

# Flow behaviour of Dust in Gas transmission Pipeline systems

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## Introduction

- Dust fixed at Pipeline wall loosened during In Line Inspection
- Low gas velocity during In Line Inspection typically 1 - 2 m/s
- Increase of gas velocity in Pipeline system afterwards
- High dust concentration in the gas stream

## Objectives

- Model development
- Model validation
- Experiments
- Dust characterization
- Field testing during In Line inspections

## Benefits

- Reduce off spec gas supply
- Reduce placement of additional dust separation equipment
- Able to predict dust flow and accumulation
- Development of “dust map” of gas transportation grids

## Future work

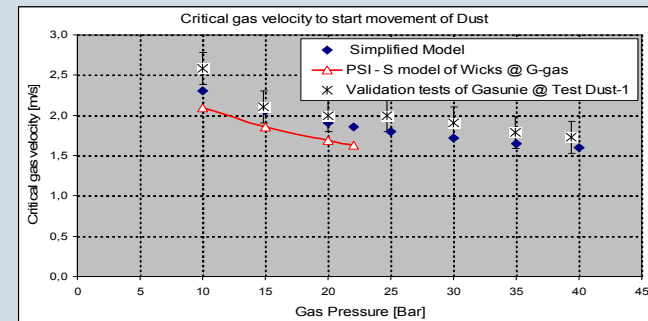
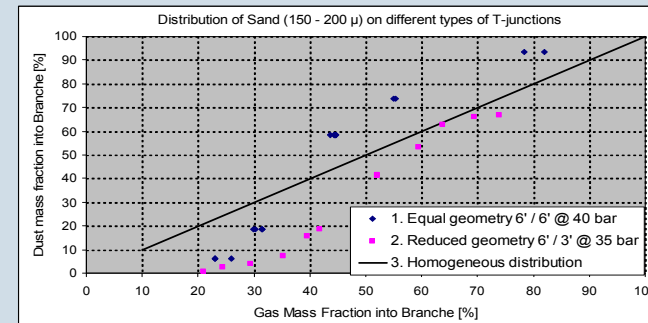
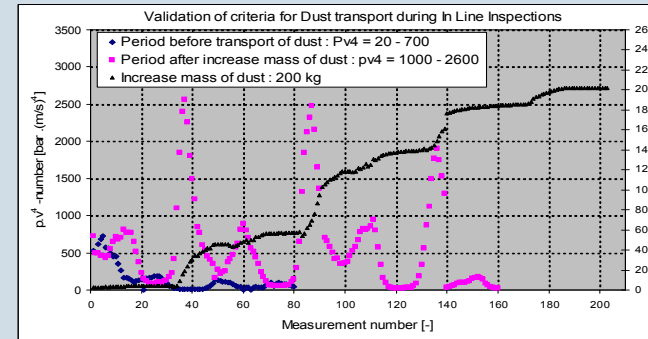
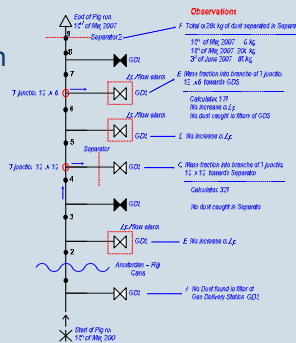
- Computational fluid dynamics calculations
- Gain additional operational experience



KEMA test facility, Groningen, the Netherlands



Typical observed black powder



**Particle size :**  
 10 – 50 micron : 1 - 70 %  
 50- 100 micron : 10 - 50 %  
 100 – 300 micron : 13 - 67 %  
 > 300 micron : 2 - 23 %

**Typical composition :**  
 Carbon : 5 - 65 wt.%  
 Iron : 10 - 49 wt.%  
 Silicon : 1 - 27 wt.%  
 Sulphur : 1 - 22 wt.%