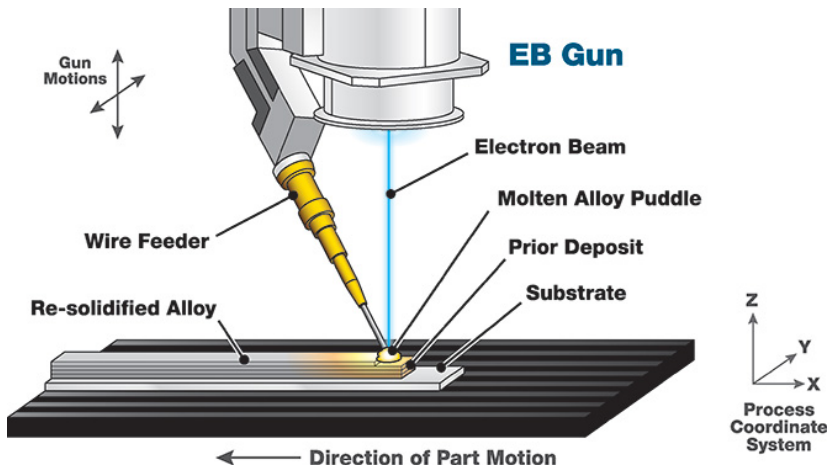


# Technologie 3D tisku

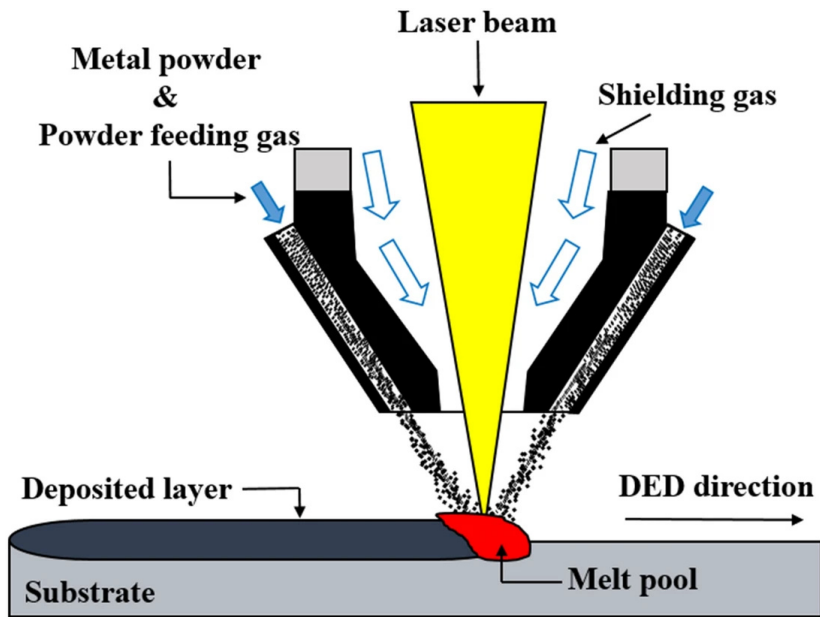
- DED - navařování
- LOM - laminace
- Binder jetting - tryskání pojiva
- Material jetting - tryskání materiálu
- SLS - prášek
- SLA - fotocitlivá pryskyřice
- FFF - filament

# DED


- Další názvy: LMD, LENS, DMD, WAAM, EBAM
- Princip: navařování materiálu
- Materiály: kov - prášek, drát

