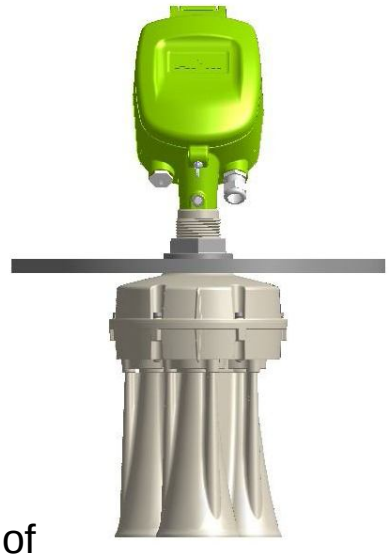
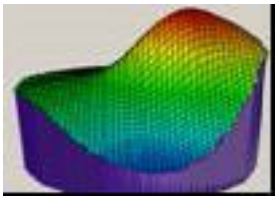
ISA INTERNATIONAL SOCIETY OF AUTOMATION
ISA Delhi Section



ISA(D) POWAT-INDIA 2012, New Delhi January 13th -14th, 2012

Subject: Changing the Market from Level to Volume

APM Automation Solutions LTD 3DLevelScanner™
Innovative 3D Technology
Providing accurate & continuous Volume measurement of material inside the tank/bin.



Presented by: **Motti Holler**
Director of Sales, Asia
Motti@APM-Solutions.com

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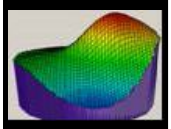
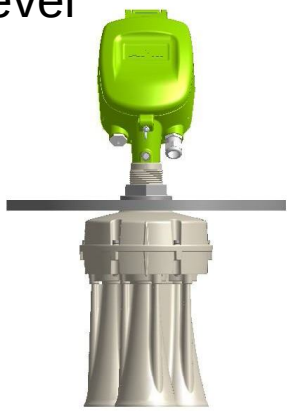
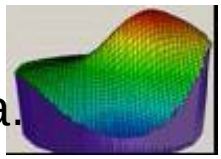


Overview

- What shall we see today?
  - A breakthrough Innovative 3D technology for accurate & continuous Volume & Level measurements of any material inside any type of bin
- Where is the innovation?
  - Can today's technologies deliver?
- The revolution of 3D technology
  - How does the innovative 3D works?
  - What value does this innovation bring?
  - Where can this technology be applied?
  - Where is this technology applied in India.





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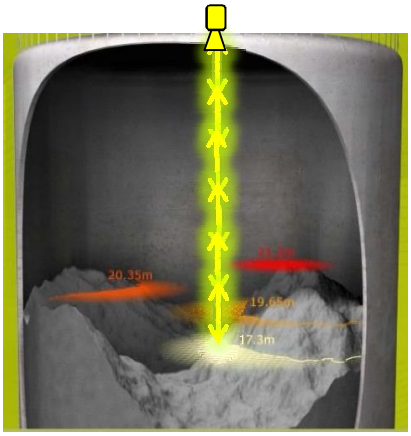
How does it work?

How do standard sensors (radar/ultrasonic/etc.) operate?

