INNOVATION PARTNERSHIP- TEVA AND SEAM RESEARCH CENTRE

Unveiling the Future of Dry Powder Inhalers through Advanced Simulation and High-Speed X-Ray Imaging

CHALLENGE

Previous research by SEAM for Teva devices faced a daunting roadblock: the inability to validate CFD models of particle flows with real-time imaging. Traditional optical techniques fell short in capturing the intricate internal dynamics of the inhaler, highlighting the need for innovative solutions.

AT A GLANCE

- 2 Years research project
- World leading research
- State-of-the-art technologies
- Significant funding & Supports
- Detailed action plans

PROJECT INTRODUCTION

Leveraging SEAM's newly acquired High Speed Imaging Capability coupled with its expertise in Computational Fluid Dynamics (CFD) , this project aimed to deliver unparalleled insights into inhaler performance, laying the groundwork for superior inhaler designs that promise improved patient outcomes.

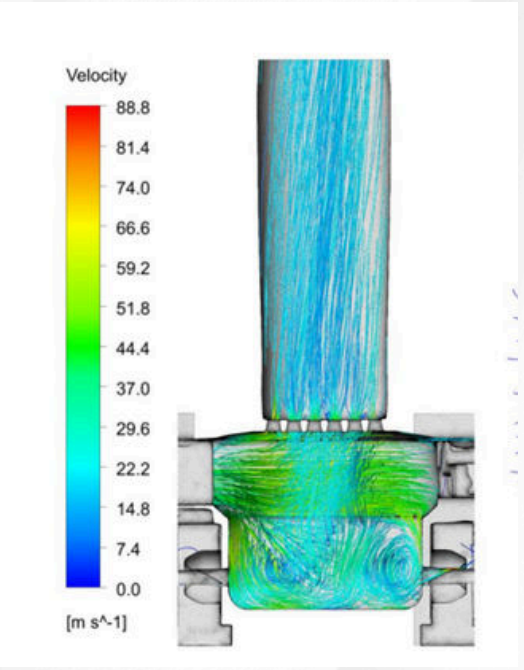
RESULTS AND VALIDATION

High-speed X-ray imaging allowed us to validate our CFD models effectively. The strong correlation between simulation and real-world observation underscored the model's accuracy in predicting realistic capsule and particle motion. This successful validation marks a significant milestone in the understanding of the clinical performance of dry powder inhalers.

MR DAN BUCK
SENIOR DIRECTOR TEVA PHARMACEUTICALS

"Teva have had a close working relationship with SEAM for over 15 years and this project is another example of what can be achieved with a collaborative mindset"

OUR APPROACH: A COMPREHENSIVE INVESTIGATION



The research project was structured into five critical tasks:

1 . CT Scanning and CFD Inhaler Modelling

We developed a reliable CT/CFD models of the inhaler, utilising software tools such as VGStudio Max, MeshLab, and SpaceClaim.

2 . CFD Modelling of Capsule Movement

Advanced simulations were conducted to explore the capsule's influence on pressure drop distribution and angular velocity.

3 . Analysis of Capsule Dose Evacuation

Particle motion methodologies were incorporated to accurately predict capsule evacuation.

4 . High-Speed X-Ray Imaging

Employing custom-developed imaging techniques, we achieved real-time visualisation of the inhaler's internal mechanisms.

5 . Custom Particle Model

Utilising ANSYS Fluent UDF for particle force history monitoring, we gained insights into particle dynamics, including wall collisions and turbulence effects.

IMPACT AND FUTURE PROSPECTS

The methodologies and findings from this project not only deepen our understanding of inhaler dynamics but also serve as a stepping stone for future research. By achieving these innovative results, Teva stands poised to lead the industry in the development of more effective inhaler designs, thus improving patient outcomes.

DR RAMESH RAGHAVNDRA

SEAM CENTRE DIRECTOR

" We take pride in collaborating with Irish based industries and this innovation partnership project with Teva is a great example of what happens when you establish strong relationship and get talented people across the aisles meet together with marketing leading technology that is on offer "