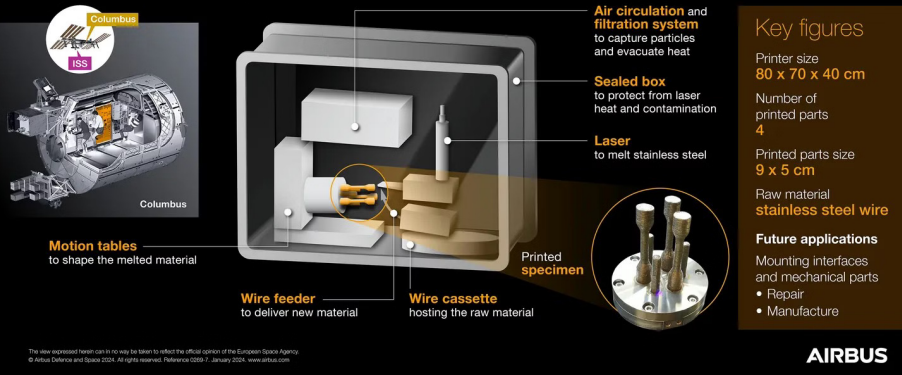


<https://www.sciaky.com/additive-manufacturing/what-is-ded-3d-printing>



# First **metal 3D printer** on board the ISS

The metal 3D printer was designed and built by Airbus under a programme of and funded by the European Space Agency.  It will be inserted inside Columbus, the European laboratory attached to the International Space Station.



The view expressed herein can in no way be taken to reflect the official opinion of the European Space Agency.  
© Airbus Defence and Space 2024. All rights reserved. Reference 0209-7, January 2024. www.airbus.com

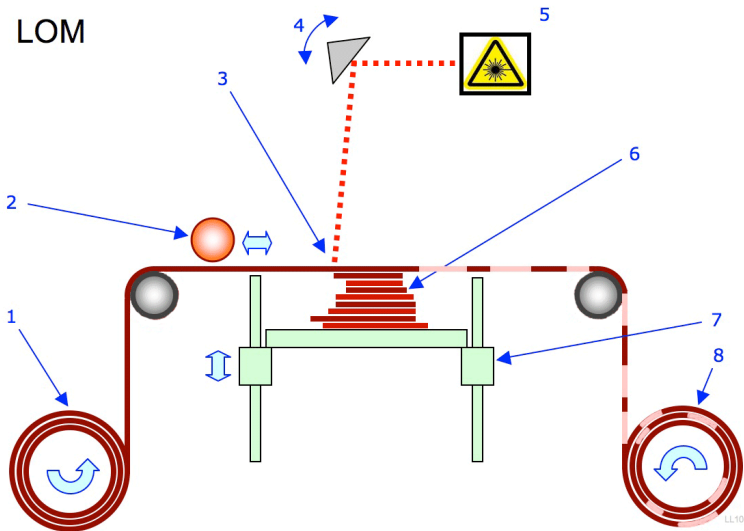
<https://www.voxelatters.com/>

behind-the-scenes-of-the-first-metal-part-3d-printed-aboard-the-iss/

# LOM

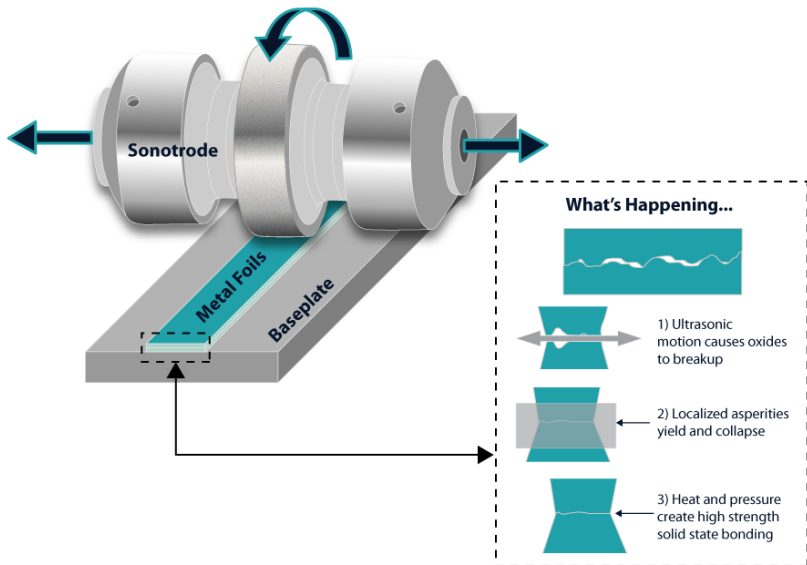
- Další názvy: SDL, UAM
- Princip: vyříznutí a laminace, UAM - ultrazvuk
- Materiály: papír, plasty, kov