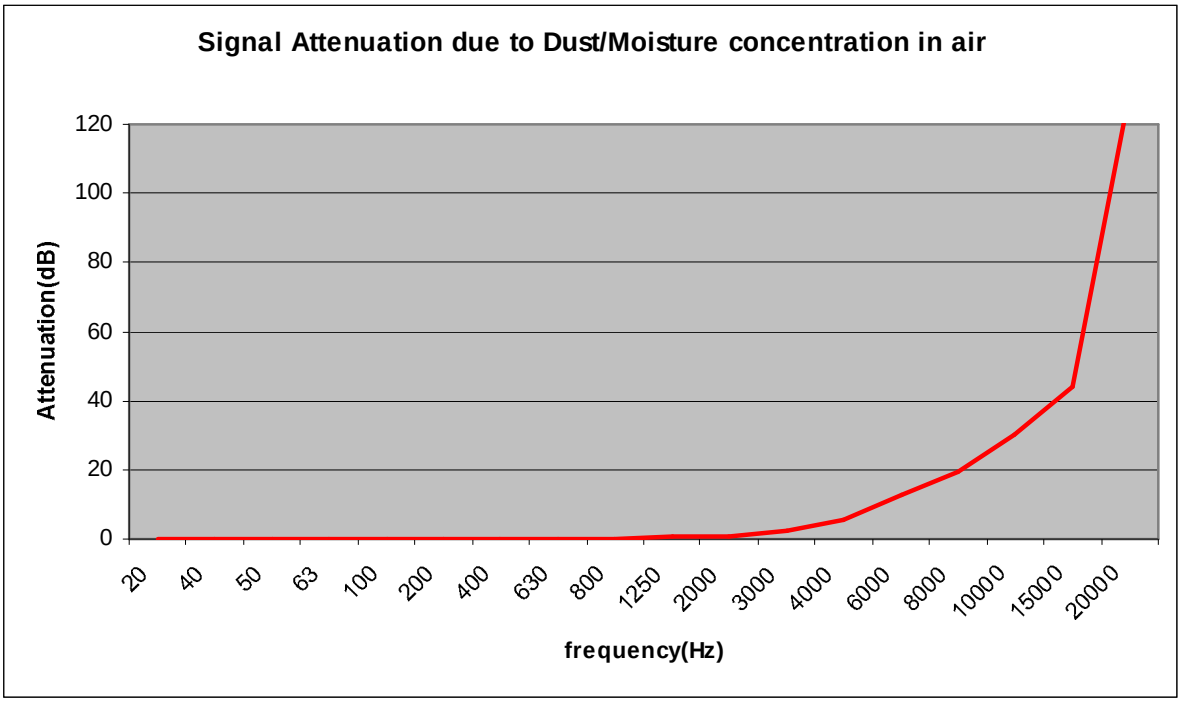


Time of flight technology

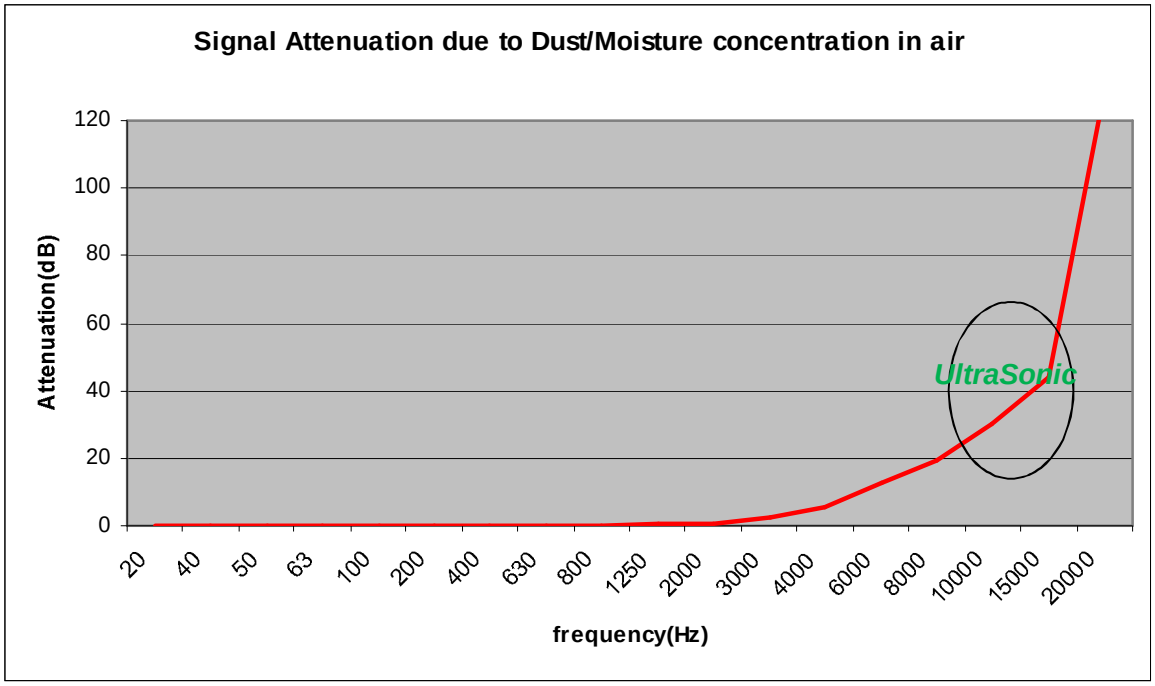
Challenges

- Dust Penetration
- Accuracy
- Volume Measurement

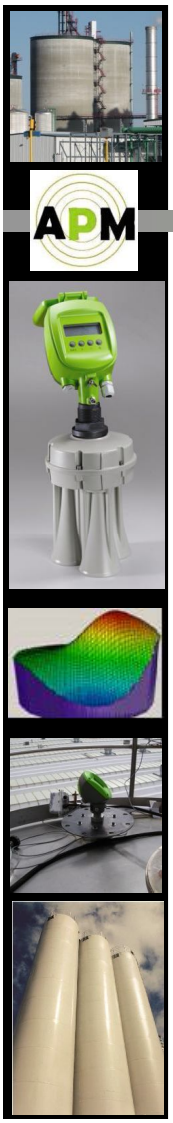
The effect of attenuation



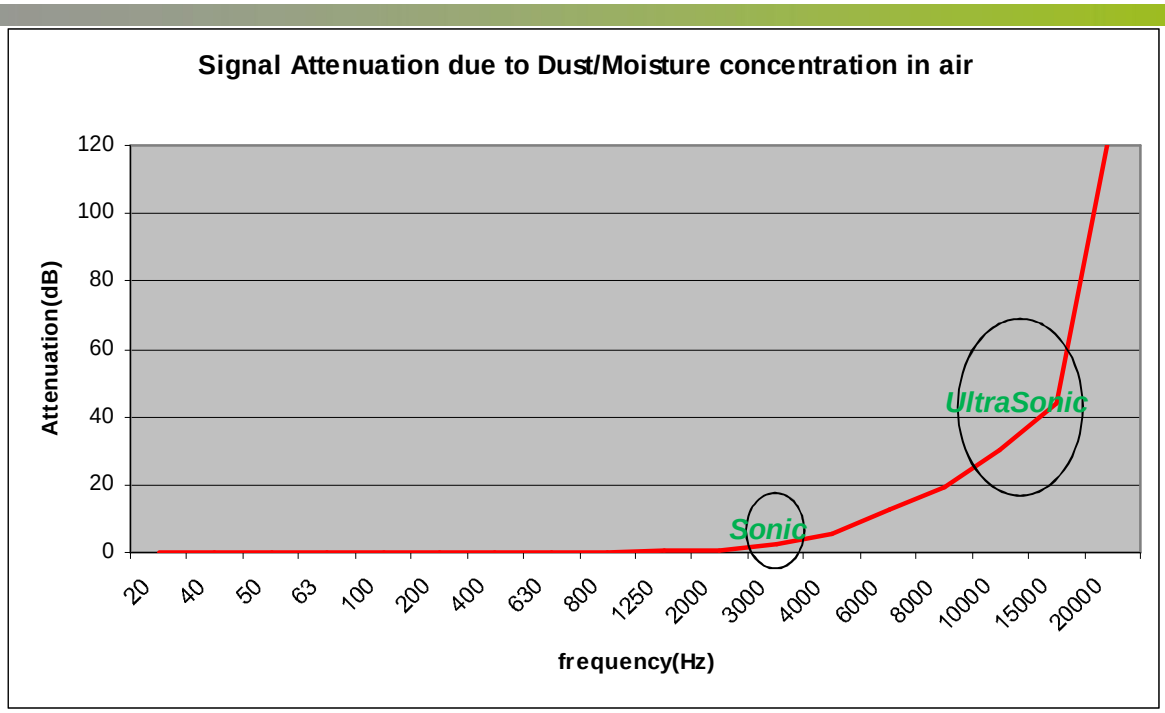
The effect of attenuation



3 db is 50% loss of signals energy



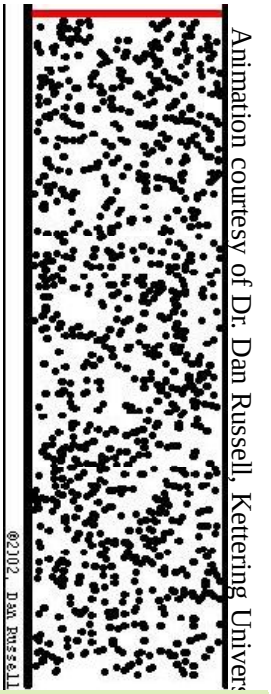
The effect of attenuation



At 3-4 KHz signal looses only 2-3 dB

The effect of Dust

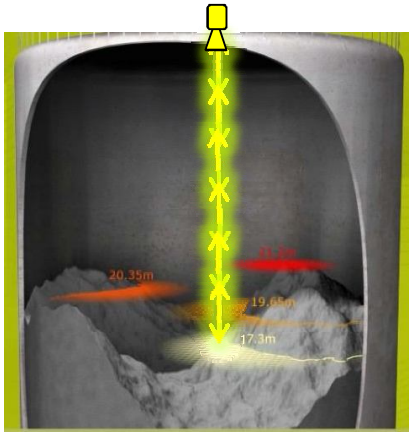
- Sound is a pressure wave
- Dust particles and humidity in the air attenuate the wave energy
- Attenuation grow sharply over 5KHz



Low freq. **=>** Effective dust penetration

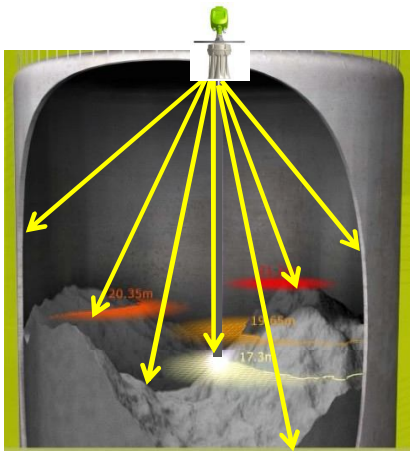
The effect of Frequency

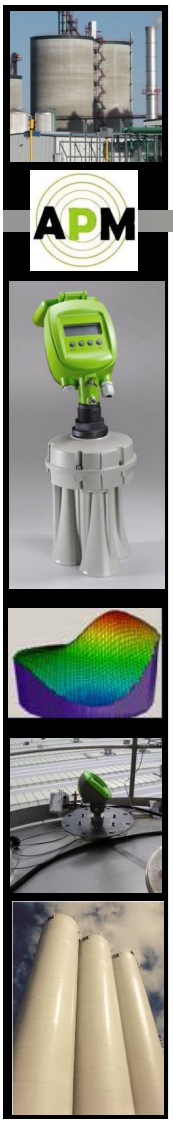
Beam Angle vs. Frequency



The effect of Frequency

The lower the Frequency
the wider the beam angle

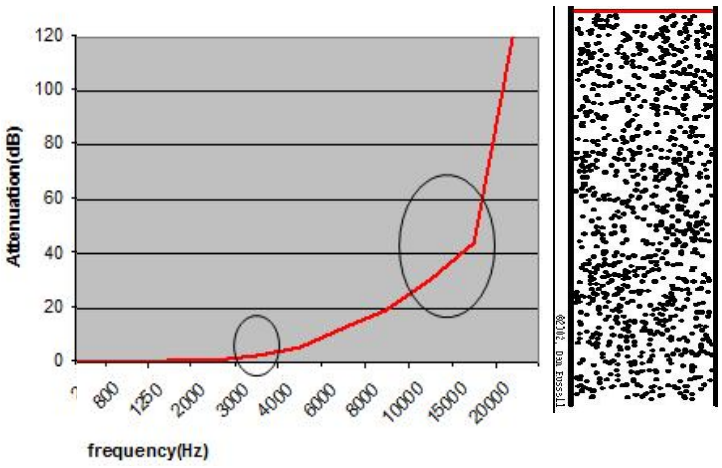


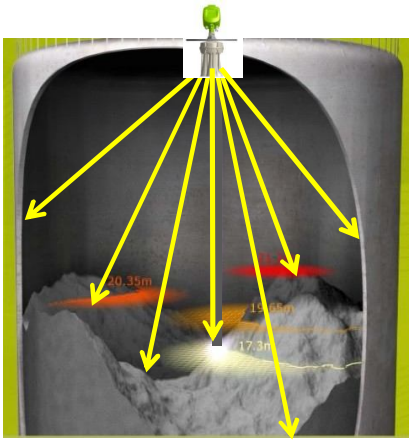


Technology advantages summary:

