

CLEAN AIR FORCE

TSI Environmental Solutions

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UNDERSTANDING, ACCELERATED



CLEAN AIR FORCE
OF CENTRAL TEXAS

AGENDA

- + Who is TSI?
- + TSI Health & Safety Division
- + How can we help?
- + Our Air Quality/Environmental Monitoring Products
- + Discussion



TSI INCORPORATED

Corporate Overview



TSI'S MISSION, VISION AND GUIDING PRINCIPLES

Mission:

TSI provides trusted measurement, application guidance, and data analytics solutions that enable our customers to make **informed decisions**.

Vision:

Creating a better world by helping protect people, products and the environment, and by optimizing research and industrial processes.

Our Guiding Principles form the basis of how we behave – every day, every interaction, everywhere in the world.



TSI HISTORY

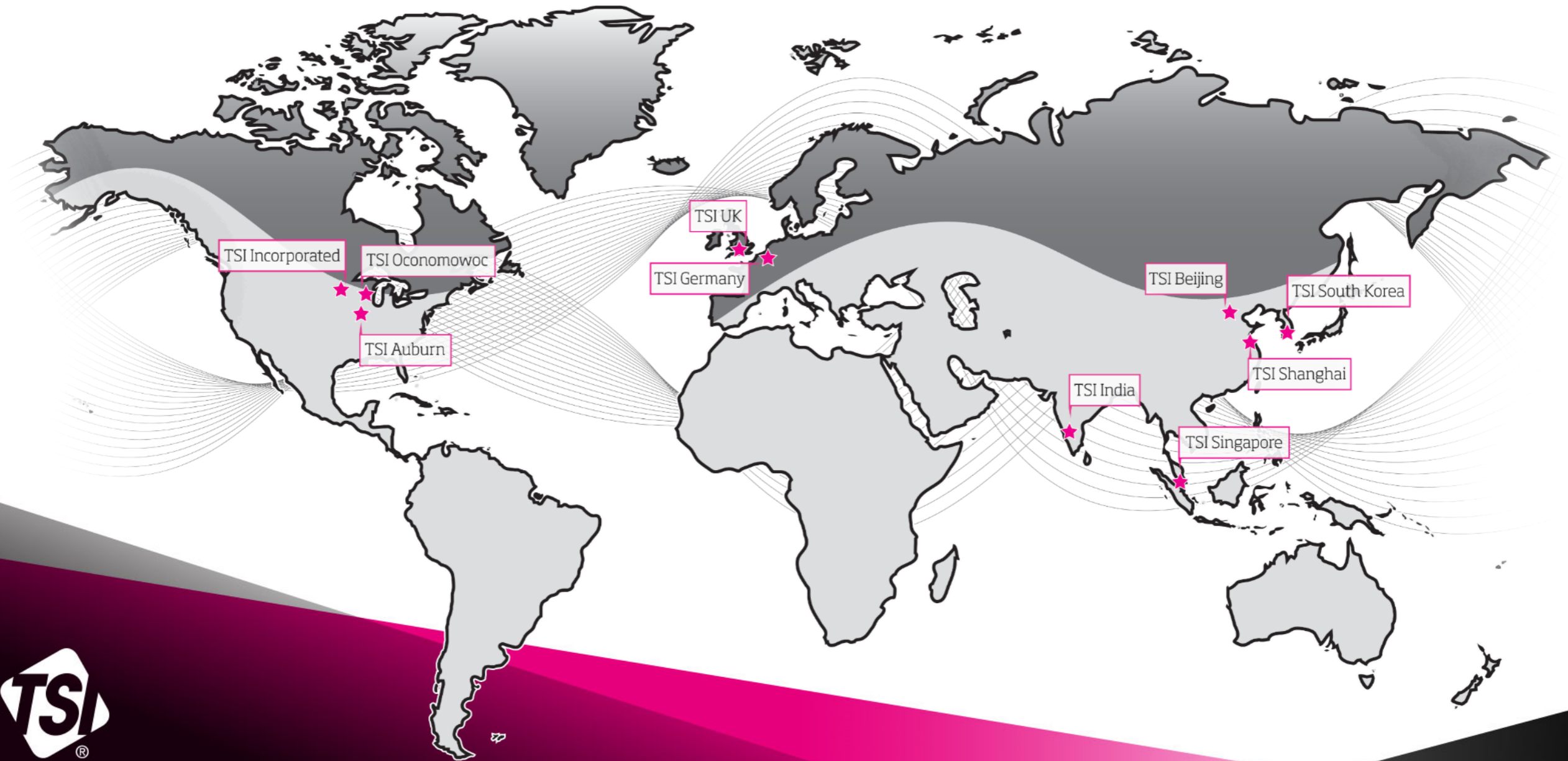
- + Founded in 1961 by University of Minnesota graduates
- + Privately-held company as part of Churchill Industries holdings
- + Over 900 employees worldwide
- + Corporate headquarters based in Shoreview, MN
 - Offices in Germany, United Kingdom, Korea, China, Singapore and India
- + Industry leader in the design and production of precision measurement instruments, as well as data analysis and management
- + Partners with research institutions and customers around the world to set the standard for measurements relating to aerosol science, air flow, health and safety, indoor air quality, environmental monitoring, fluid dynamics and biological detection.