# LOM

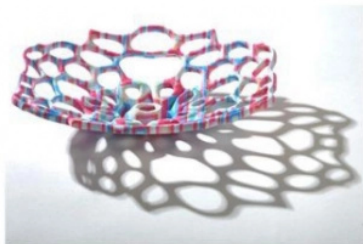


1 Foil supply. 2 Heated roller. 3 Laser beam. 4. Scanning prism. 5 Laser unit. 6 Layers. 7 Moving platform. 8 Waste.

Wikipedie



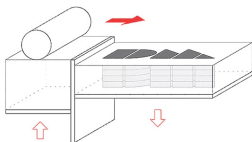




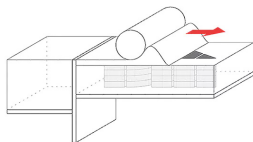
<https://3d-expo.ru/en/article/izgotovlenie-obektov-metodom-laminirovaniya-lom-78841>

# Binder jetting

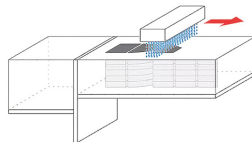
- Další názvy: 3DP, Voxeljet
- Princip: selektivní nanášení pojiva + zahřátí
- Materiály: plast, kov, keramika, sklo



Nanesení prášku

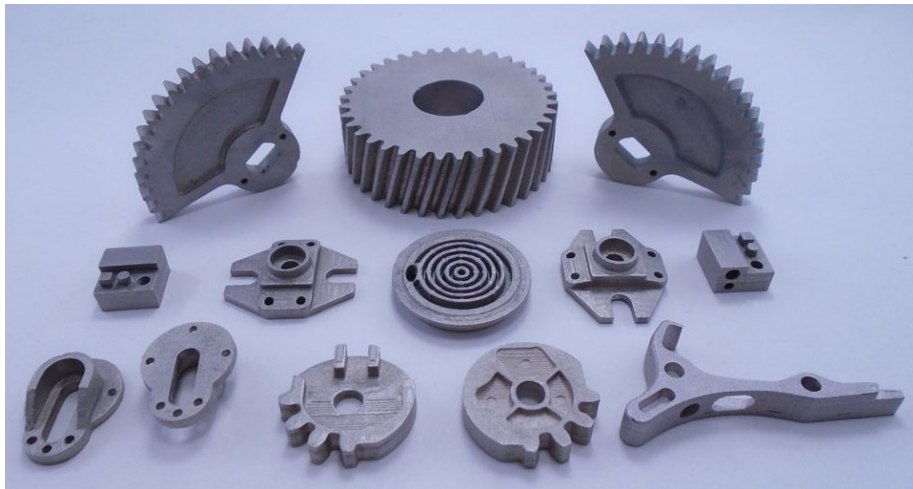


Rozprostření a zhutnění prášku



Nanesení pojiva

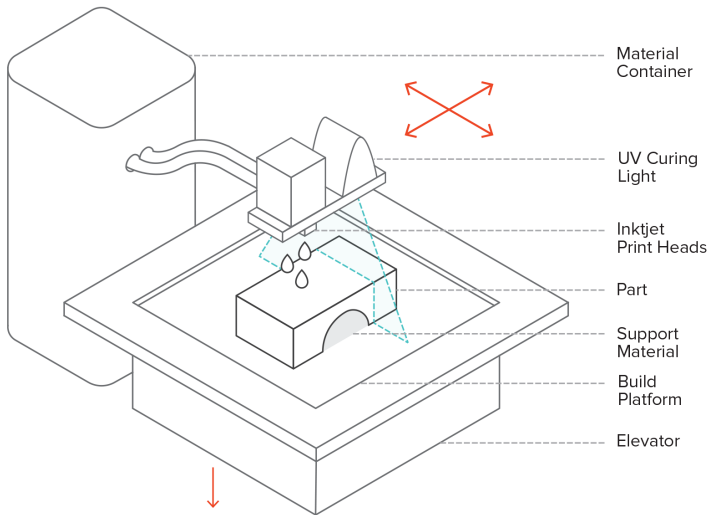
[https://additivesystems.cz/  