Low frequency has 3 major advantages:

1. Very low attenuation
2. Easy penetration through dust
3. Wide angle that covers the whole silo!



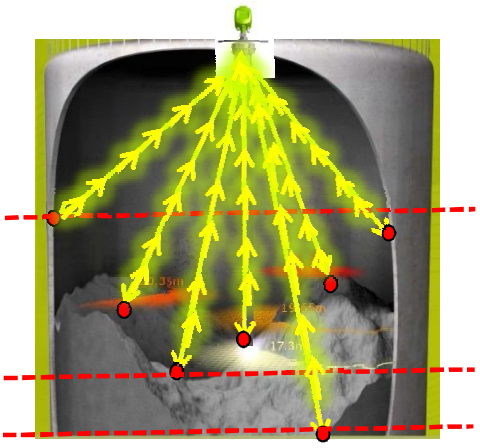


How does it work – Cont.

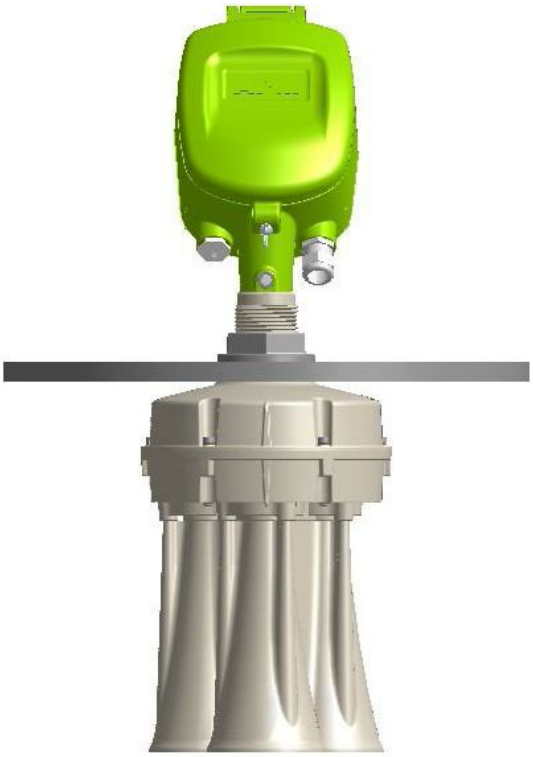
A Question:

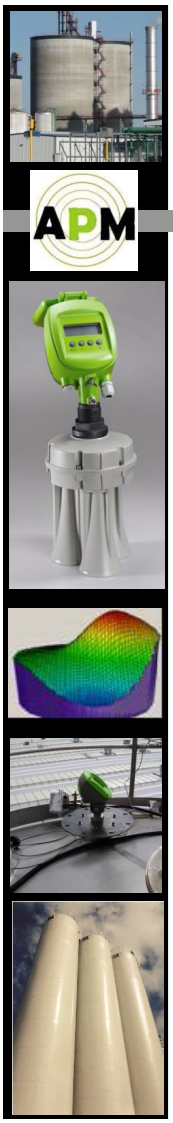
If working in low frequency is so great (dust penetration and wide angle), than why APM is the only company to use this technology?

What is the Technology Challenge?

