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## **3D Printed Concrete Habitat on the Moon: Potential and Challenges**

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# **3D Printed Concrete Habitat on the Moon: Potential and Challenges**

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3D printing technology has grown exponentially since its inception, positioning itself as one of the most competitive manufacturing techniques. Recently, it has been suggested that 3D printing might make a long-lasting dream come true by building a permanent human habitat on the Moon. The use of 3D printing for this application offers great potential while being bound by numerous challenges. For instance, with 3D printing, the need to transport building materials from the Earth to the Moon can be eliminated, making significant cost savings. All it would require is for the 3D printers to be sent to the space and for a construction ink mix design to be used on the Moon.

Furthermore, structures built on the Moon will be lighter due to the low gravity of the moon compared with Earth, and thus small structural elements will be required to withstand loads. However, the Moon observes extreme environmental conditions including temperatures ranging from -233 to +123 °C, vacuum atmosphere, and radiation. 3D printed habitats on the moon will need to withstand such harsh environmental conditions and protect residents from radiation. Our team at UNM started examining the use of 3D printed concrete as a potential material for the Moon habitat. The impact of gravity loads on the behavior of 3D printed concrete is being examined. Also, the difference between cement and polymer binders on the mechanical characteristics of 3D printed concrete incorporating Moon like aggregate is being studied. Our research work contributes to paving the road for building the first human habitats on the Moon.