binder-jetting-jako-revolucni-nastroj-aditivni-vyroby-kovovych-dilu/](https://additivesystems.cz/binder-jetting-jako-revolucni-nastroj-aditivni-vyroby-kovovych-dilu/)



<https://amfg.ai/2019/07/03/metal-binder-jetting-all-you-need-to-know/>

# Material jetting

- Další názvy: SCP, MJM, Polyjet, Projet
- Princip: selectivní nanášení materiálu + UV záření
- Materiály: polymery



<https://www.hubs.com/knowledge-base/introduction-material-jetting-3d-printing/>

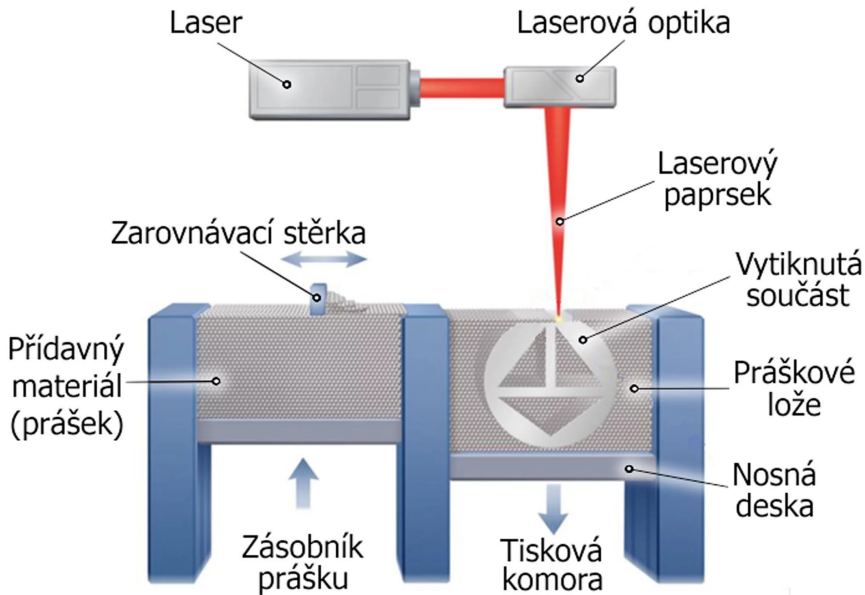


[https://www.hubs.com/knowledge-base/  
introduction-material-jetting-3d-printing/](https://www.hubs.com/knowledge-base/introduction-material-jetting-3d-printing/)

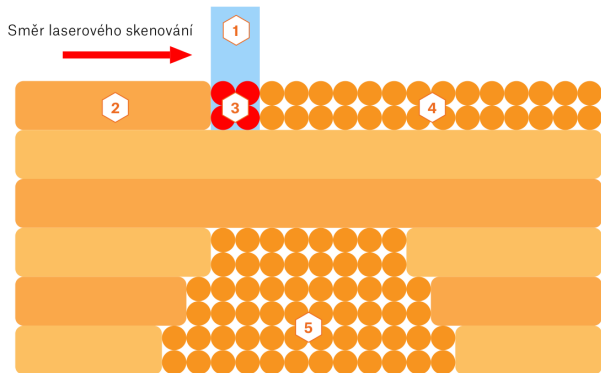
# SLS

- Další názvy: SLM, DMLS, EBM, MJF, SHS
- Princip: sintrování pomocí laseru, svazku elektronů
- Materiály: plast, kov, keramika