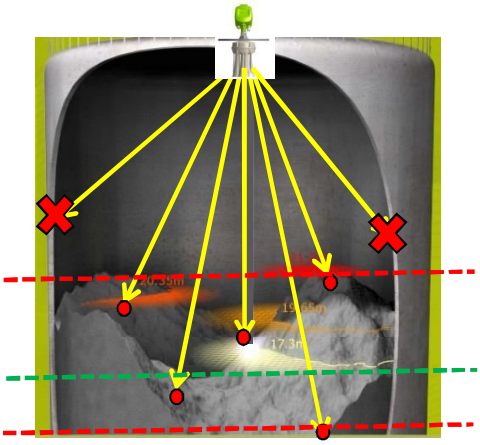


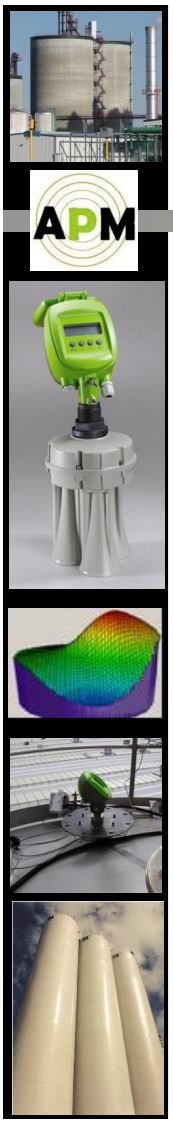
APM Innovative Patented solution



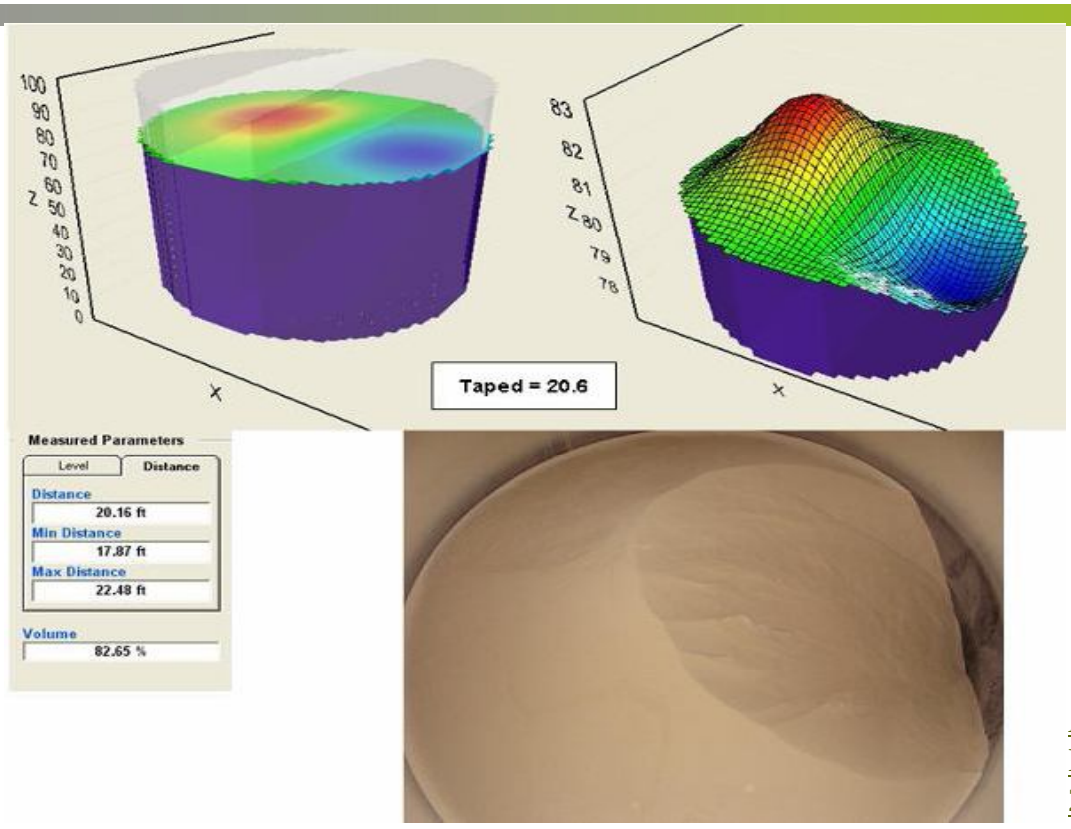


APM Innovative Patented solution



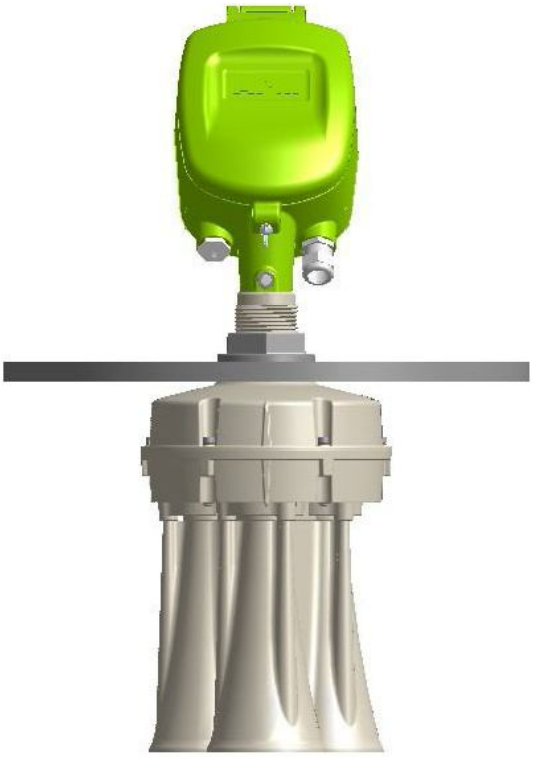


Profiling the Silo



APM Movie 2011.wmv

Special unique features



Self Cleaning

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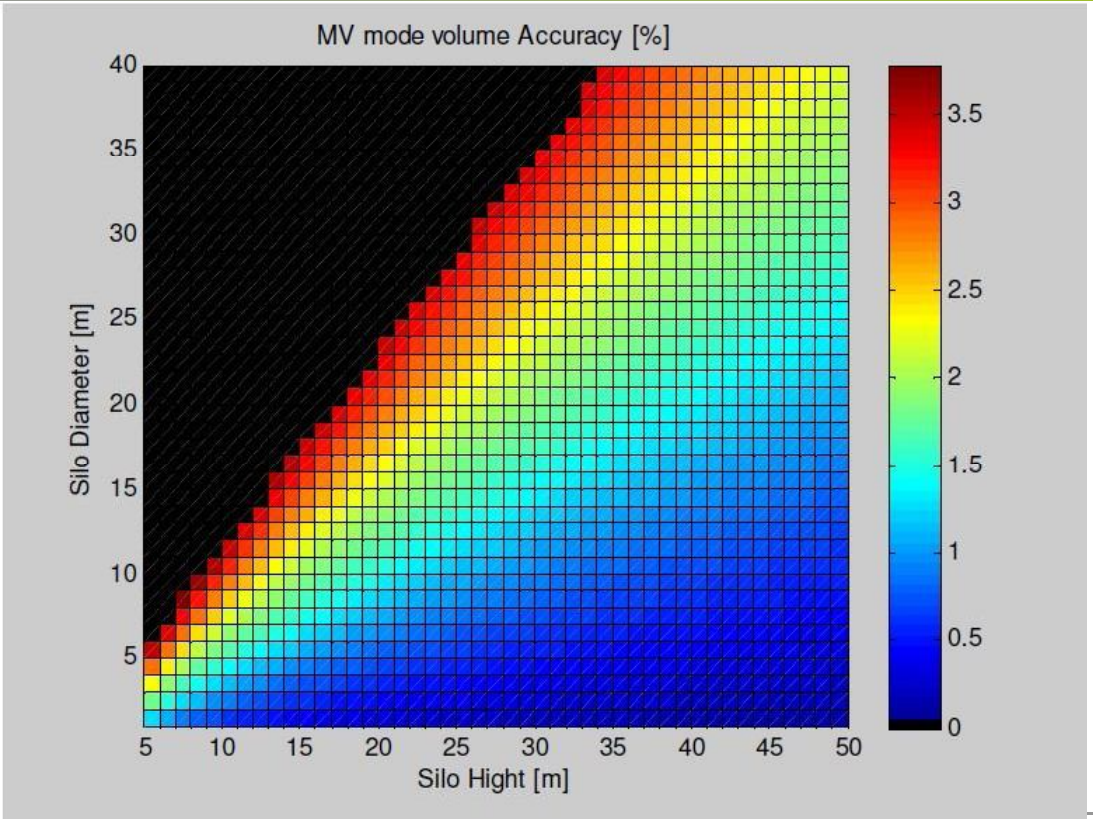
Accuracy



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USERS

Food & Beverages | Cement | **Steel** | Power Stations | Warehouse Open Piles

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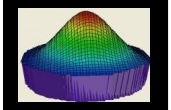

USERS

Delhi Section

Food & Beverages	Cement	Steel	Power Stations	Ware Houses

एनटीपीसी NTPC
A Maharatna Company

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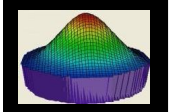
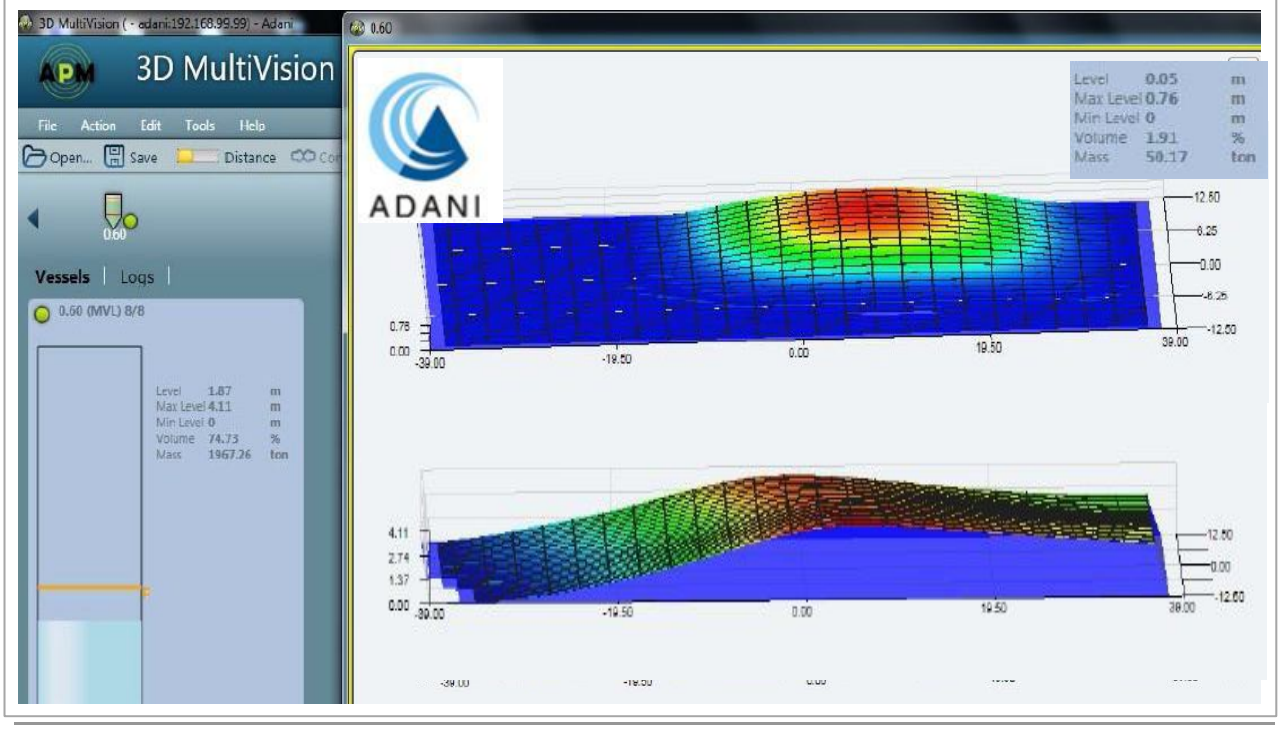


USERS

Food & Beverages | Cement | Steel | Power Stations | Ware house



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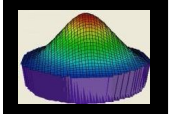
SELECTED USERS

ISA Delhi Section



3D technology usage in India (applied by APM partner EIP ENVIRO CONTROLS)

