

# NRobe™ Technology: A vehicle for delivery of compression sensitive multi-particulates

## Introduction

NRobe technology is a process technology which utilizes low compression forces. This affords NRobe dose form the potential to encapsulate and present compression sensitive materials such as pellets with brittle coatings in a robust tablet like format.

The NRobe™ process overview is given in Figure 1.

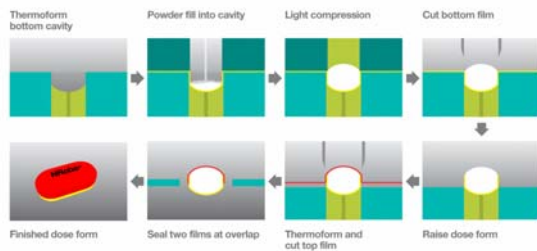


Figure 1 - NRobe process steps

We are currently developing scaled technology capable of dosing several layers of differing composition into the lower film pocket.

In the following work coated pellets are used as a model for a compression sensitive material. These pellets were encapsulated between two layers of cushioning agent (CuA) to determine whether this gives better protection than the use of low forces alone.

## Material and methods

Theophylline pellets were coated on a Glatt® GPCG3 fluid bed coater with Wurster column with a) Eudragit® NE30D + talc (1:2) and b) Eudragit RS/RL (9:1) + talc in a ratio 1:1.9, then processed into the following dose forms:

- a-1) free uncompacted pellets, a-2) tablets containing pellets and Avicel® PH200 microcrystalline cellulose blend (1:1.5) compacted at 20 kN, a-3) NRobe dose forms where pellets were processed between two layers of Avicel PH200 (1:1.5:1) at 0.5kN force a-4) NRobe dose forms where pellets were processed between two layers of Avicel PH105 (1:1.5:1) at 0.5kN force and
- b-1) free uncompacted pellets, b-2) tablet containing only pellets compacted at 0.5kN force, b-3) compact enclosing the pellets between two layers of Avicel PH200 (1:1.5:1) at 0.5kN compaction force.

The dissolution profiles were obtained using the USP24 method for Theophylline SR capsules.

## Results and discussion

Figure 2 shows that coated pellets within the NRobe dose form have a drug release profile that is statistically (95% confidence) equal to the uncompacted free pellets, whereas when the pellets were compacted into tablets they showed a significantly faster release profile.

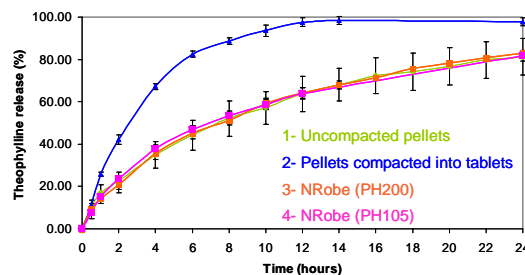


Figure 2 – Coated pellets (Talc-Eudragit NE30D, ratio: 2-1) Theophylline release profiles

Figure 3 shows the protection role of the cushioning layer (Avicel PH200) during the compaction phase. The release profile of the compacts containing the layers of cushioning agent (Avicel PH200) was very close to the release profile of the uncompacted coated pellets, while the coated pellets compacted at identical force but without cushioning layers demonstrated a significant increase in their drug release.

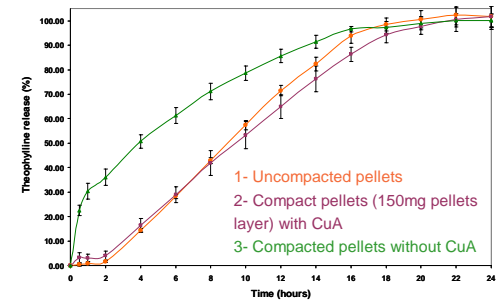


Figure 3 – Coated pellets (Talc-Eudragit RS/RL, ratio: 1:1.9) Theophylline release profiles

Image analysis demonstrated that some damage occurred in the coated pellets compacted without cushioning agent (figure 4a), whereas a minimal number of pellets were damaged in the NRobe dose forms (figure 4b).

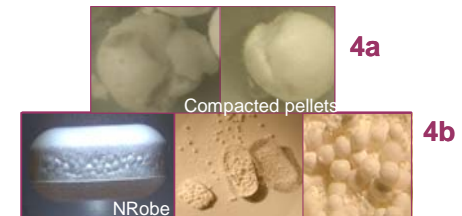


Figure 4 – Image analysis of compact without cushioning agent (4a) vs enrobed pellets with cushioning agent (4b)

## Conclusion

The combination of low compaction forces and a protecting cushioning layer creates elegant and robust dose forms. Analysis showed that this approach gave minimal damage to the pellets resulting in an equal release profile for the pellets within NRobe™ to free pellets. NRobe process technology enables robust dose forms containing pressure sensitive formulations to be designed and processed simply without altering the inherent desired release attributes.

FMC Corporation conducts NRobe  
Technical development at :  
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Laboratory and pilot-scale production  
capabilities are available

Full-scale production equipment  
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## NRobe™ Technology:



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