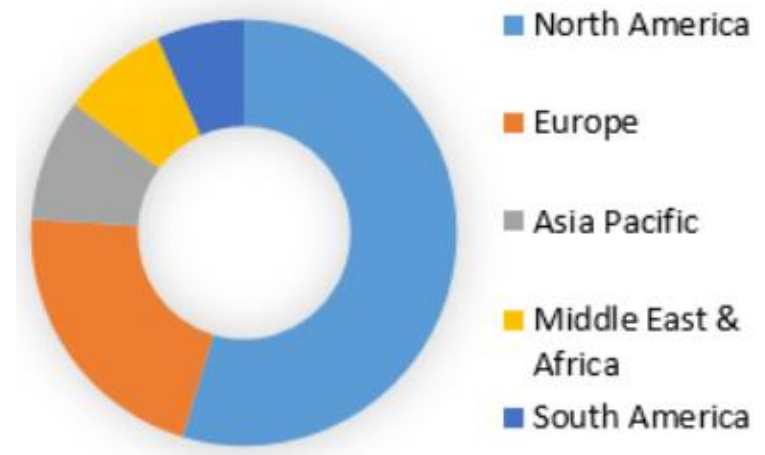
Airsoft guns market is expected to reach **\$6.52 Billion** in 2029. Growing at a **CAGR of 10.3%** (2021-2029)

Introduction of Airsoft Market

Reginal Market Share

Region wise, North America dominated the market with largest share. Airsoft Gun's and their different varieties are the mostly bought in North America. The preference for Airsoft guns with different type and mechanism changes with different geographical locations. Thus, the growing preference for growing popularity and involvement of people in these adventure sports are driving the growth of the Airsoft guns market in North America.

Regional Analysis in 2021 (%)



Introduction of Airsoft Market

Key Market Players in the America

- VALKEN SPORTS
- Colt's Manufacturing Company
- Crosman Corporation
- Lancer Tactical
- Kriss USA
- Krytac

Top 20 AIRSOFT BRANDS



Phrozen User in Airsoft Market



GHK is established in Taiwan in 2008. As a pioneer of AK GBB manufacturer, their focus is to produce high quality GBBR (Gas Blow Back Rifle).



Low-cost converted handguns are an essential component in the rising demand for customized airsoft. Thus, GHK works with Phrozen to bring flexible options and a unique customer experience to airsoft players via 3D printing.

Essentials of Phrozen's Solution

3D Printing

1. Sonic 4K 2022 3D Printer
2. Phrozen Mega 8K 3D Printer
3. ONYX Impact Plus Resin
4. Cure & Wash Kit

Made by Third Party

1. Parts of the airsoft



Print and Prepare Parts for Airsoft

Airsoft Gun Parts Printed by Phrozen 3D Printers

Gun Model: GHK M4 GBBR 14.5'

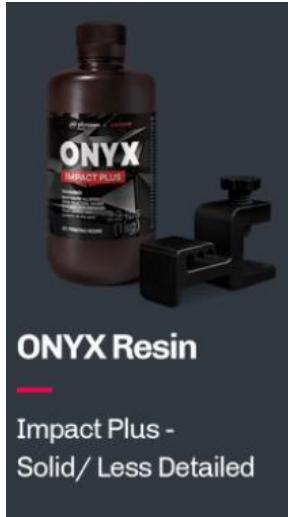


GBBR (Gas Blow Back Rifle) made by Phrozen Products for Prototyping and Small-scale Production