ISA Delhi Section

	Project/Customer	Application	Remarks
1)	**PSEB – Ropar TPS**	**Fly ash silo**	**Working since April 2009**
2)	**HPGCL – Yamuna Nagar**	**Fly ash silo**	**Working since August 2009**
3)	**HZL-CPP-Chanderia**	**Fly ash Silo**	**Working since December 2009**
4)	**HZL-CPP-Zawar**	**Fly ash silo**	**Working since June 2009**

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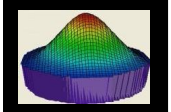

3D technology usage in India (applied by APM partner EIP ENVIRO CONTROLS)

ISA Delhi Section

	Project/Customer	Application	Remarks
5)	**Aditya Cement**	**Various sticky materials**	**Working since May 2009 (replaced the Radar)**
6)	**Madras Cement**	**Cement silo**	**Working since November 2009**
7)	**Glow Power-Thailand**	**Fly ash silo**	**Working since Oct0ber 2009**

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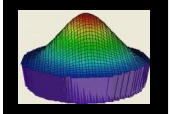

3D technology usage in India (applied by APM partner EIP ENVIRO CONTROLS)

ISA Delhi Section

	Project/Customer	Application	Remarks
8)	**Tata power**	**Coal Bunker**	**Replaced the Radar**
9)	**Penden Cement Bhutan**	**Cement Silo**	**Replaced the Radar**
10)	**Maducon Project**	**Coal bunker**	**Replaced the Radar**
11)	**Tata Steel**	**Iron Ore**	**Replaced the Radar**
12)	**And many more….**		

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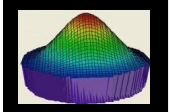

Applications

Delhi Section

Food & Beverages | Cement | Steel | **Power Stations** | Chemicals

Coal Silos

Fly Ash Silo

Lime Stone

ESP Hoppers

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ESP Market: Introduction

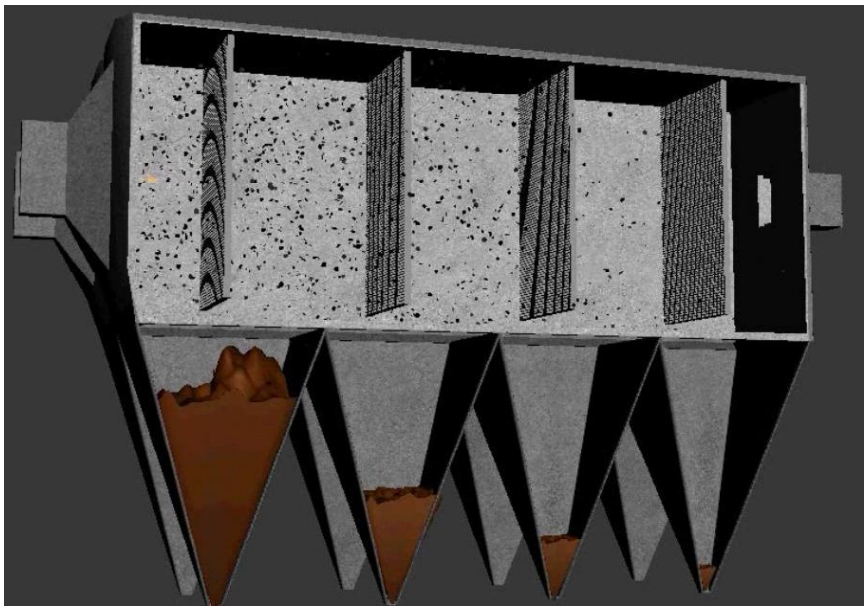
In Thermal Power Stations, ash (dust) particles are collected in the Economizer of the Boiler by gravity method.

However, a large portion of the Fly-ash (dust) particles can not be trapped in the Economizer.

It is collected in the ESP Hoppers

More attention due to the anticipation of upcoming strict U.S. Environmental Protection Agency (EPA) regulations.

Market - ESP Hoppers



Electrostatic Precipitators (ESP) having high peak voltage of 71 KV on the collecting plates to polarize the Fly-Ash (dust) Particles.

Fly-ash (dust) particles are collected in ESP Hoppers

Market Problem & Need

- Fly-Ash (dust) is collected in a number of hoppers below the ESPs. To prevent over-spilling of Fly-Ash (dust) from these hoppers, de-ashing is performed after a fixed time interval.

- De-Ashing process results in:
  - High power consumption (due to inefficiency: de-ashing operation takes place after the pre-fixed interval even though the hopper is not filled completely with Fly-ash).
  - A lot of wear & tear is caused due to moving parts of the de-ashing system.

“Houston, we have a problem…”

- Build-ups of the ash particles, inside the Hoppers, near the High Voltage Plates could cause a short-circuit between the collecting plate and the electrode (especially under Humid conditions),
destroying the plate arrangement and the electrical equipment.

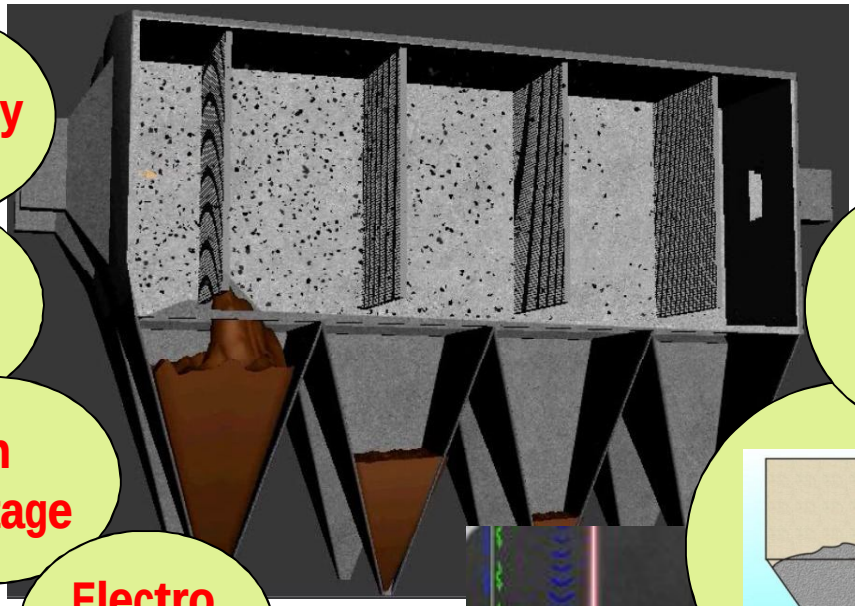
A technology challenge

Humidity

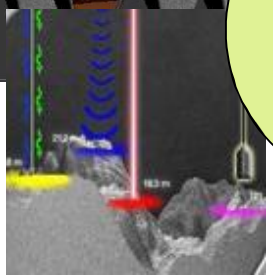
Dust

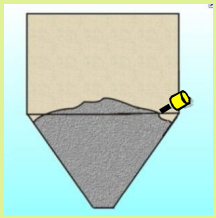
High Voltage

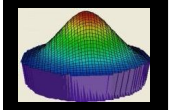
Electro Static



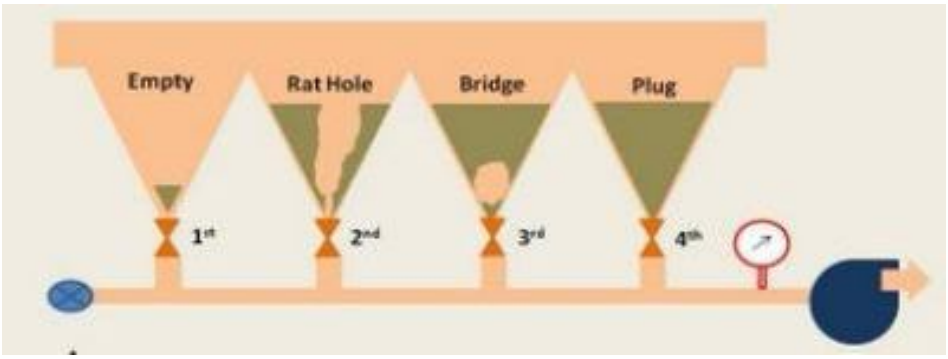
RF
Capacitance
Vibrating
Switches







How much Fly Ash is inside?



Source: Inside Power station

The need….