<https://www.mmspektrum.com/clanek/technicke-plyny-pro-3d-tisk-a-laserove-navarovani>



## J.Průša: Základy 3D tisku

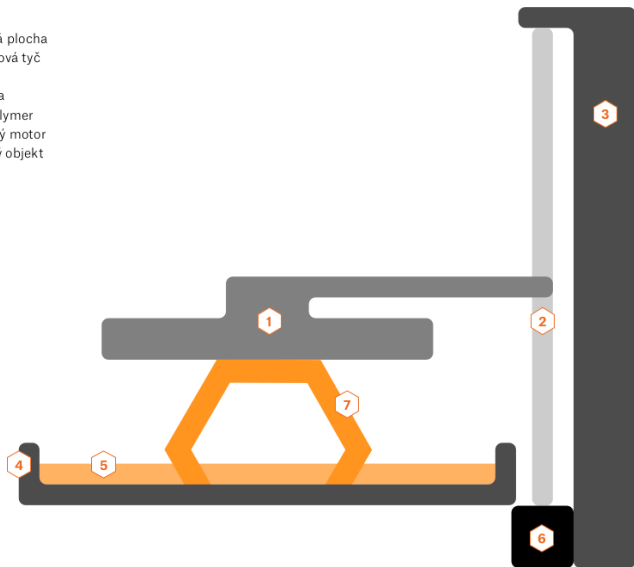


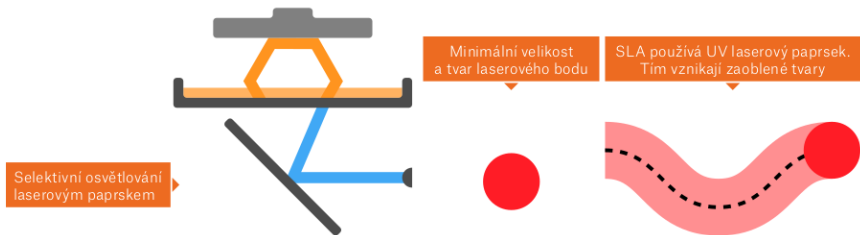
<https://cz.china-3dprinting.com/metal-3d-printing/slm-3d-printing.html>

# SLA

- Další názvy: DLP, 3SP, CLIP
- Princip: fotocitlivá pryskyřice
- Materiály: polymery

- 1 Tisková plocha
- 2 Trapézová tyč
- 3 Osa Z
- 4 Vanička
- 5 Fotopolymer
- 6 Krokový motor
- 7 Tištěný objekt



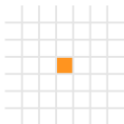


J.Průša: Základy 3D tisku

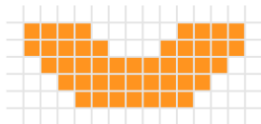
Selektivní osvětlování  
projektorem



Velikost a tvar  
minimálního  
bodu (pixelu)



DLP promítá pixely v těch místech,  
kde má dojít k vytvrzení

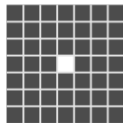


J.Průša: Základy 3D tisku

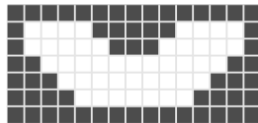
Selektivní osvětlování pomocí maskovací vrstvy - LCD panel



Velikost a tvar minimálního bodu (pixelu)



