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**ZEUNA STÄRKER**



**OE Supplier Car Exhaust  
Systems**

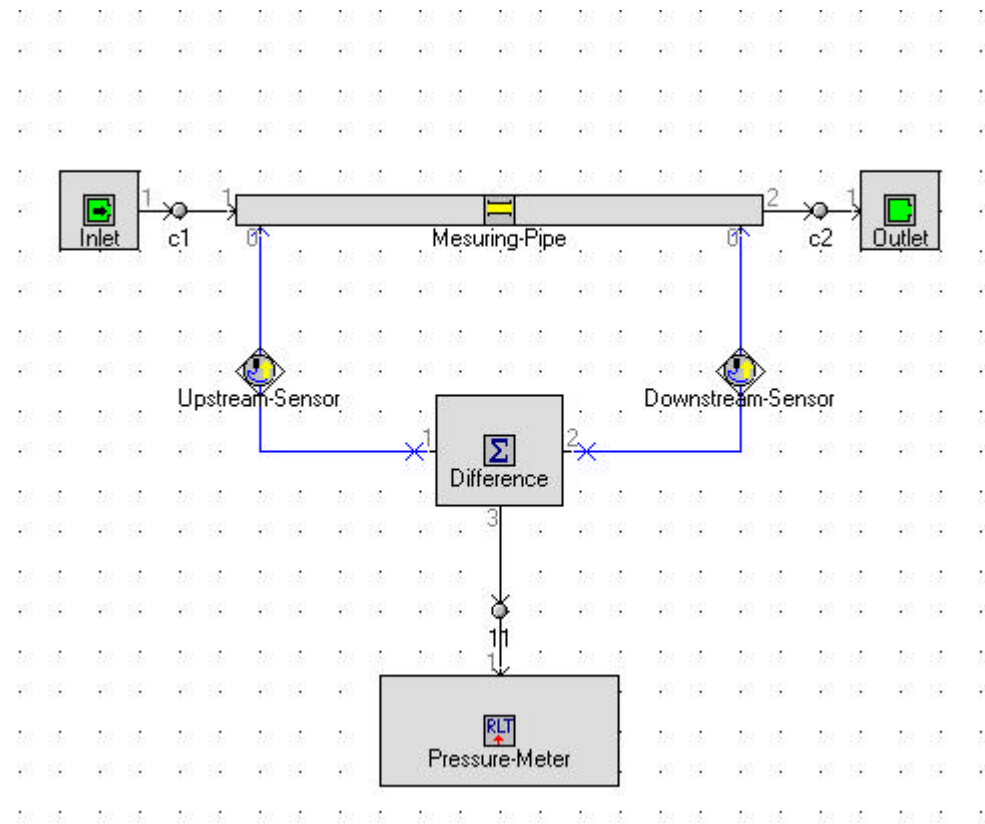
**GT-Power as a Tool for Backpressure Prediction**

**30.10.00**

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Detlev Rammoser**

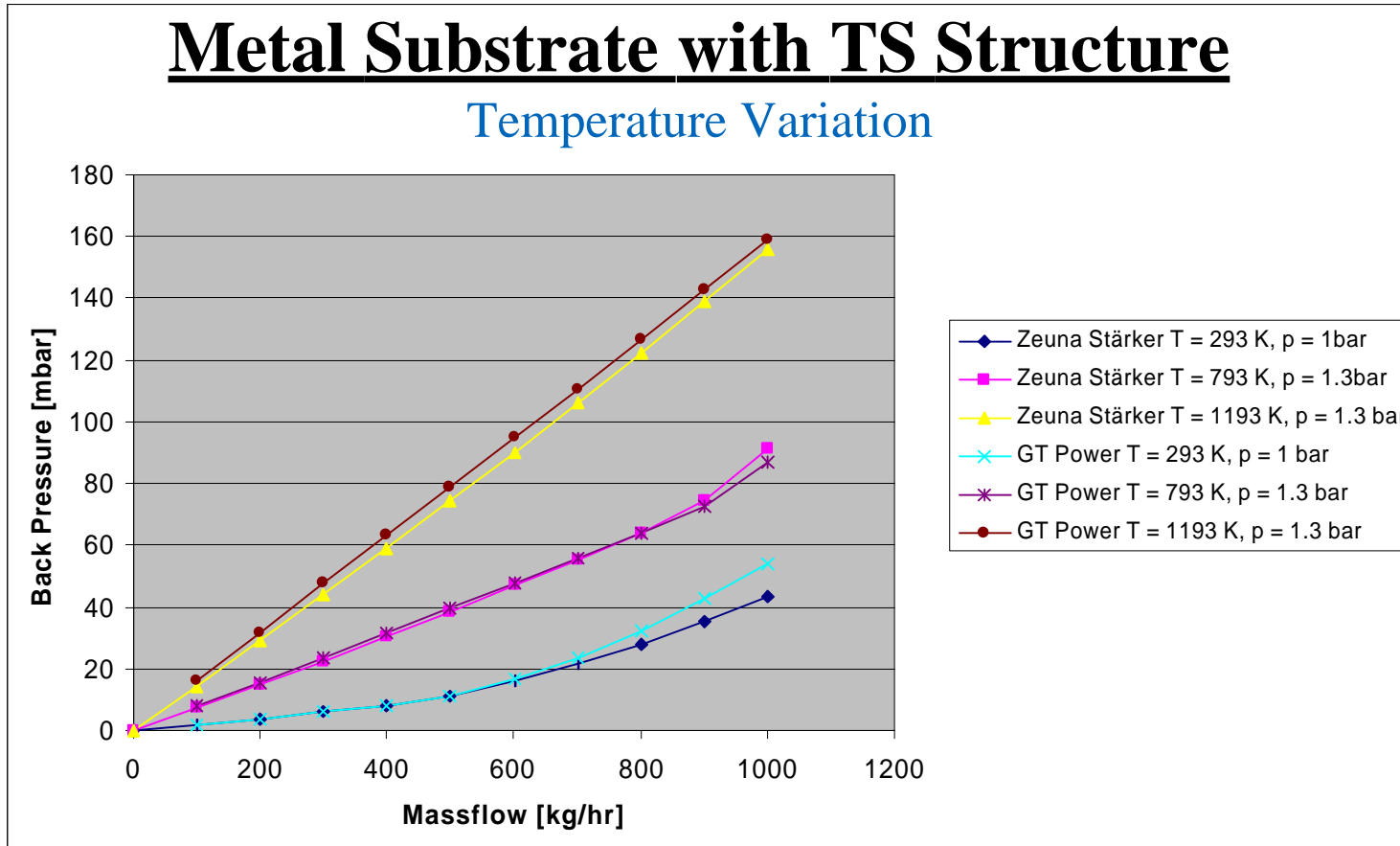
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Objective: Obtaining Pressure loss between arbitrary Points  
⇒ Sum and Sensor Objects as ``Pressure Indicator``