A reliable Automatic Level Detection System is needed to control the High and Low Level of Fly-ash in the ESP Hoppers.

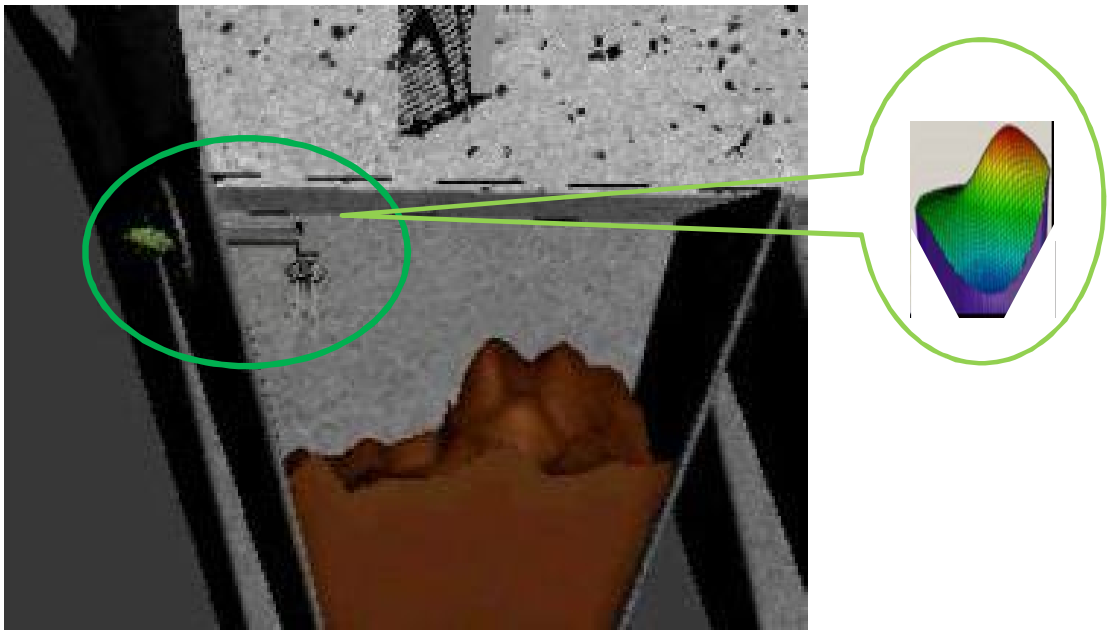
Emptying process should start **only** when the pre-set maximum level is reached.

How much Fly Ash is inside?

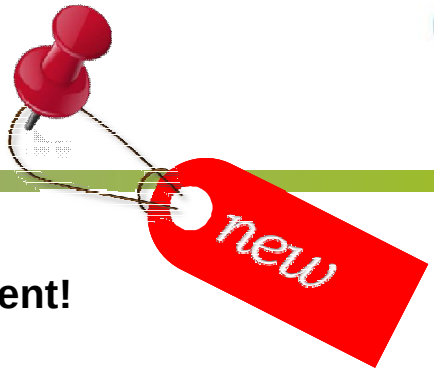
Level Control & Detection in Fly Ash Hoppers is a difficult problem in the industry!

ESP Hoppers monitoring is getting more and more attention due to the anticipation of upcoming strict U.S. Environmental Protection Agency (EPA) regulations.

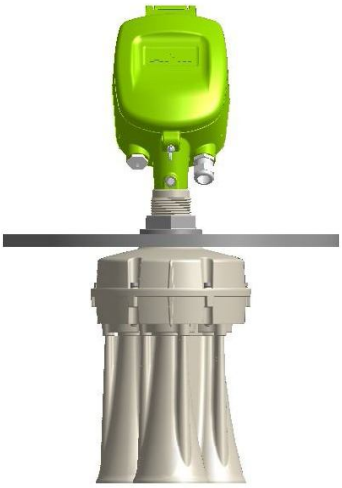
The Solution: 3D Visualization



The Solution



- **Continuous volume measurement!**
  - Better Monitoring
  - Emptying your hoppers on time
  - **Reduce the number of failures**.
    - Prevent **short circuiting of** the plates.
    - Less **pollution** due to less failures.
    - Less Maintenance expenditures on parts.
    - Less Maintenance expenditures due to shut down of plant / generation.
- **See build-ups as they occur!!**



Precise measurement means $$$

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3DLevel Vision
3D Level Vision
Auotomation Solutions LTD.
16
North
8
Center
14
South
Kellogg's
File
Action
View
Tools
Help
Overview
Alerts
Add
Edit
Remove
Options
Help
Sort By:
Group
Connected
Sugar
Vessel Name (1)
Sugar
Distance 3 [m]
Volume 100 [%]
Volume 625 [m^3]
Mass [lb]
Vessel Name (1)
Sugar
Distance 7 [m]
Volume 61 [%]
Volume 523 [m^3]
Mass [lb]
Glucose Syrup
Vessel Name (1)
Glucose Syrup
Distance 18 [m]
Volume 34 [%]
Volume 212 [m^3]
Mass [lb]
Vessel Name (2)
Glucose Syrup
Distance 4 [m]
Volume 90 [%]
Volume 543 [m^3]
Mass [lb]
Vessel Name (4)
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Distance 20 [m]
Volume 12 [%]
Volume 134 [m^3]
Mass [lb]
Flour
Vessel Name (3)
Flour
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Volume 625 [m^3]
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Mass [lb]
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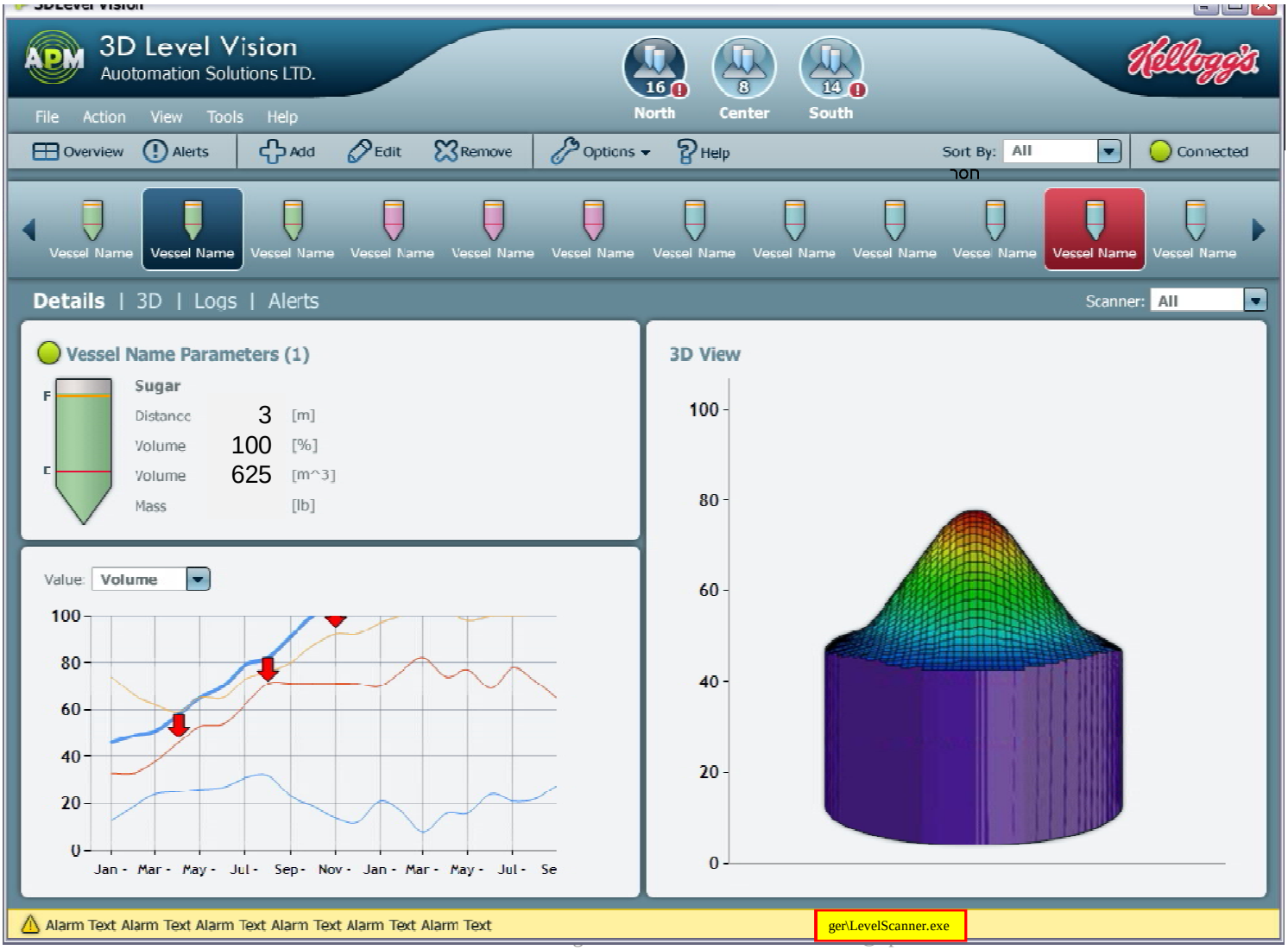
Volume 311 [m^3]
Mass [lb]