1971 | TSI starts work on a project to design a wind speed velocity sensor—or anemometer—that is sensitive to low winds and winds in a low-density atmosphere. Of the 60 anemometers created for NASA, six went on to Mars, installed on the Viking spacecraft.



TSI LOCATIONS



TSI GLOBAL SUPPORT

- + Multiple Manufacturing Centers
- + Multiple Instrument Service Locations
- + Extensive R&D for Product Development
- + Customer and Technical Support



OUR CUSTOMERS



TSI MARKETS

Our unique product line includes over 200 Precision instruments and solutions which can be classified into the following segments:



Manufacturing



Healthcare & Medical



**Occupational
Health & Safety**



Agriculture



Environmental



HVAC



Research & Analytical



OCCUPATIONAL HEALTH & SAFETY



TSI supports the Occupational health and safety professional and industrial hygienist with solutions that not only measure worker exposure, but also assist with worker comfort, safety and regulatory compliance requirements.



OCCUPATIONAL HEALTH & SAFETY

APPLICATIONS



RESPIRATOR
FIT TESTING



NOISE & SOUND



HEAT STRESS



DUST MONITORING



INDOOR
AIR QUALITY



FUGITIVE EMISSIONS
MONITORING



VENTILATION
TEST & BALANCE





HEALTHCARE AND MEDICAL

TSI solutions range from providing flowmeters incorporated into most leading ventilator manufacturers equipment, providing calibration devices, ensuring proper controlled pressure in critical hospital and laboratory spaces, TSI provides a broad lineup of solutions meeting the critical needs of this market.





HEALTHCARE AND MEDICAL APPLICATIONS



ROOM
MONITORING



BIOMEDICAL



RESPIRATOR
FIT TESTING



LAB MONITORING
AND CONTROLS



INHALATION DRUG
DEVELOPMENT



ENVIRONMENTAL

TSI provides solutions which measure dust, gases, and particles whether generated from natural events or human activity. Whether the need is meeting compliance requirements or assessing the environment, TSI has the solution.



ENVIRONMENTAL

APPLICATIONS



OUTDOOR
AIR QUALITY
MONITORING



ENGINE
EMISSIONS



AEROSOL
RESEARCH



AMBIENT
AIR



TSI DIVISIONS – SERVING MULTIPLE MARKETS

- + **Health & Safety**
- + Research & Analytical
- + Energy and Comfort
- + Contamination Control
- + MSP



HEALTH & SAFETY

All U.S. Sales Members work directly with TSI

H&S Product Categories:

+ Occupational H&S

- Respirator Fit-Testing
- Indoor Air Quality
- Exposure Monitoring
- Quest Products
 - Hearing Conservation, Heat-Stress

+ Environmental

- Air Quality and Dust Monitoring Solutions
 - Other Associated Parameters



TSI H&S ENVIRONMENTAL MONITORING SOLUTIONS

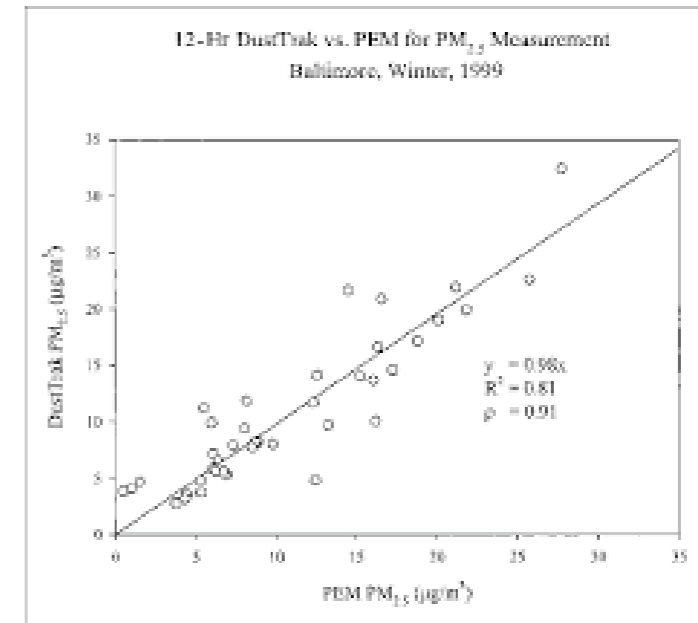
Environmental Product Categories:

+ Near Reference; True Real-time monitors

- Laser photometry – True real-time; highly accurate
 - And associated optional parameters

+ Low-cost Sensors

- PM only
- PM + Gas



TSI H&S ENVIRONMENTAL MONITORING SOLUTIONS

NOTE: EPA, most other environmental regulatory bodies look for measurements in PM, specifically PM2.5 and PM10

How can TSI assist with your Air Quality monitoring project?