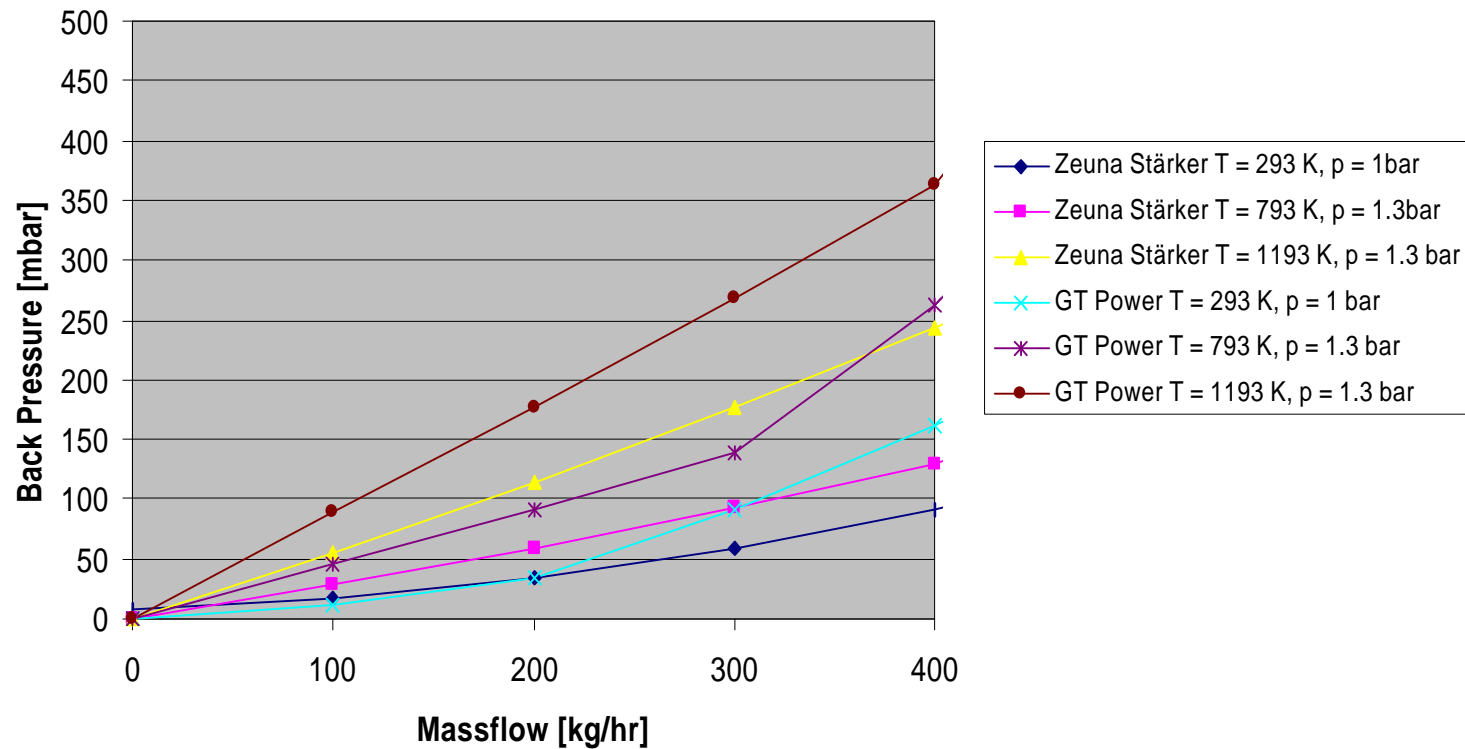


## Metal Substrate with TS Structure

### Temperature Variation



## Ceramic Substrate Temperature Variation

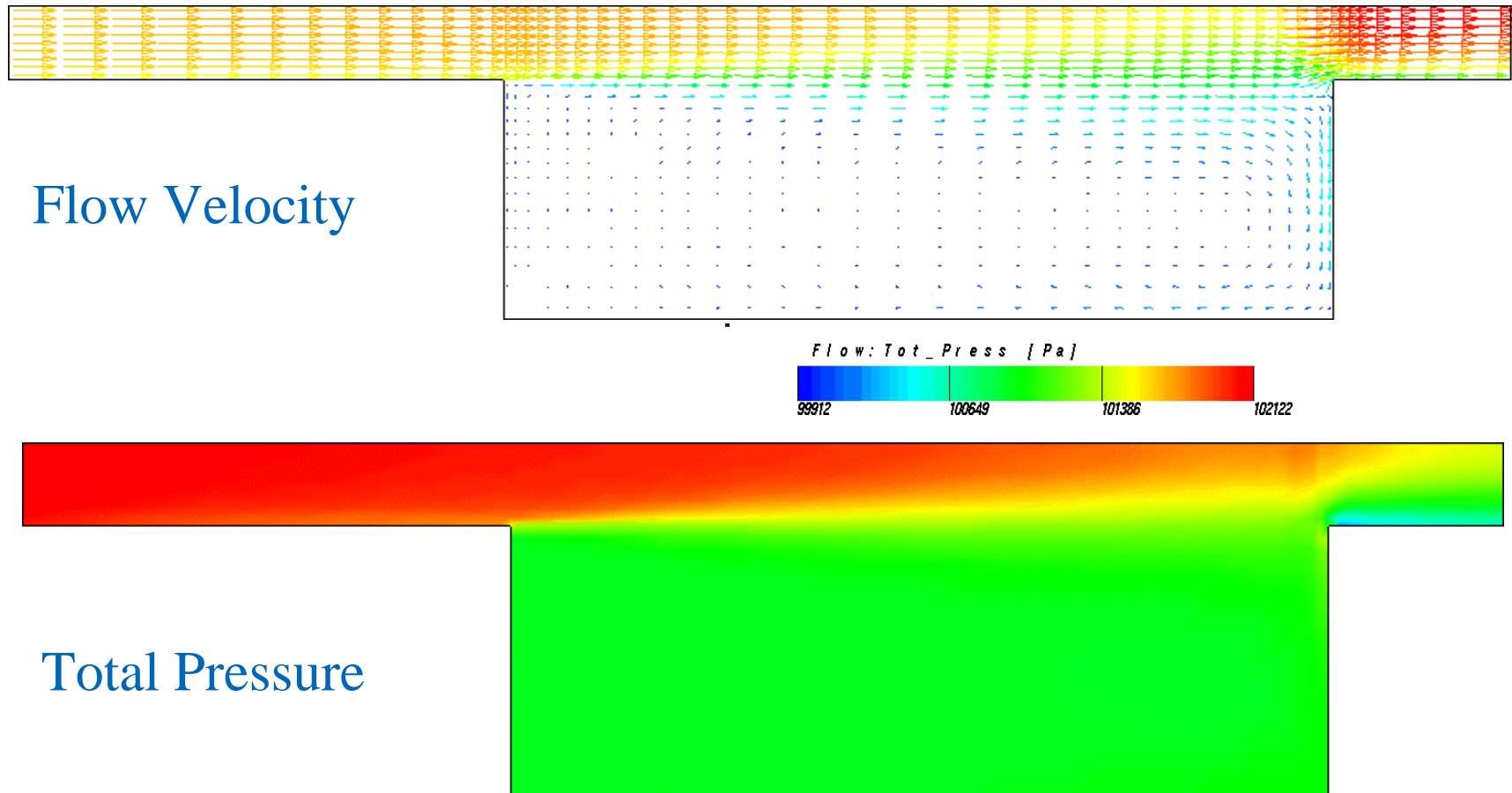


### Conclusions:

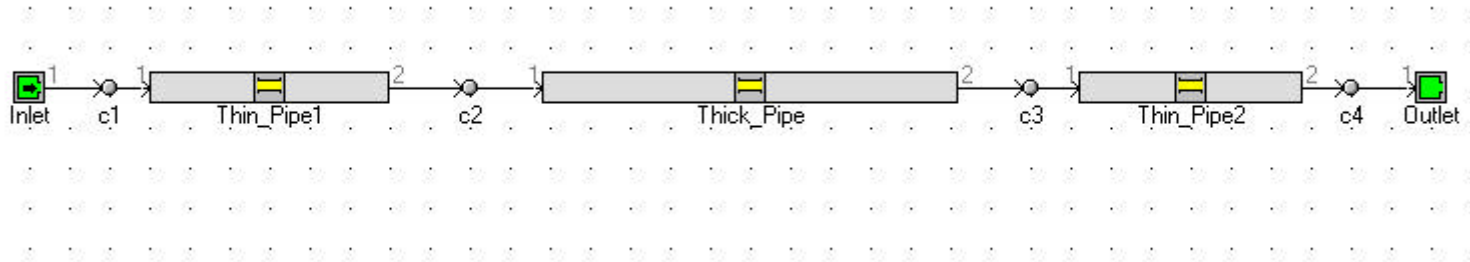
- several common substrate types: ceramic (rectangular/hexagonal), metal (with/without TS structure)
  - ⇒ GT- Power results correlate for metal with TS structure
  - ⇒ for the other substrate types adjustment (e.g. of the Friction Multiplier) necessary
- velocity distribution is not considered