3D Level Vision
Auotomation Solutions LTD.
Kellogg's
16
North
8
Center
14
South
File
Action
View
Tools
Help
Overview
Alerts
Add
Edit
Remove
Options
Help
Sort By:
All
Connected
Vessel Name
Details | 3D | Logs | Alerts
Scanner:
All
Vessel Name Parameters (1)
Sugar
Distance 3 [m]
Volume 100 [%]
Volume 625 [m^3]
Mass [lb]
Value:
Volume
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Jan - Mar - May - Jul - Sep - Nov - Jan - Mar - May - Jul - Se
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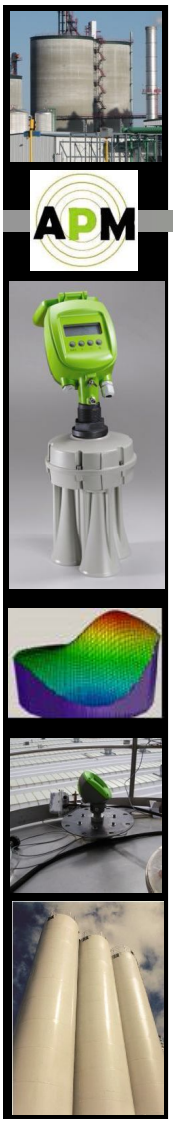
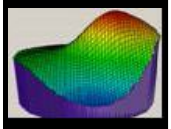


APM 3D Level Scanner Competitive Advantages

- The only volume measurement device for silos
- The only device that measure Average, minimum and maximum level
- Measuring any solid materials
  - Works with materials with low dielectric constant
- Operates in dusty and moisture conditions
- Early warning on adhesion of materials to the walls of the silos
- Measures any type of containers:
  - large open bins
  - Bulk solid storage rooms
  - Warehouses



Competitive Advantages – Cont.

- Remote cellular monitoring and service
- Inventory means $$$
  - Control material usage and utilization
  - Ensure timely delivery of finished goods
- Self Cleaning
- 3D Mapping visualization tool to help decide where to fill (in multiple filling points silos).
- Measuring range of up to 70 meters
- Very small dead Band (25 cm from antenna tip)

Thank You!

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Hazardous Area Classification and methods of preventing fire and explosion hazards in Gas & Coal based Thermal Power Plants

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OVERVIEW

- Introduction
- Basics of Fire & Explosion Hazard
- Various methods of classification
- Various methods of protections
- Scope of Implementation in Power Plant
- Implementation by Lanco

Introduction

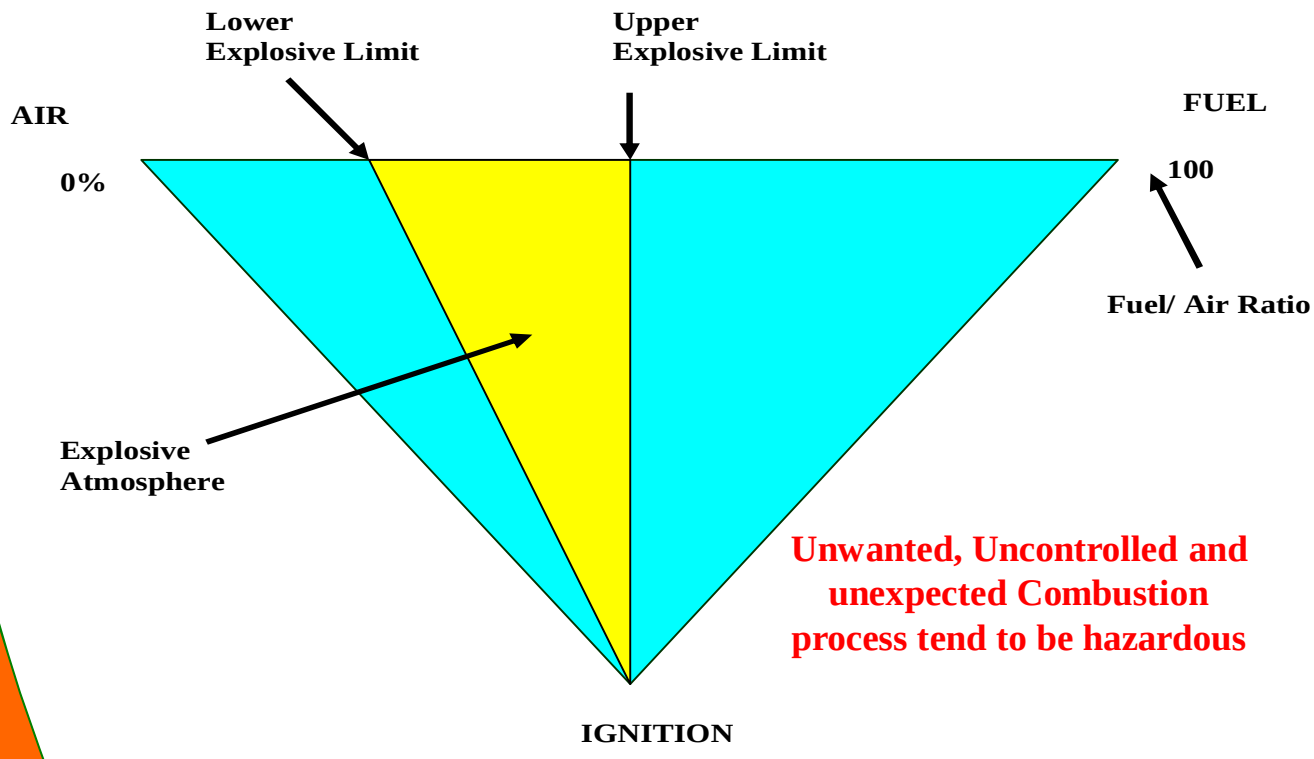
- **Coal and gas based power plants use flammable solids, liquids and gases that pose fire or explosion hazards.**

- **Define their locations and potential sources of leaks, and determine the extent of the Hazardous Area associated with each leak source.**

- **Each Hazardous Area should be classified according to applicable industry codes and standards.**

