DustTrak Presentation

EDS SCOTLAND

Innovation 2 Extraction

TSI® UNDERSTANDING, ACCELERATED
Agenda

+ Introduction – why do we need to sample?
+ Dusttrak market segments and applications
+ Product Line
  - Models
  - Features
  - Theory of Operation
  - Specifications
+ Accessories
+ Questions
Why do we need to sample air?
Legislation

What are the Legal Obligations?

‘The employer has an overriding duty and first priority to consider how to prevent employees being exposed to substances hazardous to health by All Routes.’
Reasons for air sampling

COSHH ACoP

Control of Substances Hazardous to Health Approved Code Of Practice
Reasons for Air Sampling

• Health Protection
• Environmental Protection
• Compliance with Government Legislation
• Product Protection
• Process Protection
• Protection from compensation claims
Particles Size Perspective

- Visible Airborne Debris 25 µm
- Human Hair ± 150 µm
- Average Atmospheric Dust 5-10 µm
- Heavy Atmospheric Dust 10 µm
- Metallic Fumes 0.3-1 µm
- Ultrafine Particles < 0.1 µm
Typical Particle Sizes

- **DANGER ZONE**
- Oil fume/mist
- Airborne dust
- Viruses
- Colour pigment
- Pollen
- Bacteria
- Tobacco smoke
- Coal dust
- Hairs
- Carbon black
- Cement dust
- Milled flour

Size Range:
- 0 µm
- 0,01 µm
- 0,1 µm
- 1 µm
- 10 µm
- 100 µm

Visibility:
- Visible by electron microscope
- Visible by microscope
- Visible by eye

(0,1 mm)
Airborne Hazards

Gases & very small particles can reach the deepest areas of the lungs.
Find and Control Pollutant Sources

You can’t solve a Problem you can’t find!
The Revolution in Real Time Dust Monitoring Has Arrived!
Market Segments and Applications

+ Industrial/occupational hygiene surveys
+ Indoor air quality investigations
+ Baseline trending and screening
+ Point source monitoring
+ Engineering control evaluations
+ Engineering studies
+ Remote monitoring
+ Emissions monitoring
+ Aerosol research studies

+ Environmental (non-regulatory) monitoring
  - Fugitive emissions
  - Site perimeter
  - Fenceline
  - Dust control operations
  - Environmental research studies

+ Process monitoring
  - Mining industry
  - Metal working/machining fluid monitoring inside enclosures
  - Combustion aerosol monitoring with and without dilution tunnels
  - Paper mills
  - Grain mills
  - Foundry process monitoring
  - Paint spray booths
  - Paint stripping processes
DustTrak DRX – the measurement

+ DustTrak DRX aerosol monitors are advanced continuous real-time, 90° light-scattering laser photometer that simultaneously measure mass and size fraction
  Â No other monitor can do both!
+ Desktop and handheld monitors measure size-segregated mass fraction concentration
  Â Total PM, PM$_{10}$, Respirable, PM$_{2.5}$, and PM$_{1.0}$ size fractions
  Â Over a wide concentration range, 0.001 – 150 mg/m$^3$
DustTrak DRX – the measurement

+ The DRX can be set to display any of the following size fraction modes
  Â IH Mode: Total PM, PM$_{10}$, Respirable ($\leq 4$ µm) size fractions
  Â ENV/IAQ Mode: Total PM, PM$_{10}$, PM$_{2.5}$, PM$_{1.0}$
  Â All Mode: Total PM, PM$_{10}$, Respirable, PM$_{2.5}$, PM$_{1.0}$

+ Particle detection range: 0.1 - $\sim 15$ µm
+ Incorporates sheath air system
+ Internal pump for active sampling
+ No need for inlet conditioners
+ Measure any aerosol contaminant as long as it is in the particle detection range
  Â Dust, smoke, fume, mist, etc.
Desk Top Design

- DustTrak II Model 8530

- DustTrak DRX Model 8533
Desktop Models

+ Ideal for long-term surveys and remote monitoring applications
  Å Manual and program log modes makes unattended operation easy
  Å Long run times, up to 12 hours with internal Li-Ion batteries, and even longer when used in the environmental sampling platform
  Å Turn it on, set it up, and walk away