⇒ need for further improvement of the object CatalystBrick

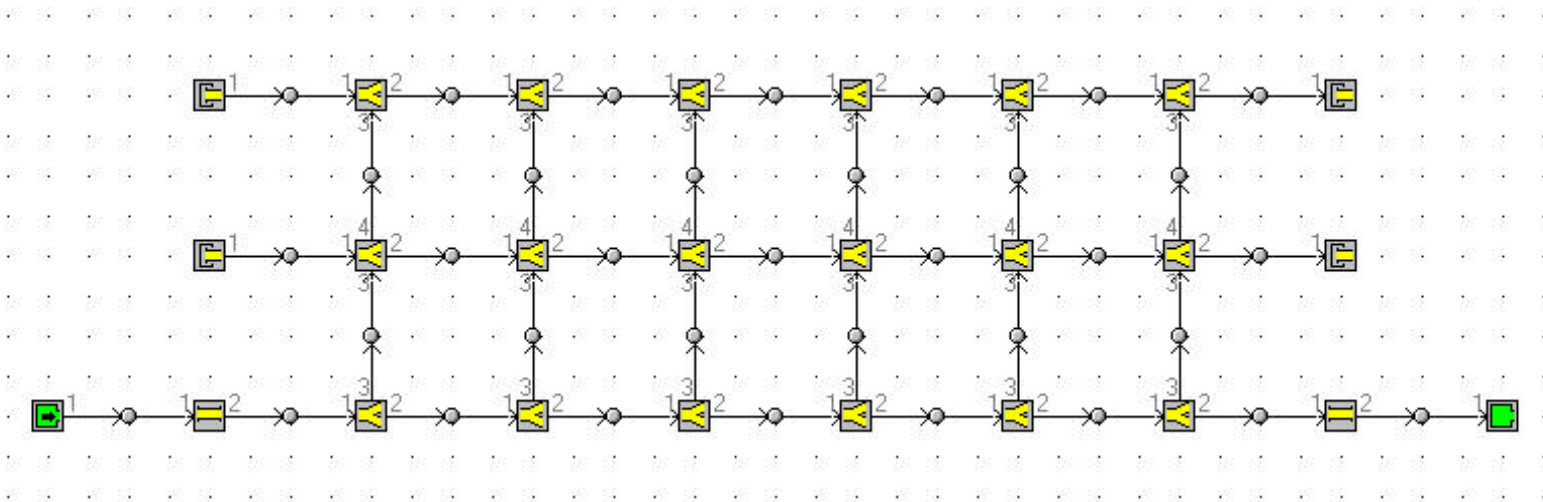
**Simple Muffler Chamber (3D