MSLA aktivuje pixely na LCD v těch místech, kde má dojit k průchodu světla



J.Průša: Základy 3D tisku

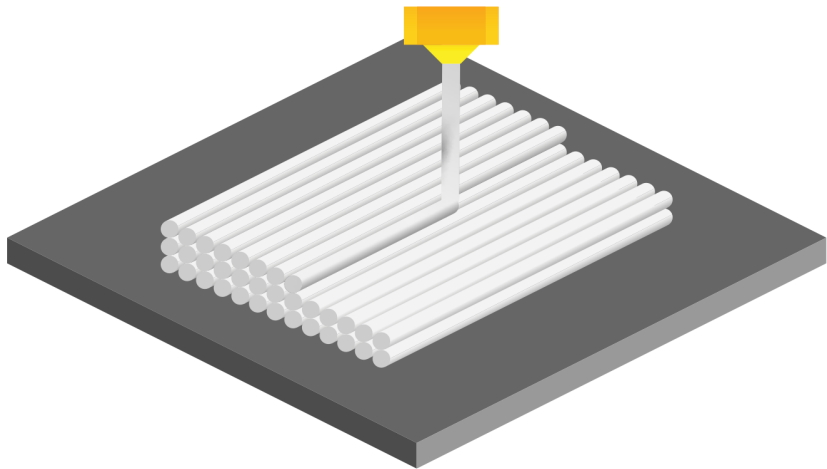




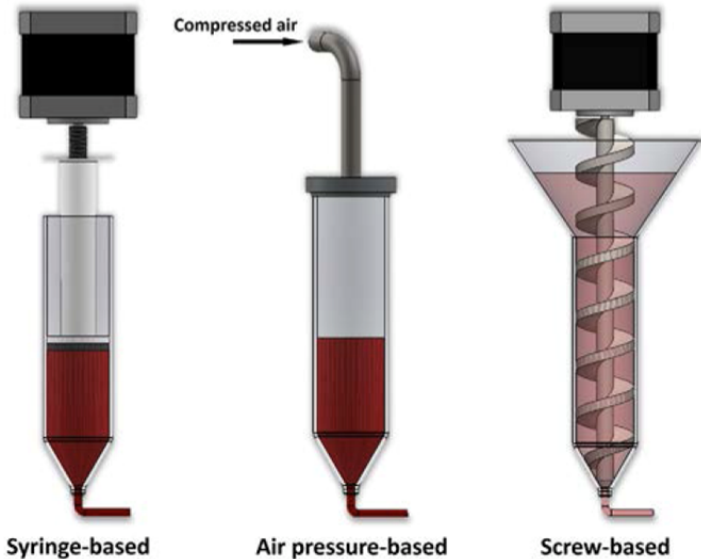
<https://additive-x.com/technology-sla/>

# FFF

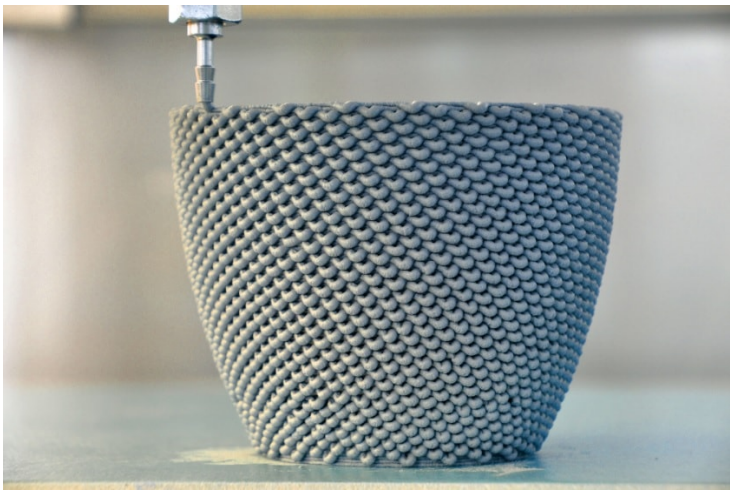
- Další názvy: FDM, APD, ADAM, BMD
- Princip: vytlačování, tavení materiálu
- Materiály: plasty, keramika



