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New Challenges and Solutions

in the

Gravimetric PM Measurement Process

(PM = Particulate Matter)

by

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New Challenges and Solutions
in the
Gravimetric PM Measurement Process

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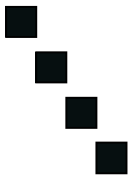
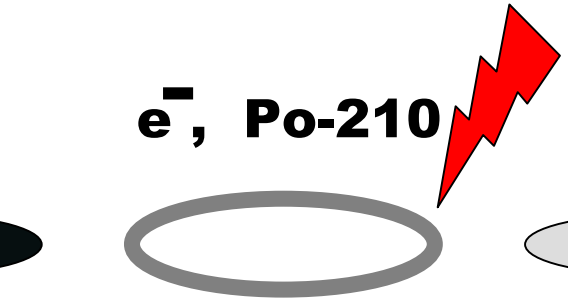
1 Process ?
Financial Efficiency

EPA 1065
EU Directives





2 Weighing Accuracy 1µg ?
Technical Status

From 200 µg
(Diesel PM)

Teflon Filter !

to 20 µg
Tier4, EURO V..

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Introduction :
The Entrepreneurial PM Consequence – is quite considerable

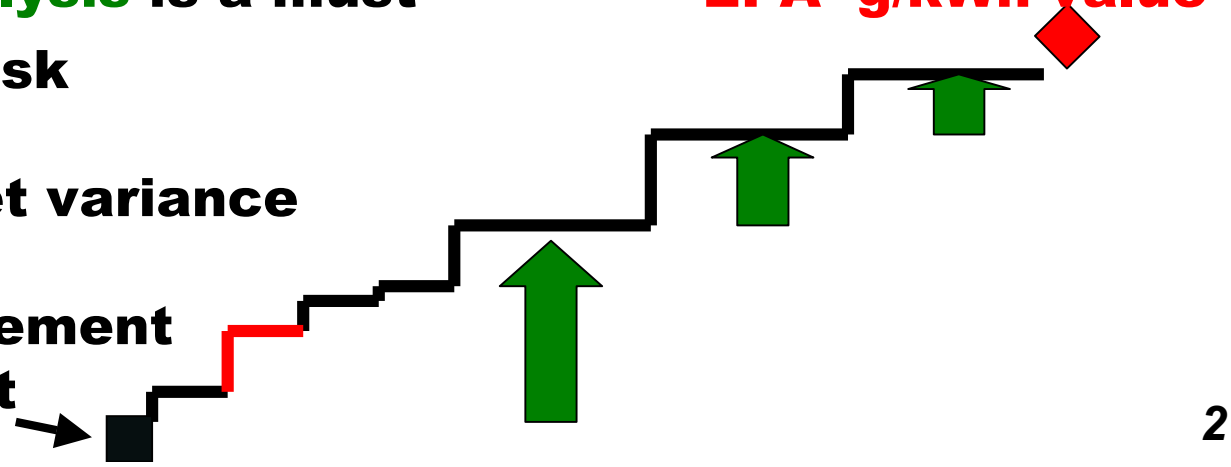
How are the paragraphs controlled ?

EPA takes a car, engine and measures the emission

e.g. Power Train Inc., paid USD 2 million (AECC 1/11)

Conclusion and Consequence 1 :
Error Estimation Analysis is a must

- **entrepreneurial risk**
- **production/market variance**
- **tech test measurement PM process result**



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Introduction (continued): The EPA`s (and EU) expectation

is to apply „ good engineering judgement“

- **Strict requirements: (paragraphs)** — **emission values published (g/kWh) measured in a defined test cycle in a defined environment T, DP, P with defined measurement devices for an operational system (type, market, year...)**

- **to apply the standard company`s procedures (ISO....) for the competitive realisation**

- **to take all other paragraphs as a valuable help**

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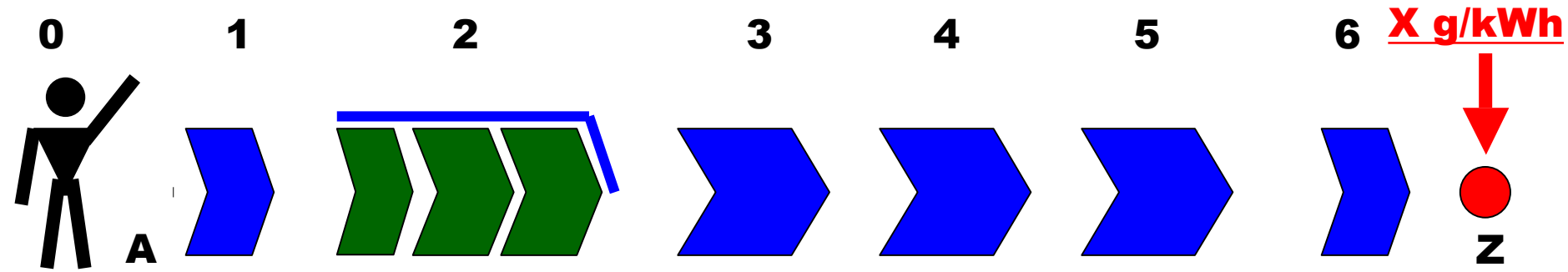
The Gravimetric PM Measurement Process – requires two quite different user competences