CFD)**

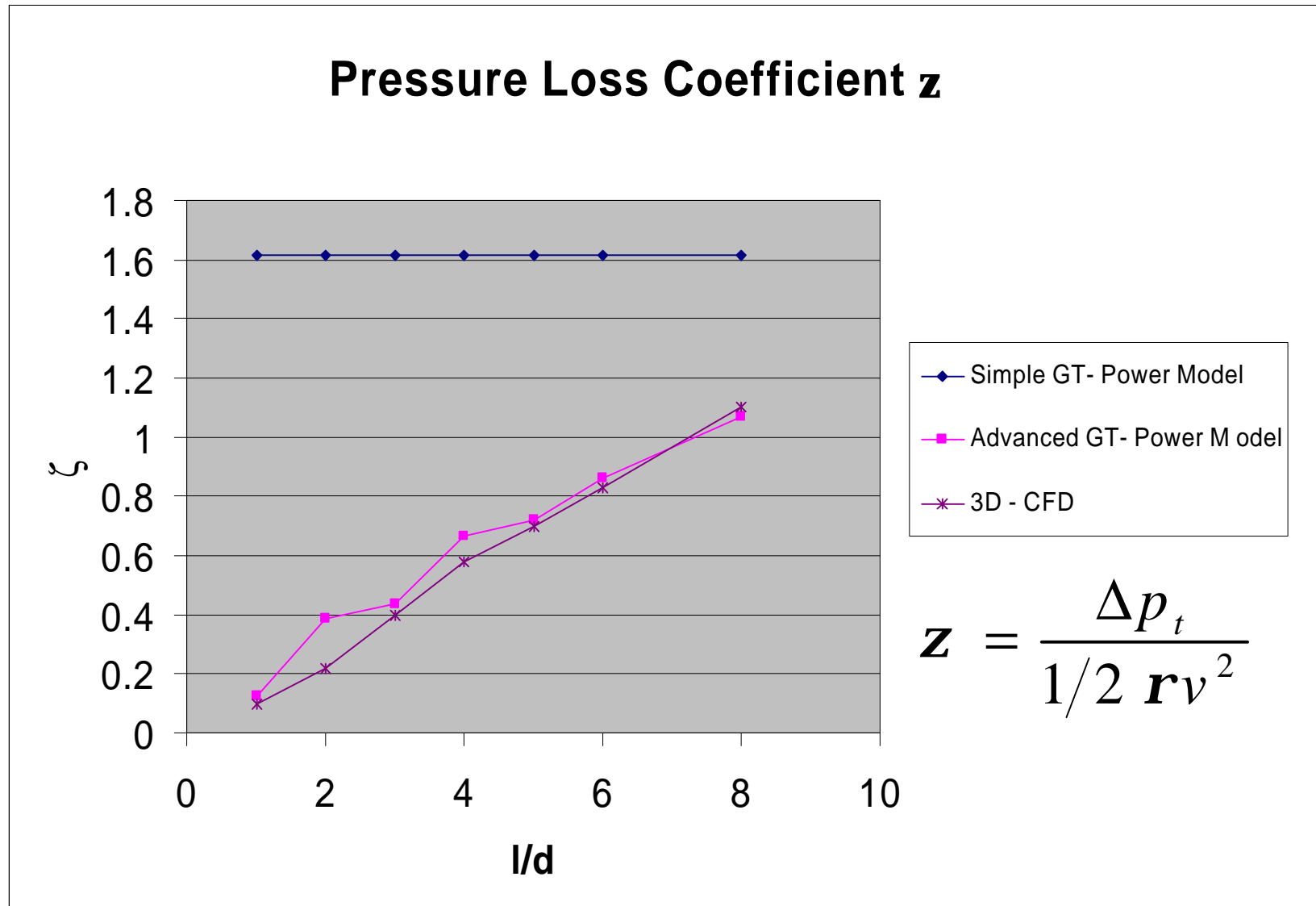


## Simple GT- Power Model



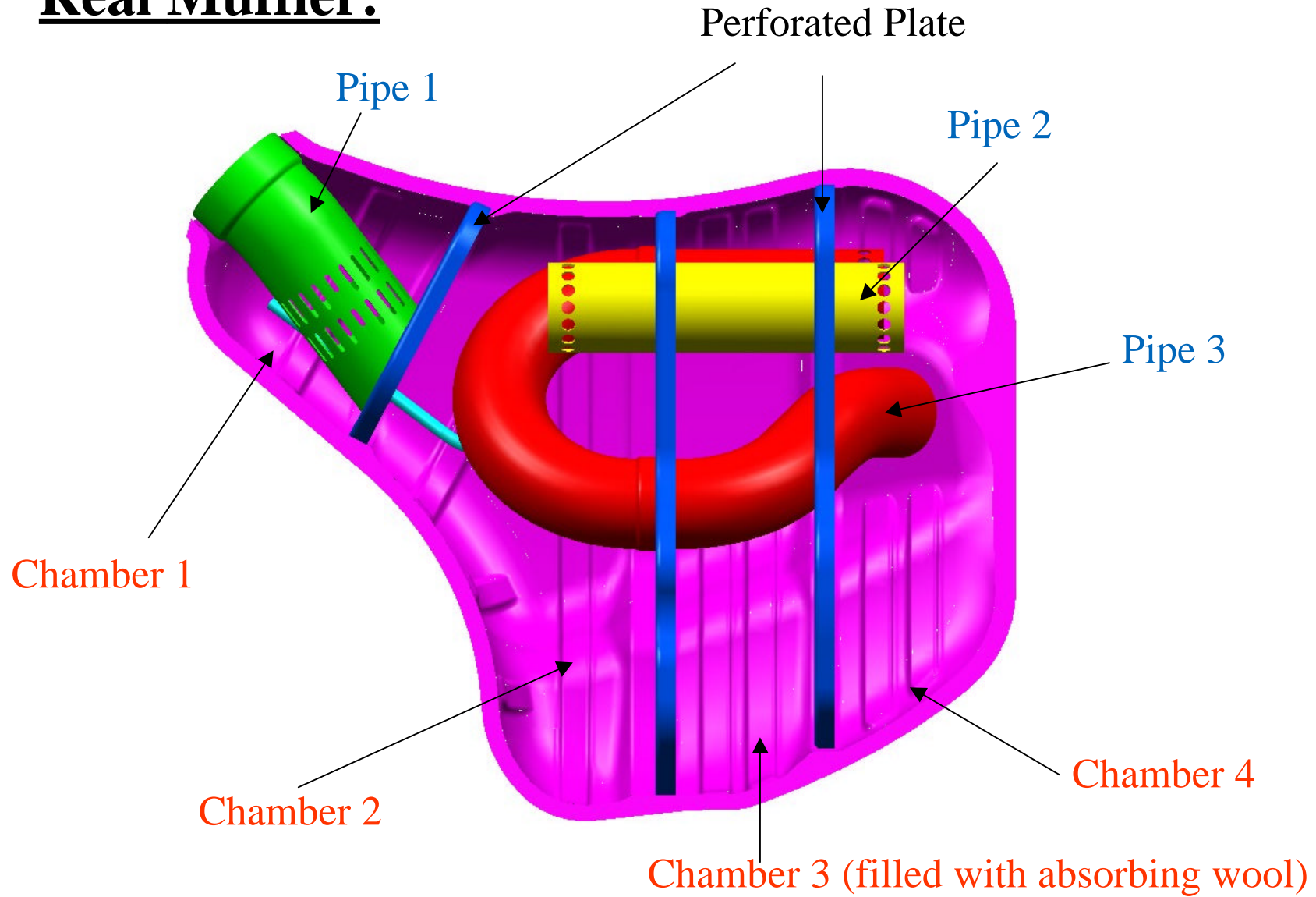