J.Průša: Základy 3D tisku



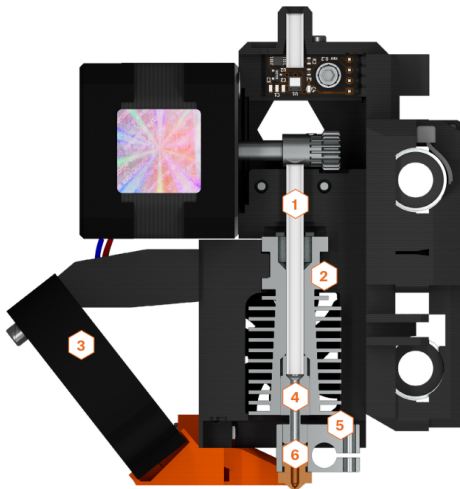
[www.food.gov.uk/research/emerging-challenges-and-opportunities/3d-printing-technologies-in-the-food-system-for-food-production-and-packaging](http://www.food.gov.uk/research/emerging-challenges-and-opportunities/3d-printing-technologies-in-the-food-system-for-food-production-and-packaging)  
print=1

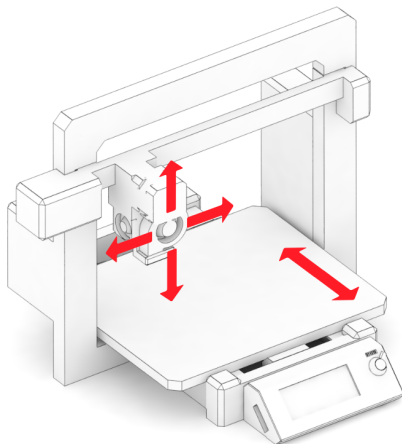
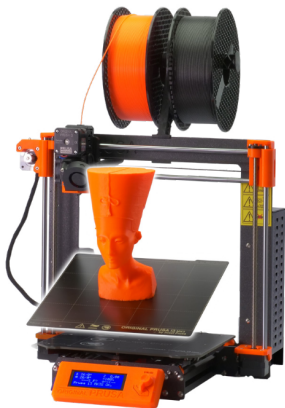


<https://manufactur3dmag.com/stoneflowers-ceramic-3d-printing-kit-can-convert-fdm-printer-clay-printing>

### Extruder

- 1 Teflonová (PTFE) trubička
- 2 Heatsink (chladič)
- 3 Tiskový ventilátor
- 4 Heat break (izolátor)
- 5 Heater Block
- 6 Tryska





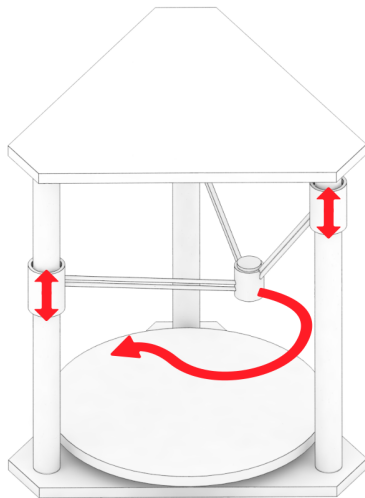
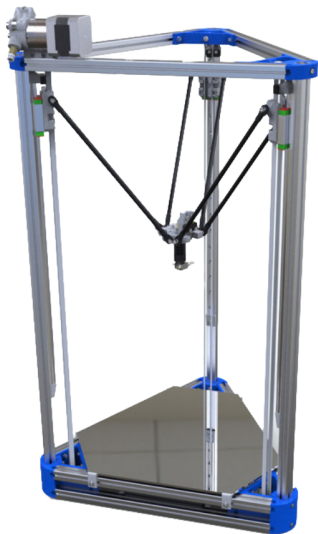
J.Průša: Základy 3D tisku