- usually core competence
- usually underestimated expensive „hobby“

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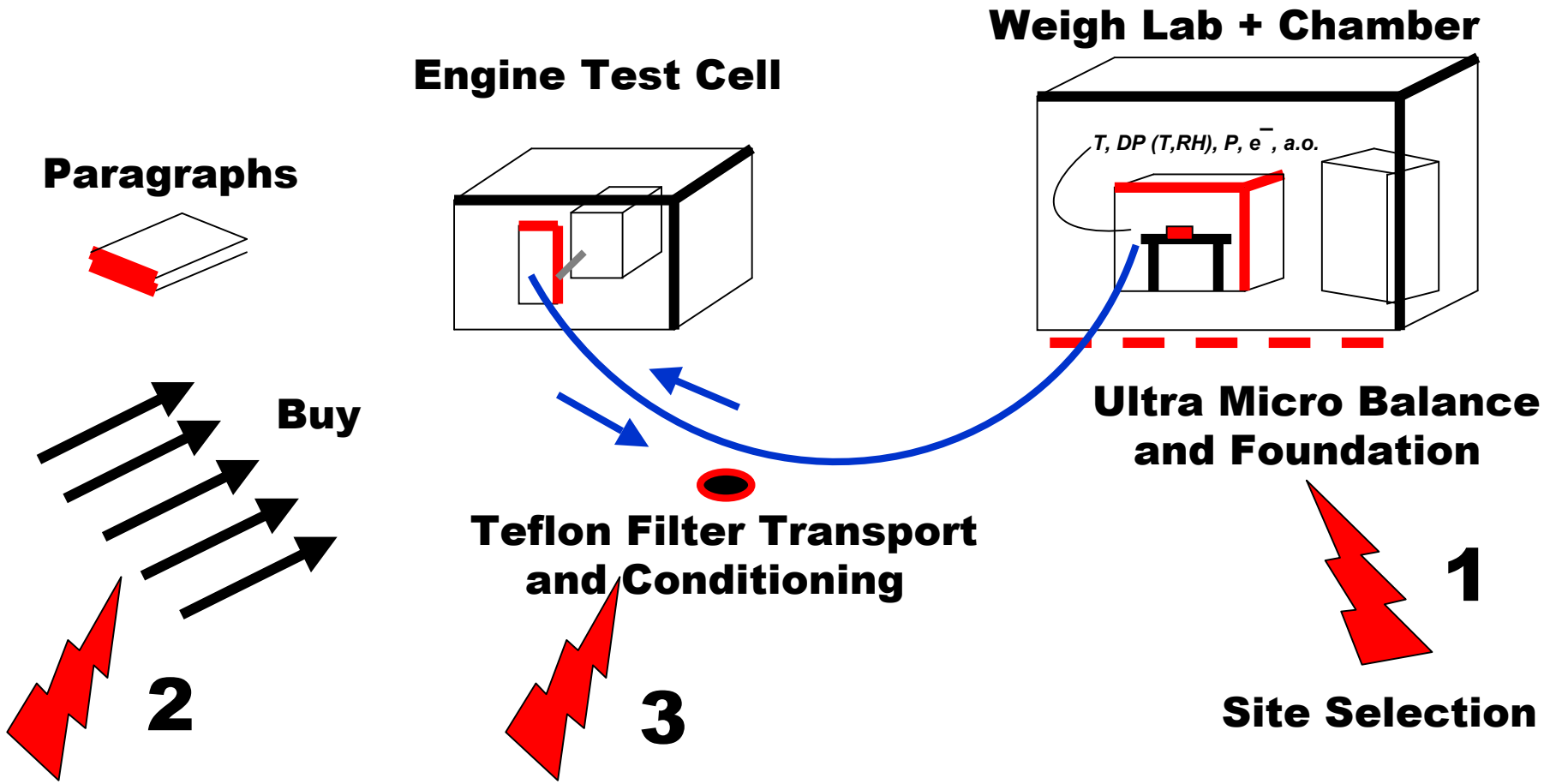
The Gravimetric PM Measurement Process – Infrastructure requires „TQM“ already before the kick-off