## Advanced GT- Power Model

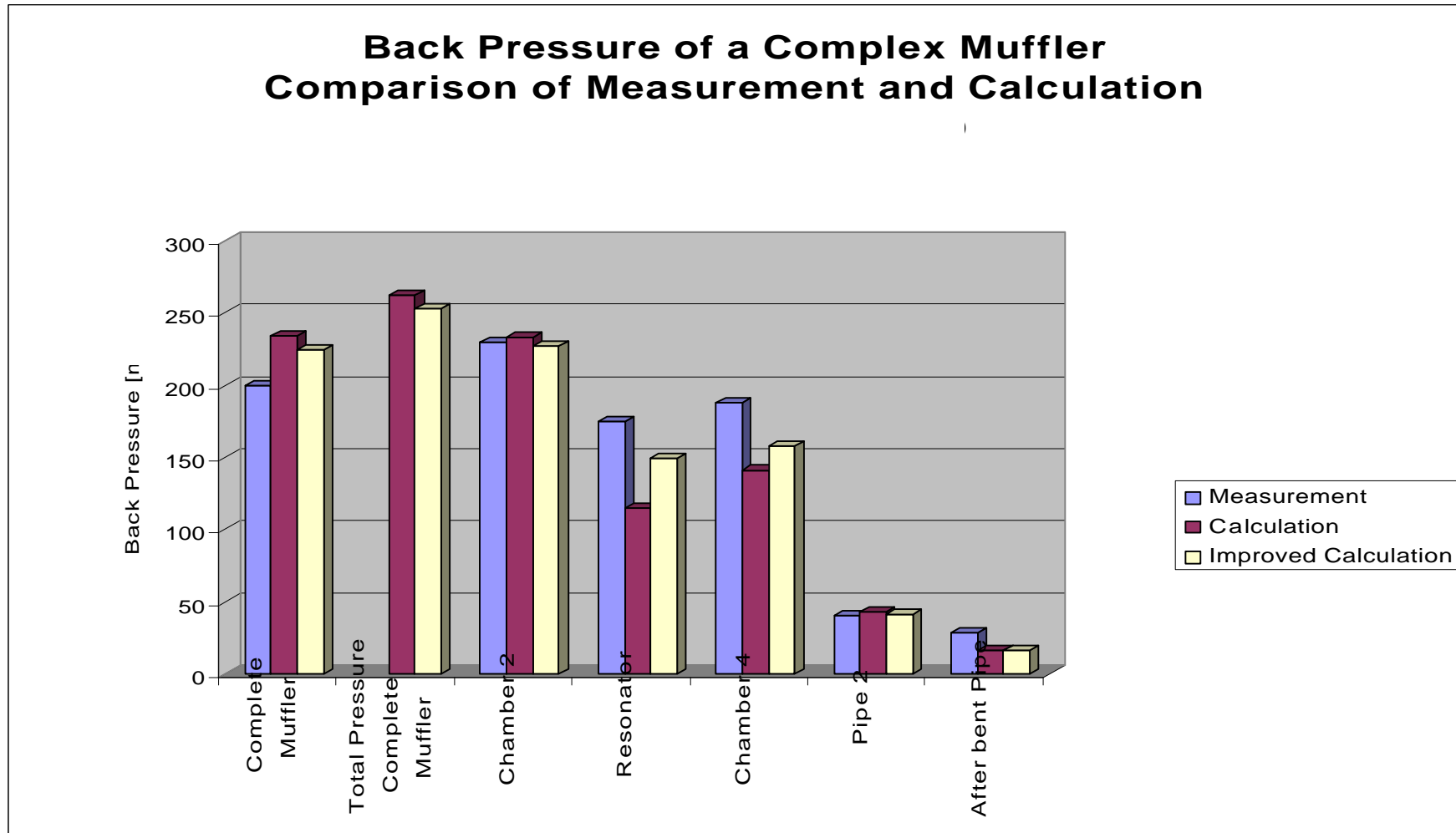






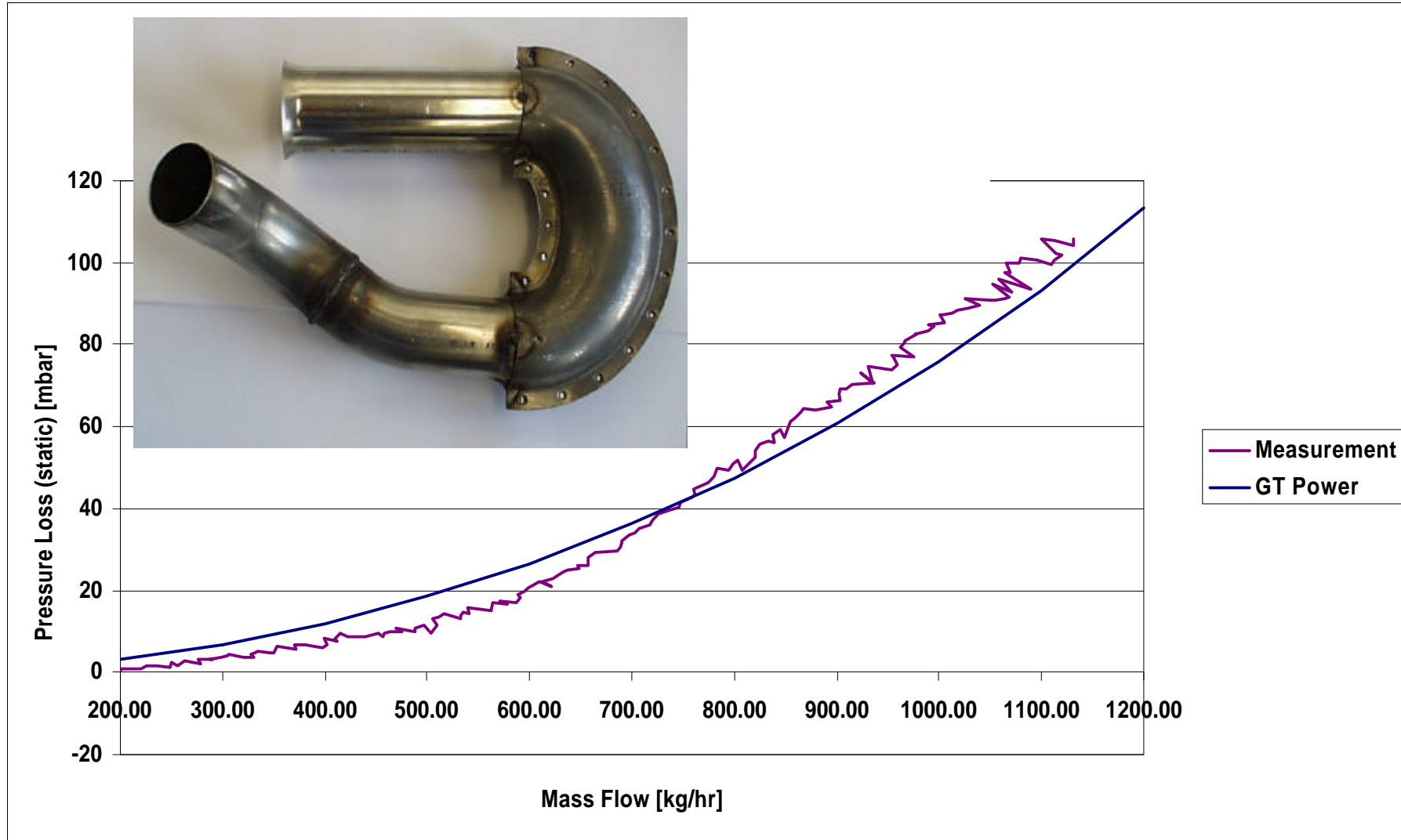
**Real Muffler:**