Print and Prepare Parts for Airsoft

Parameter Setting

Phrozen ONYX Impact Plus



Machine Resin **Print** Advanced

Layer Height:	<input type="text" value="0.050"/>	mm	Bottom Lift Distance:	<input type="text" value="8.000"/>	+	<input type="text" value="0.000"/>	mm
Bottom Layer Count:	<input type="text" value="6"/>		Lifting Distance:	<input type="text" value="8.000"/>	+	<input type="text" value="0.000"/>	mm
Exposure Time:	<input type="text" value="30.000"/>	s	Bottom Retract Distance:	<input type="text" value="8.000"/>	+	<input type="text" value="0.000"/>	mm
Bottom Exposure Time:	<input type="text" value="35.000"/>	s	Retract Distance:	<input type="text" value="8.000"/>	+	<input type="text" value="0.000"/>	mm
Transition Layer Count:	<input type="text" value="10"/>		Bottom Lift Speed:	<input type="text" value="45.000"/>	&	<input type="text" value="0.000"/>	mm/min
Transition Type:	<input type="text" value="Linear"/>	▼	Lifting Speed:	<input type="text" value="45.000"/>	&	<input type="text" value="0.000"/>	mm/min
Transition Time Decrement:	<input type="text" value="0.450"/>	s	Bottom Retract Speed:	<input type="text" value="150.000"/>	&	<input type="text" value="0.000"/>	mm/min
Waiting Mode During Printing:	<input type="text" value="Light ..."/>	▼	Retract Speed:	<input type="text" value="150.000"/>	&	<input type="text" value="0.000"/>	mm/min
Light-off Delay:	<input type="text" value="0.000"/>	s					
Bottom Light-off Delay:	<input type="text" value="12.000"/>	s					

Support Setting

Top support diameter: 0.4 m (easily to remove) / Middle support diameter: 1.2 mm

Test Result

Default Dimension Tolerance $\leq 0.1\text{mm}$

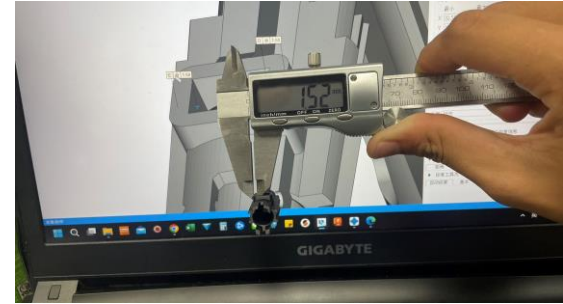
+0.08mm



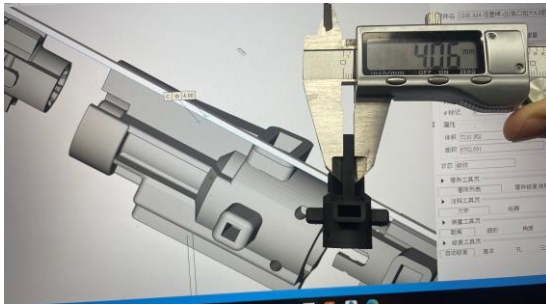
+0.06mm



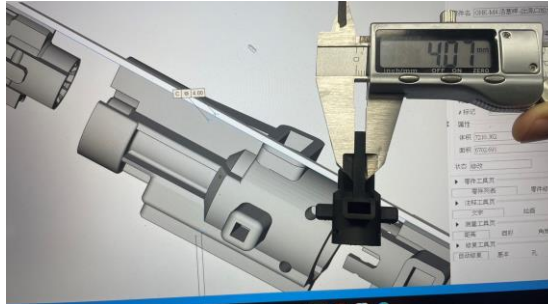
+0.02mm



+0.06mm



+0.07mm



+0.07mm



Test Result

Dimension Tolerance (Tolerance Compensation via Slicer) $\leq 0.03\text{mm}$

Designed Size = 4mm

1st to printout is 4.06mm (+0.06mm)

2nd via scaling and printout is 3.99mm (-0.01mm)



Designed Size = 1.50mm

1st to printout is 1.56mm (+0.06mm)

2nd via scaling and printout is 1.49mm(-0.01mm)



Test Result

Printing Test:

- Accuracy of Dimension: Pass
- Assembling Precision: Pass
- Finest Appearance: Pass
- Roundness of the Holes: Acceptable

Shot Testing

- Impact Strength Durability: Pass
(The parts are functionally able to operate after 2,000 airsoft shots)
- Low temperature resistance: Pass
(Sudden Temperature Drop: -60°C)



Test Result



Impact Force(Gas) 30KG/m³: Pass



Impact Force(CO₂): 70KG/m³: Pass

Conclusion

Phrozen's 3D printing solution perfectly fits GHK's demand for both the development and manufacturing stages.

Developing Cost: Less than US\$10 per parts

Developing Time: Less than 22 hours

Other Benefit: drives makers and players to 3D print parts for converted handguns.