Continuous manufacturing has received significant attention in the pharmaceutical industry in the last decade to increase the efficiency of drug manufacturing and provide affordable medicine to the public. One significant challenge is continuous and consistent powder feeding at low feed rates. A reliable and consistent micro-feeder is one of the key elements for resource-efficient manufacturing of precision medicines and products for small patient populations and adaptable clinical trials. This research presents a novel micro-feeder capable of feeding poorly-flowing pharmaceutical powders at low rates - most emerging drug substances are poorly flowing.

Challenges
There are many challenges while developing a powder feeder that can continuously and reproducibly feed powder with high consistency.

Key industrial requirements
- Feeding cohesive materials < 10 g/h with < 3% relative standard deviation (RSD).
- Unaffected by refilling.
- High repeatability & stability.
- Simple control mechanism.

Design & Innovation

Novel design features
- Enabled by 3D printing technology.
- Double screw agitator
- Homogenises powder density in hopper.
- Feeding screw
- Minimises feed rate variations.

Conclusion

- Capable of feeding poorly-flowing pharmaceutical powders at low rates.
- Able to continuously and accurately feed as low as 0.9 g/h without feedback control - outperforming any known feeder from markets or literature.
- Refilling has no impact.
- Modular design provides the flexibility to adapt the system for a broader range of materials or industrial applications beyond pharmaceutical materials.
- Significantly reduce waste for drug development, clinical trials and drug manufacturing.