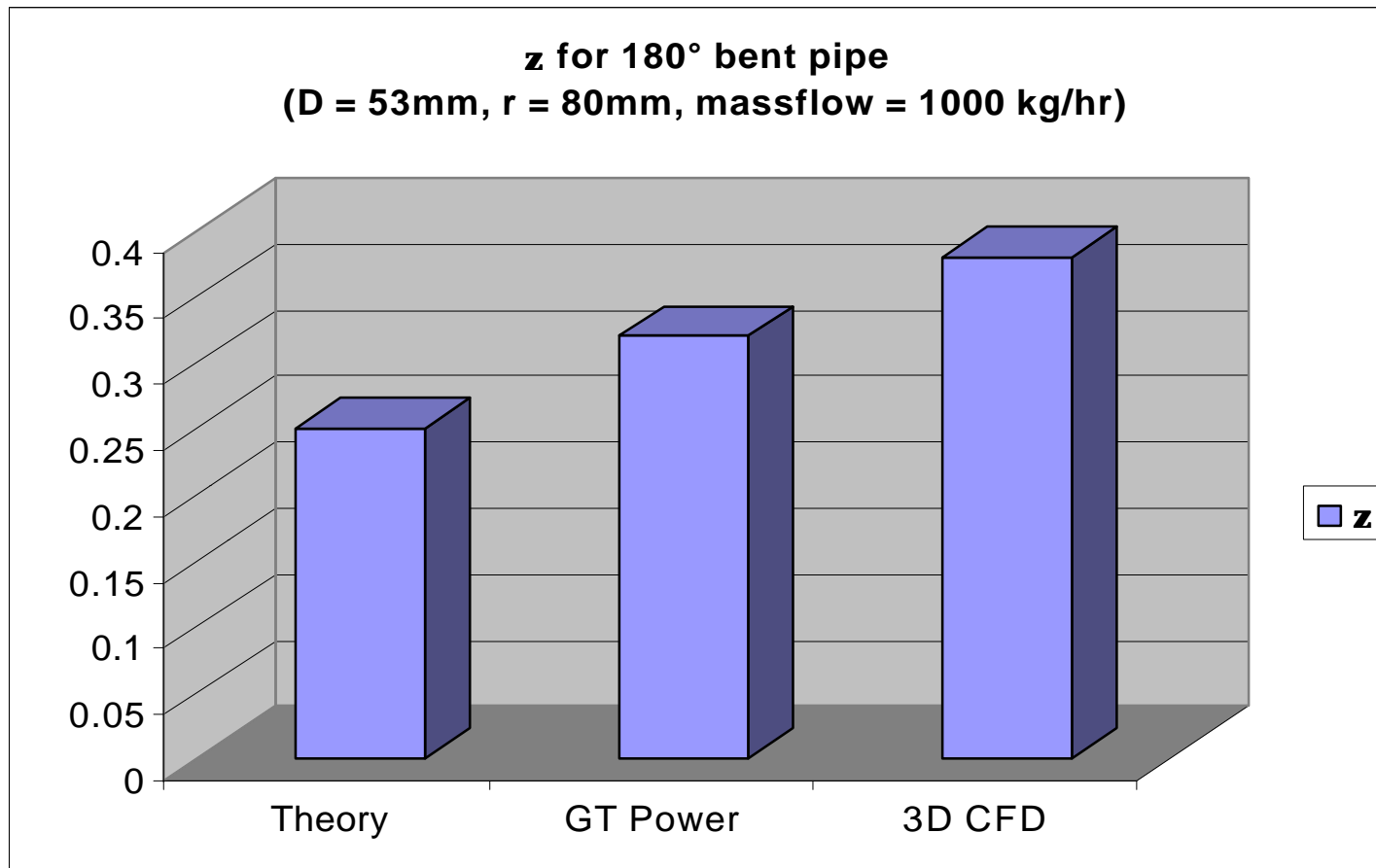
⇒ Using numerous flowsplits to calculate fast and slow flow separately improves the results