prusaresearch.com



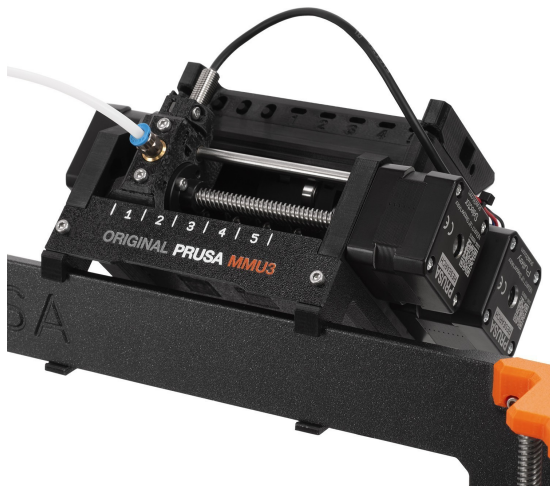
# Delta

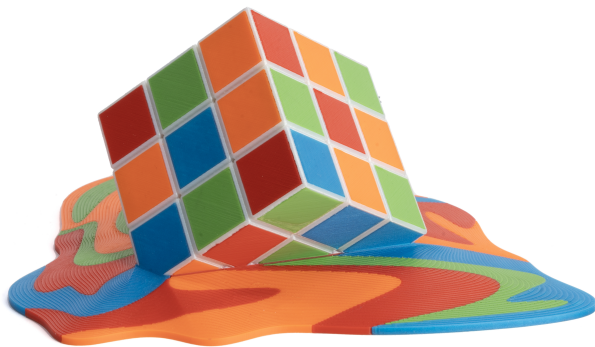


# FFF - barevný tisk

- ruční výměna filamentu
- automatická výměna filamentu
- míchání v extruderu - azurová, purpurová, žlutá, černá, bílá
- průsvitný filament a barevné inkousty

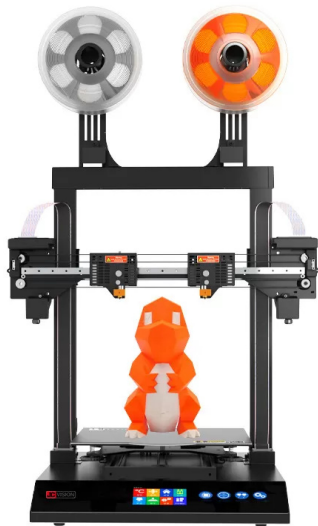
# Automatická výměna filamentů





# FFF - podpěry

- podpěry ze stejného materiálu
- dvě trysky - pomocný materiál, který se pak rozpustí



<https://www.jcvision-display.com/sale-13810854-jcvision-pla-desktop-dual-extruder-3d-printer-400w-two-nozzl.html>

## Tisková podložka

- nevyhříváná, vyhříváná
- sklo; kapton; PEI - hladký, drsný; Satén,...

## Tryska

- mosaz
- ocel

FDM



SLA



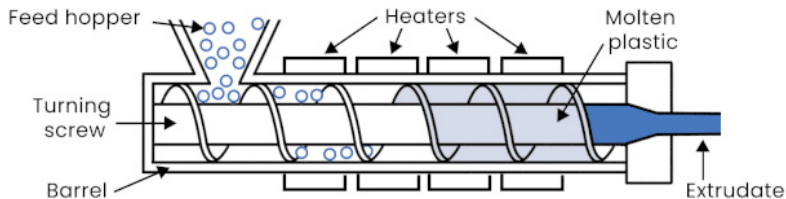
**AllOnScale®**  
Professional Scale Models BV - the Netherlands

<https://allonscale.com/fdm-vs-sla/>



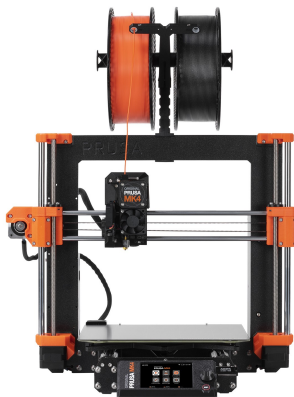


# Recyklace plastu



<https://www.3devo.com/blog/benefits-of-learning-extrusion>

## Stavba tiskárny



[prusaresearch.com](http://prusaresearch.com)