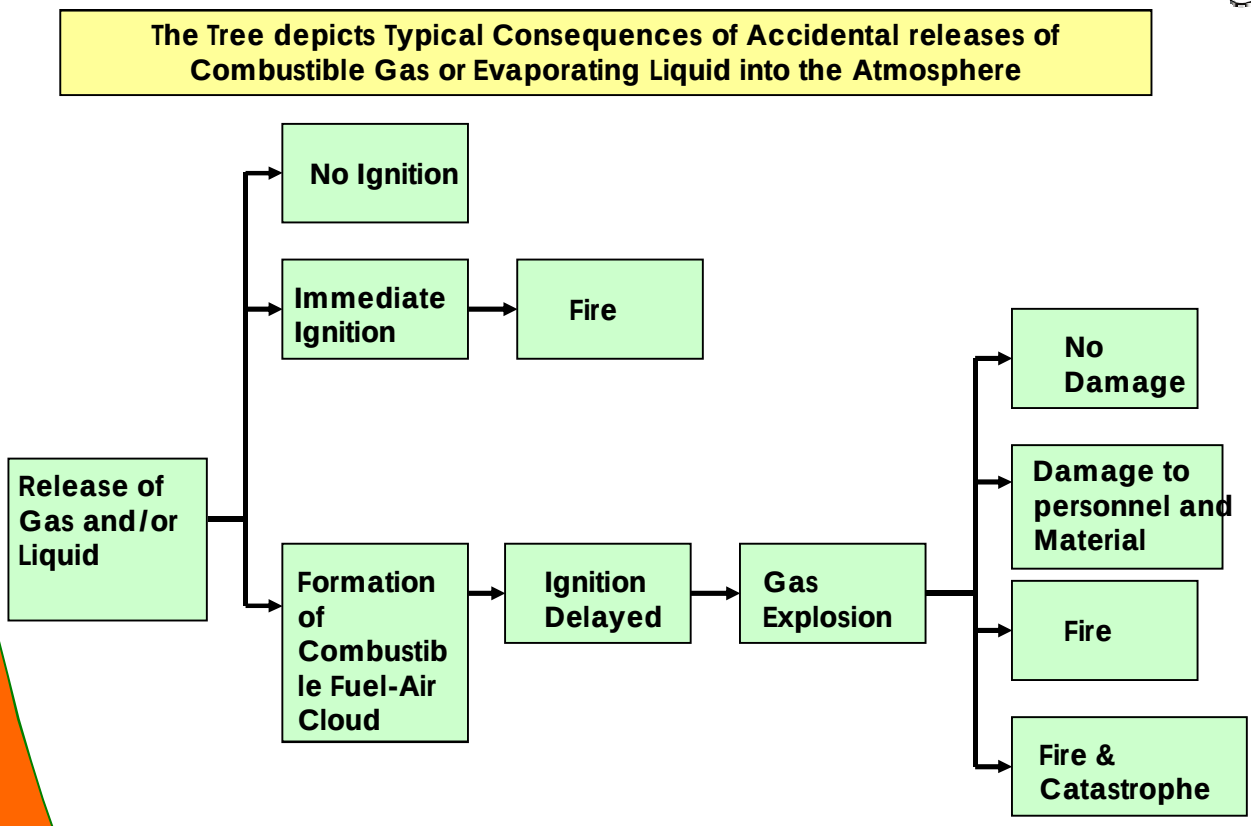
- **Suitable electrical equipment, wiring devices, and wiring methods shall be used**

Basics – Fire/Explosion Triangle



Unwanted, Uncontrolled and unexpected Combustion process tend to be hazardous

Basics – Explosion Tree



Methods of Classification

- **Electrical Area Classification is the process of determining the existence and extent of Hazardous (Classified) Locations in a facility**

- **Areas are classified in accordance with material type, material properties, and on the likelihood that a flammable substances is present.**

- **Guidance on assessing this classification of the hazard is given in the NFPA 497 Standard, or NEC Article 500, NEC Article 505, and IEC 79-10. For hazardous dusts, the guiding standard is IEC 61421.10**

Methods of Classification – Solid – North American

North American: North America has subdivided Combustible Dust (Class II) and Ignitable Fibres and Flyings (Class III) into two Divisions. Combustible Dust (Class II) is further sub-categorized based on material type and presence of suspension

Based on Material Type

Material	Category
Metal Dust	Class II, Group E
Coal Dust	Class II, Group F
Grain and Plastic Dust	Class II, Group G
Fibres and Flyings	Class III

Based on presence of suspension

Conditions	Classification
Dust or Fibres and Flyings in Suspension	Division 1
Metal Dust in Suspension or Settled on Surfaces	Division 1
Other Dusts or Fibres and Flyings Settled on Horizontal Surfaces	Division 2

Methods of Classification – Solid –European

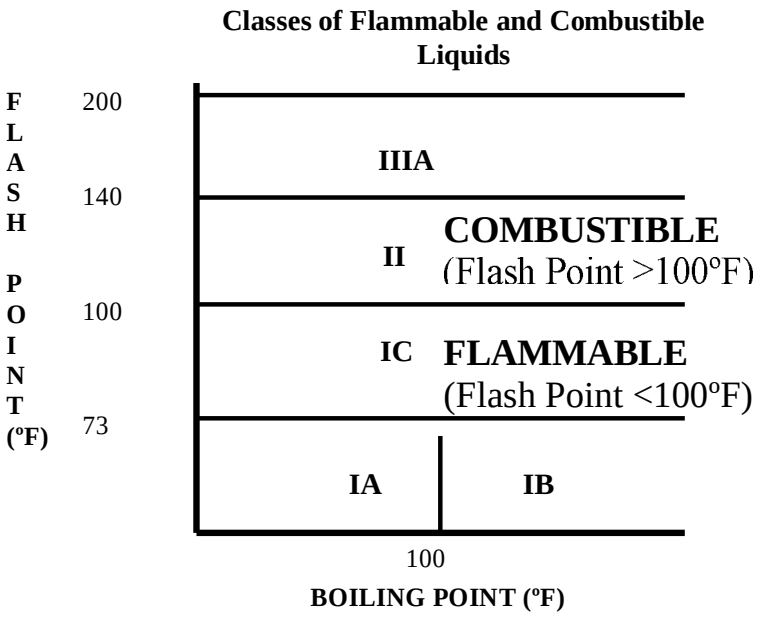
Europe uses the Zone system and have created three Zones

- **Zone 20: Areas in which a dust cloud is almost always present, such as the inside of hoppers, silos, cyclones, filters, dust transport systems, blenders, mills, dryers, and bagging equipment.**

- **Zone21: An area not classified as Zone 20 in which combustible dust, as a cloud, is likely to occur during normal operation, in sufficient quantities to be capable of producing an explosive concentration of combustible dust in mixture with air**

- **Zone 22: An area not classified as Zone 21 in which combustible dust, as a cloud, can occur infrequently, and persist only for short period, or in which accumulations or layers of combustible dust can give rise to an explosive concentration of combustible dust in mixture with air.**

Methods of Classification - Liquid



- Two primary hazards associated with flammable and combustible liquids are explosion and fire.
- Standards addresses primary concerns of design and construction, ventilation, ignition sources and storage

Low Flash High Hazards

Combustible Liquid: Any liquid having a flash point at or above 100°F (37.8°C.)

Flammable Liquid: Any liquid having a flash point below 100°F (37.8°C)

Methods of Classification – Gas - Likelihood

Based on likelihood of presence of the Hazardous gas – Division and Zone concept

Division Classification (North American)	IEC Zone Classification
Class I, Division 1: Where ignitable concentrations can exist under normal operating conditions; may exist frequently because of repair, maintenance or leakage; or may exist due to breakdown of equipment in conjunction with an electrical failure.	**Class I, Zone 0:** Where ignitable concentrations are present continuously or for long periods of time. **Class I, Zone 1:** Where ignitable concentrations are likely to exist under normal operations; may exist frequently because of repair, maintenance or leakage; may exists due to breakdown of equipment in conjunction with an electrical failure; or adjacent to Class I, Zone 0 locations.
Class I, Division 2: Where volatile flammable liquids are stored, etc. in closed containers; where ignitable concentrations are normally prevented by positive pressure ventilation; or adjacent to Class I, Division 1 locations.	**Class I, Zone 2:** Where ignitable concentrations are not likely to exist in normal operation or may exist for a short time only; where volatile flammable liquids are stored, etc. in closed containers; where ignitable concentrations are normally prevented by positive pressure ventilation; or adjacent to Class I, Zone 1 locations.

Methods of Classification – Gas - Type

Some of the factors separating the various gases or vapours

•MESG(minimum experimental spark gap)

•MIC(Minimum ignition current)

•MIE (minimum ignition energy)

Gas	CEC/NEC Code	IEC Code
Acetylene	Group A	Group IIC
Hydrogen	Group B	Group IIB + H2
Ethylene	Group C	Group IIB
Propane	Group D	Group IIA
Coal Mines	Gaseous Mines	Group I

AIT (Auto Ignition Temperature): Because these temperatures did not correlate to the Gas Groups, Separate Temperature Codes were established. A Tabular representation of both the standards are reflected in "Table F: Temperature codes used by IEC and North American Code" of the paper.