# Pressure Loss of a bended Muffler Tailpipe



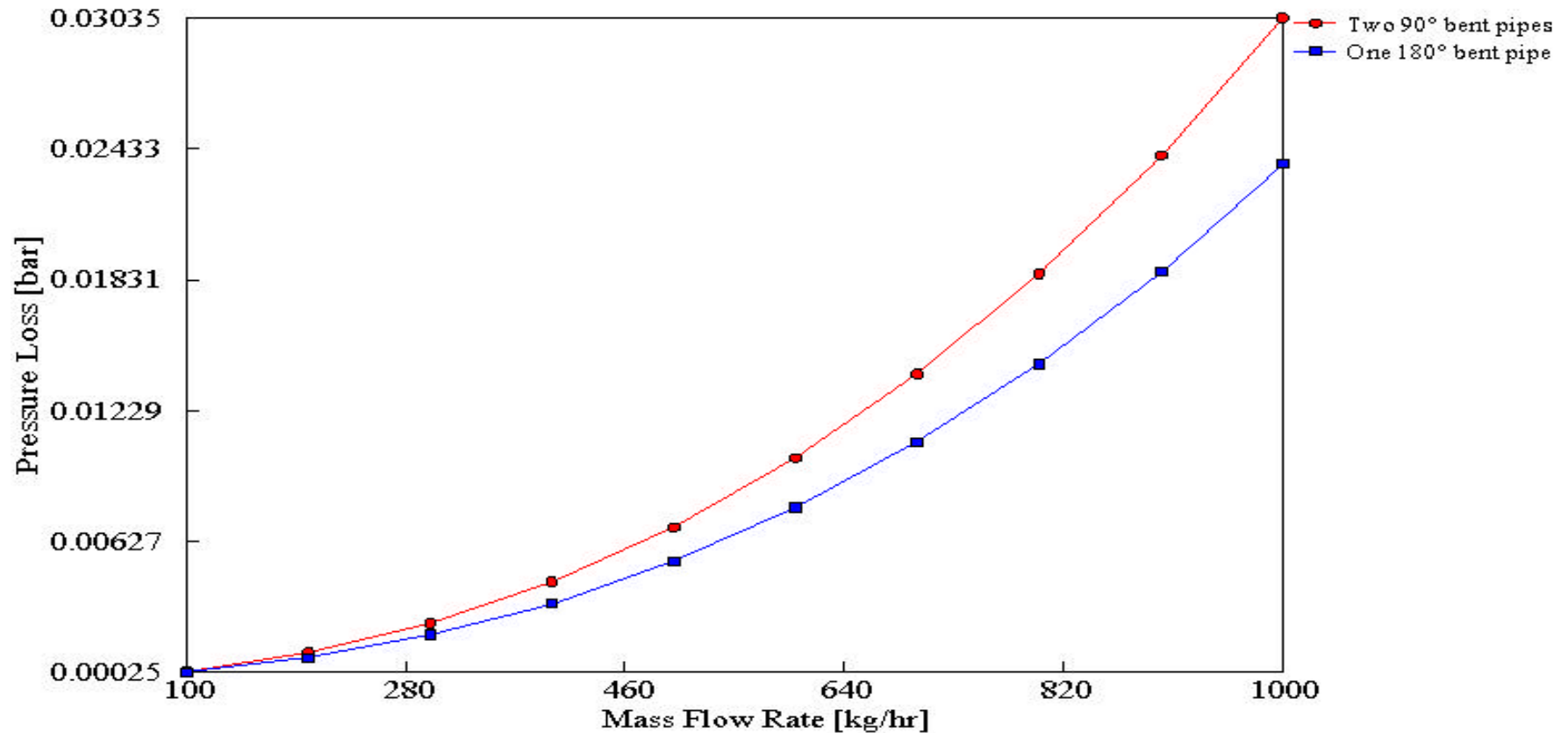
## Theory, GT- Power, 3D CFD

$$z = \frac{\Delta p_t}{1/2 r v^2}$$



## Two 90° bent pipes vs. one 180° bent pipe

### GT-Power Calculation



⇒ Two directly connected 90° bends cause higher pressure loss than one 180° bend

## Summary

- Properly used, GT Power is suitable to predict the pressure loss of an exhaust system with a reasonable accuracy

### but:

- ⇒ limitations of GT Power's 1-D approach has to be kept in mind during the modeling process
- ⇒ validation with experimental measurements remains necessary