+ A variety of communications allows remote access to logged data
  Å Ethernet, USB (device) with wireless radio modem, and analog/alarm output
Features - All DustTrak Models

+ Continuous real-time measurements

+ Colour touch screen operation

+ Real-time graph display

+ TrakPro Data Analysis Software

+ Data logging – manual and program log modes
Features - All DustTrak Models

+ User adjustable instantaneous alarm with visual and audible instrument warnings, and relay setting
+ On-screen instrument status indicators for flow, laser, and filters
+ Filter service indicator for preventative maintenance
+ User serviceable sheath air flow and pump filters
Features – All Desktop Models 8530 (II), 8531 (II HC), and 8533 (DRX)

+ Gravimetric reference sampling capability
  Å Using a 37 mm filter cassette, user supplied
+ Auto zero capability with optional external auto zero module
+ 15-minute STEL alarm with visual and audible instrument warnings, and relay setting for alarm output
+ Analog/alarm output
Gravimetric Reference Sampling

+ All desktop instruments have gravimetric sampling capability and active flow control
+ To improve accuracy of the photometric measurement, the instrument can be calibrated with gravimetric samples
  Â Typically, conduct side by side photometric to gravimetric samples
+ A 37 mm filter cassette (user supplied) can be inserted in-line with the aerosol stream at the outlet of the optical chamber without the need for an external sampling system
  Â TSI does not supply any filter media for this type of sampling
  Â It is always best to work with an AIHA/agency accredited laboratory
Features – All Desktop Models 8530 (II), 8531 (II HC), and 8533 (DRX)

+ Data logging – manual and program log modes
+ Download data directly from instrument via
  • Ethernet connection to PC
  • USB
  • Wireless modem
+ Hot swappable batteries
+ 5.7” VGA Colour Touch Screen
+ Ten thousand hour rated pump!
  • Yes, that’s 10,000 hours!
Wireless Modems

- Provides two-way communications between desktop versions of the DustTrak II and DRX and a PC using TrakPro Data Analysis Software

- Set up and program DustTrak II and DRX

- Retrieval of logged data files remotely (data acquisition)
Features – DustTrak DRX Models 8533, and 8534

+ DustTrak DRX aerosol monitors measure size-segregated mass fraction concentration corresponding to:
  Â Total PM, PM$_{10}$, Respirable, PM$_{2.5}$, PM$_{1.0}$
+ Simultaneous display of data, real time graph, statistics, and logging of all size size-fractions
+ Standard and advanced calibration capability
Specifications

+ Sensor Type – all models
  Å90° Light Scattering

+ Particle Size Range
  All DustTrak II Models
  Å0.1 to 10 µm
  All DustTrak DRX Models
  Å0.1 to ~15 µm
## Specifications

+ **Aerosol Concentration Range**

<table>
<thead>
<tr>
<th>DustTrak II</th>
<th>0.001 to 400 mg/m³</th>
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<tbody>
<tr>
<td>Å8530 Desktop</td>
<td>0.001 to 400 mg/m³</td>
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<tr>
<td>Å8532 Handheld</td>
<td>0.001 to 150 mg/m³</td>
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Specifications

+ Resolution
  Å ±0.1% of reading or 0.001 mg/m³, whichever is greater

+ Zero Stability
  Å ±0.002 mg/m³ per 24 hours at 10 sec. time constant

+ Flow Rate
  All DustTrak II Models
  Å 3.0 lpm set at factory, user adjustable from 1.4 to 3.0 lpm

  All DustTrak DRX Models
  Å 3.0 lpm, no user flow adjustment
Specifications

+ Flow Accuracy
  Å ±5% of factory set point, internal flow control

+ Temperature Coefficient
  Å +0.001 mg/m³ per °C

+ Operational Temperature
  32 to 120°F / 0 to 50°C

+ Storage Temperature
  -4 to 140°F / -20 to 60°C

+ Operational Humidity
  Å 0 to 95% RH, non-condensing
Specifications

+ Time Constant
  ÅUser adjustable, 1 to 60 seconds

+ Data Logging
  Å5 MB of on-board memory (>60,000 data points)
  Å45 days at 1-minute log interval