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The Gravimetric PM Measurement
Practical Basic Alternatives (selected main problems)

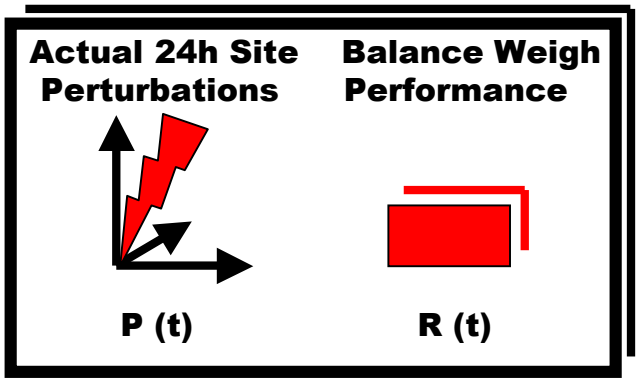
1 Site Selection of the Weigh Chamber (Room)

„JUST EXPERIENCE“

\+ „no cost“

− maybe high risk
(> EUR 150`000)

„EXPERIENCE + VWE Measurement FACTS“



\+ reliable,
option geo-technical modifications

− expertise EUR 5000
(e.g. IKT)

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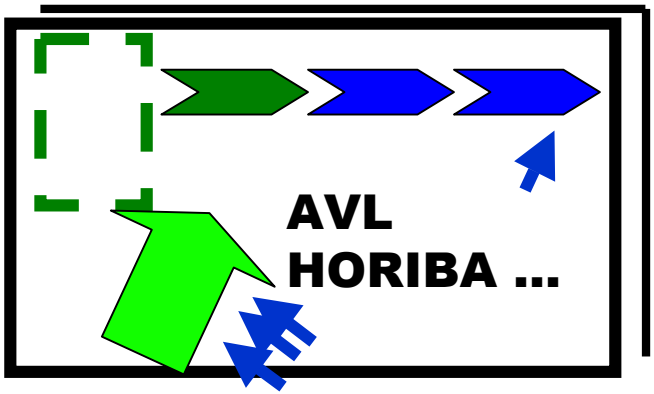
The Gravimetric PM Measurement
Practical Basic Alternatives (selected main problems)

2 Buy/Procurement Management (General)

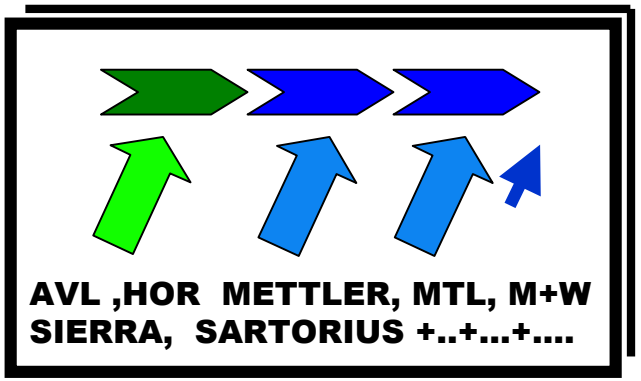
„ONE PRIME CONTRACTOR“



\+ **„formally one hand“**

− **indirect OEM specialist contact**

„FEW PACKAGE SUPPLIERS“



\+ **reliable, direct and flexible OEM contact**

− **requires clear lead and contact (user side)**

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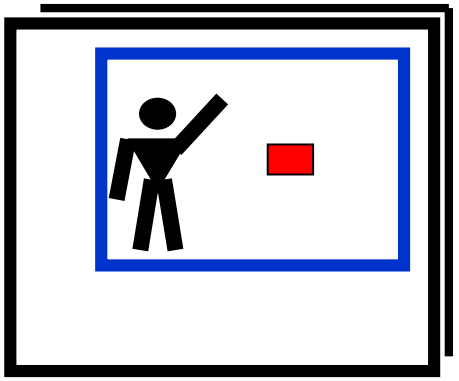
The Gravimetric PM Measurement
Practical Basic Alternatives (selected main problems)

