



## Additive Manufacturing

Additive manufacturing (AM) is an emerging means of production in which objects are created by layering materials in precise geometric shapes according to a predetermined design. This contrasts with traditional “subtractive” manufacturing in which material is pared, milled, carved, or otherwise reduced to shape an object. Additive manufacturing refers to [the general manufacturing process](#) that can include various production processes such as rapid prototyping, rapid tooling or mass customization, while 3D printing generally refers to the sub-category of non-industrial scale production not designed for high-value manufacturing applications. The AM process involves creating an object’s design via computer software then directing hardware to fabricate the object using spools of filament that are melted and applied in successive, precise layers.

### Proliferation Concerns

In the coming years it’s possible that AM will pose a [proliferation concern](#) for nuclear regulatory regimes. AM is increasingly proving capable of producing nuclear-related hardware, while the democratization of the field and ability to transfer items virtually through CAD files rather than physically exporting goods across borders presents problems for export control regimes. The primary concern is not that AM will enable greater access to nuclear weapons technology, but rather that it would make it easier to produce components and machinery necessary to establish a nuclear enrichment capability or to improve upon weapon delivery systems such as ballistic missiles. While there exists the possibility that AM could be used to exploit gaps in export controls to establish illicit procurement pathways, international bodies such as the [Nuclear Suppliers Group](#) and [Missile Technology Control Regime](#) are [currently](#) working to stay abreast of the evolution and proliferation of AM to mitigate its disruption to global production and supply chains.