+ Log Interval
  ÅUser adjustable, 1 second to 1 hour
Specifications

+ Communications
  All Desktop Models
  Å USB device / host and Ethernet
    - Stored data is accessible using a flash memory drive
  All Handheld Models
  Å USB device / host
    - Stored data is accessible using a flash memory drive

+ Physical Size (HWD)
  All Desktop Models
  Å 5.3 x 8.5 x 8.8 in / 13.5 x 21.6 x 22.4 cm
  All Handheld Models
  Å 4.9 x 4.8 x 12.5 in / 12.5 x 12.1 x 31.6 cm
Specifications

+ Weight

**All Desktop Models**
• 3.5 lb / 1.6 kg; 4.5 lb / 2.0 kg – 1 battery;
  5.5 lb / 2.5 kg – 2 batteries

**All Handheld Models**
• 2.9 lb / 1.3 kg; 3.3 lb / 1.5 kg with battery

+ Power – AC

• Switching AC power with Universal Line cord included,
  115 – 240 VAC
Specifications

+ Touch Screen
  All Desktop Models
  • 5.7 inch VGA color touch screen
  All Handheld Models
  • 3.6 inch VGA color touch screen

+ Gravimetric Sampling
  All Desktop Models
  • Removable 37 mm cartridge (user supplied)

+ CE Rating
  • Immunity EN61236-1:2006
  • Emissions EN61236-1:2006
DustTrak II and DRX Desktop and Handheld Kits

Each instrument includes: carry case; AC Adapter with universal line cord (all countries); x1, 6600 mAH Li-Ion rechargeable battery pack (Desktop units only); x1, 3600 mAH Li-Ion rechargeable battery pack (Handheld units only); Impactor kit – PM$_{10}$, PM$_{4}$, PM$_{2.5}$, and PM$_{1}$ impactors with x2 impactor plates and tube of vacuum oil (DustTrak II only); Standard Calibration kit - PM$_{2.5}$ impactor and tube of vacuum oil (DustTrak DRX only); 10 mm Dorr-Oliver Cyclone with cyclone clip and tubing (DustTrak II only); 3 ft. conductive sample tubing; zero check filter; 37 mm mesh filter cassette (Desktop units only); x8, internal replacement sheath air filters; TrakPro Software CD; x2, touch screen stylus’s; USB interface cable; Ethernet interface cable (Desktop units only); Analog/Alarm Output cable (Desktop units only); Filter cover removal tool; TSI screwdriver (Handheld units only); Operation and Service Manual; Calibration Certificate; and two-year warranty
DustTrak II and DRX Optional Accessories

+ Auto Zero Module
+ Environmental enclosure (environmental sampling platform)
+ External Battery Chargers
  - 6600 mAh Li-Ion batteries
  - 3600 mAh Li-Ion batteries
+ Field Service Kit
  - x8, internal sheath air filters
  - X2, replacement filter well covers
Auto Zero Module

+ All desktop instruments have the ability to be auto zeroed using the optional Auto Zero Module
+ When sampling over extended periods of time zero drift occurs
+ Zero drift occurs when electronics and mechanical components cause a concentration shift
  - Even when the DustTrak is connected to a HEPA filter
+ This drift is eliminated by re-zeroing the DustTrak electronics with a HEPA filter as often as possible
  - The optics are purged with HEPA air
  - Baseline voltage is recorded and becomes the new zero concentration from which all other concentrations are determined
Auto Zero Module

+ The Auto Zero Module consists of a pump and a HEPA filter
+ The Auto Zero Module is attached to the inlet of the DustTrak along with a power cable
+ The interval of auto zeroing is user selectable from 15 minutes to 24 hours
+ Auto zeroing takes place in 1 minute, no data is recorded during this time
+ Over long periods of time the data missed during zeroing has insignificant contribution to overall average concentration
Auto Zero Module
ESP Design
QUESTIONS???
Thank-You!