- + We speak in terms of solutions
- + Let's have a discussion about your specific project first, and determine if there's a solution for your problem.
- + We educate on potential solutions, and consult from beginning to end (and throughout project). We help with device recommendation, acquisition plan, installation and training.



TSI H&S ENVIRONMENTAL MONITORING SOLUTIONS

Considerations:

- + What is the site we are monitoring? Ex: construction site; power plant, etc.
- + What is driving the need to monitor? Regulatory? Research? Public Health?
 - Associated need for accuracy
- + What is required for the project?
 - PM size; other parameters (gas, windspeed/direction)
 - Data collection – type (via cloud or local); frequency to collect; what will be done with the data and where will it go?
- + Power options at site?



TSI H&S ENVIRONMENTAL MONITORING SOLUTIONS

Near Reference Instrument Discussion (DustTrak):

+ DustTrak family of products

- DustTrak 8530; 8533
- DustTrak Environmental 8540; 8543

+ DustTrak history

- DustTrak 8520 first developed in 1980's
- DustTrak is the industry standard laser photometer for dust-monitoring, with THOUSANDS in use in the U.S., and many more globally.
- DustTrak 853X launched in 2007
- DustTrak Environmental launched in 2015



TSI H&S ENVIRONMENTAL MONITORING SOLUTIONS

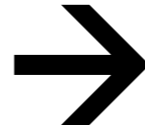
+ Evolution of DustTrak family for Environmental Applications

- DustTrak 8530; 8533 with 8535 enclosure:
 - heated inlet; auto-zero, external pump add ons



TSI H&S ENVIRONMENTAL MONITORING SOLUTIONS

- + Evolution of DustTrak family for Environmental Applications
Integrate all added features into one purpose built instrument, DustTrak Environmental



TSI H&S ENVIRONMENTAL MONITORING SOLUTIONS

DustTrak Parameters

- + PM1, 2.5, Resp, 10, total - simultaneously (8543 DRX)
- + PM1, 2.5, Resp, 10, total - size selectable (8540)
- + Optional: wind-speed/direction, gas detection

DustTrak Deployment Scenarios

- + Construction/Remediation
- + Emergency Response (Ex: EPA ER group)
- + Perimeter Monitoring
- + Industrial (Employee H&S)
- + Research
- + Clean Up Efforts



DustTrak™

Family Highlights

- + Higher concentration
- + Higher accuracy
- + Low maintenance
- + Field serviceable
- + Durable and reliable
- + Advanced pump (DTE)
- + Local service and support



SoFi Stadium, Inglewood, CA

- + Citadel EHS monitored air quality using TSI's DustTrak™ 8533 Monitors to comply with South Coast AQMD Rule 1466
- + Monitors also incorporated useful accessory options:
 - Netronix™ Cloud Data Management System for real-time communication and alerts
 - Solar Power Solution for uninterrupted power supply



Read more about this project:
www.citadelehs.com/featured-projects/



OTHER, MORE LOCAL CASE STUDIES

- + Coal Fire Power Plant – San Antonio area
- + Harris County – Oil and Gas
- + Hurricane Harvey
- + Deep Water Horizon
- + Texas Tech – BlueSky and DustTrak/Gas



TSI H&S ENVIRONMENTAL MONITORING SOLUTIONS

Low cost sensor discussion:

“Science behind the measurement”

BlueSky family

+ 8143 – PM only

+ 8145 – PM and gas



TSI H&S ENVIRONMENTAL MONITORING SOLUTIONS

BlueSky parameters

PM = 1, 2.5, 4, and 10

Optional Gas (8145) = CO₂, CO, O₃, NO₂, SO₂

Other = Temp, Humidity, Optional Pressure (8145)

BlueSky Deployment Scenarios

- + Community Monitoring
- + Corporate Campuses
- + Research



TSI H&S ENVIRONMENTAL MONITORING SOLUTIONS

Quick comparison of two technologies – DustTrak vs. BlueSky

DustTrak = laser photometer

+ Instrument, not a sensor

+ Consistent flow rate (3 lpm) with pump

+ Humidity Compensation

+ Single channel vs. DRX (only laser photometer capable of multiple size fractions simultaneously)



TSI H&S ENVIRONMENTAL MONITORING SOLUTIONS

Quick comparison of two technologies – DustTrak vs. BlueSky

BlueSky = lower cost sensors

+ Sensor is an OPC

+ Calibrated at TSI

+ Fan to draw sample

+ OPC allows multiple size fraction measurement through algorithm



THANK YOU!!

Open Discussion and Questions