2 Buy/Procurement Management Weigh Facility +/-

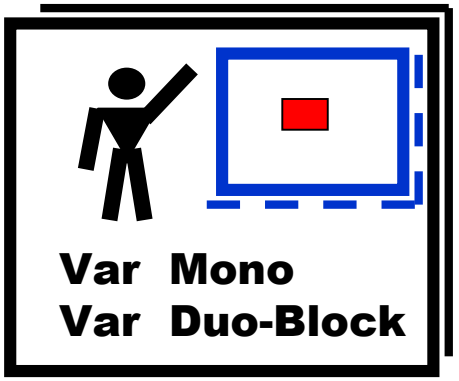
T, DP, RH, (P)

„ROOM“



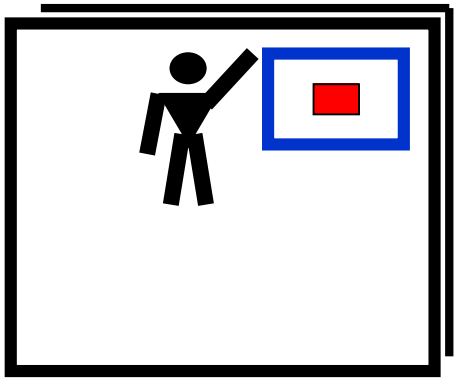
EUR 300`000

„CHAMBER“



EUR 200`000

„MINI-BOX“



EUR 100`000

(Note: option robotics for > 50x/day, +EUR 120`000)

Conclusion 2:

„expensive“ „ most cost-efficient“ „questionable“

! Ask also for recurring cost (energy, service, flexibility, support)

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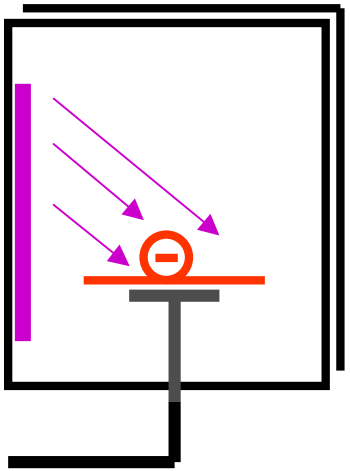
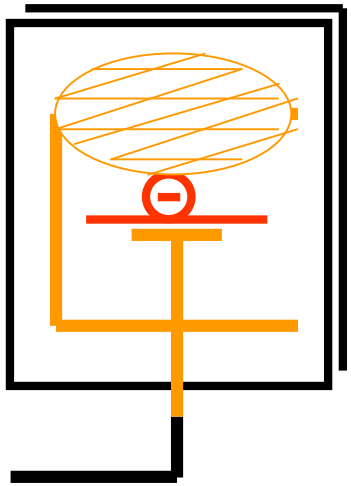
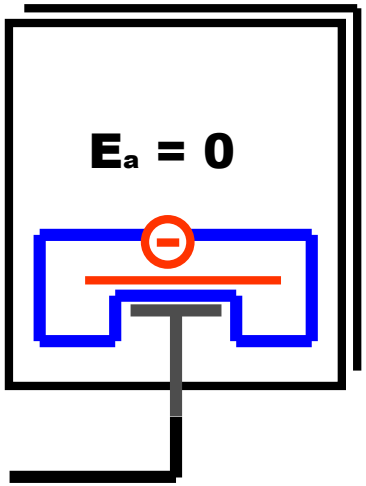
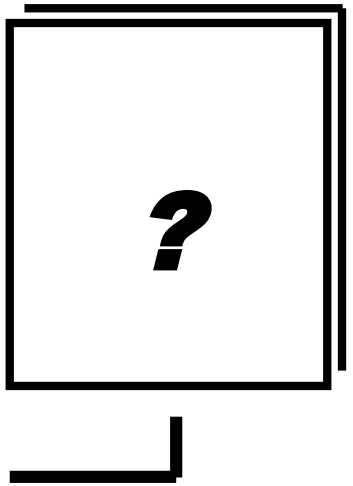
The Gravimetric PM Measurement

3 Technical Status of Teflon F-Weighing Accuracy

„Po-210 alpha“	„Light FARADAY“	„IKT Inverse FARADAY TCW“	„Other Solutions“
			
it works	even for 2g balances	only for 6g balances	n.a.

+/- 2.5 µg

20 µg trsp, cond & weigh cage solution

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- **Conclusion 3:**
  Collect the current experience (internal + external)
  for future Project Realisation Efficiency
  Save in buy phase EUR 100`000, + EUR 30`000 p.a.
  (process lead, infra and exp.planning)

- **Conclusion 4:**
  Future 20 µg PM on Teflon reliably with FARADAY,
  +/- 2.5 µg
  (more than non-Po, TCW solution with directly identifiable Teflon and Borosilicate filters, e.g. MTL)

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The Gravimetric PM Measurement Process Improvement

Thank you

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