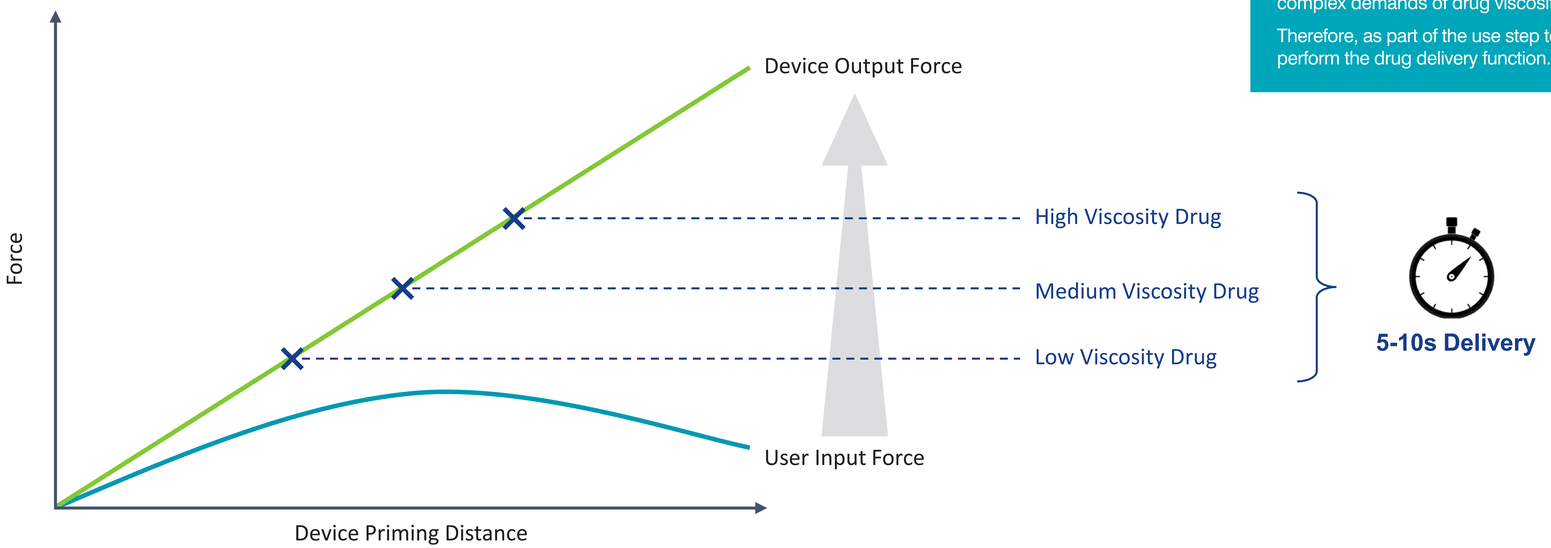
# Mechanically priming and controlling drug delivery in a reusable auto-injector

Trends in increasing drug viscosity have resulted in auto-injectors requiring higher output forces. The required forces are often higher than a user could comfortably achieve and this has led to the need for pre-primed spring driven devices. These high forces are often pre-set by single use auto-injectors, which have the benefit of simple user steps. **Reusable auto-injectors**, however, can offer many potential benefits, but would require an innovative approach to meeting the design inputs.






**5-10s Delivery**

## USE STEP

For a **reusable auto-injector** to be truly beneficial, it would need simple use steps, and a means of generating sufficient delivery output force. The use of motor(s) in electro-mechanically driven auto-injectors is now common.

A re-usable auto-injector also requires a means of incorporating the disposable element (primary container for the drug), potentially through an aperture or compartment within the auto-injector.

## DESIGN APPROACH

What if the mechanism design could harness the energy applied by the user to insert/load the device from this user step, to then be utilised for the drug delivery system?

Even more beneficial would be to store this energy, and amplify the force so when activated, there is a ***force advantage*** – in order to meet the complex demands of drug viscosity, time to deliver and all in a safe and controlled way.

Therefore, as part of the use step to insert the primary container, the auto-injector spring(s) becomes preloaded as a result, and ready to perform the drug delivery function.

## BENEFITS

The benefits of this approach compared to, for example, an electro-mechanical driven mechanism could be:

- Reduced cost to manufacture.
- Reduced risk of failure, due to the simplicity of the mechanism.
- Less complex regulatory pathway.
- No power consumption needed for the mechanics of drug delivery – which would greatly reduce or even eliminate any additional re-charging of an electronic device.

An **Energy-from-User** mechanism could therefore provide an output force that peaks at approximately 40N, offering high versatility, and the user forces required to attain this could be as little as 10N.

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