PRAGMATECH WASTE SOLUTIONS

Waste Consulting
Remote Monitoring | Asset Management

PM Expo, Toronto
Nov 30th, 2016
GTAA Waste & Recycling Updates

DNA OF **PANDORA**

PragmaTech waste solutions

- **FROM "DUMB & DUMBER" WASTE EQUIPMENT**

TO "INTELLIGENT" WASTE EQUIPMENT

Albert Einstein
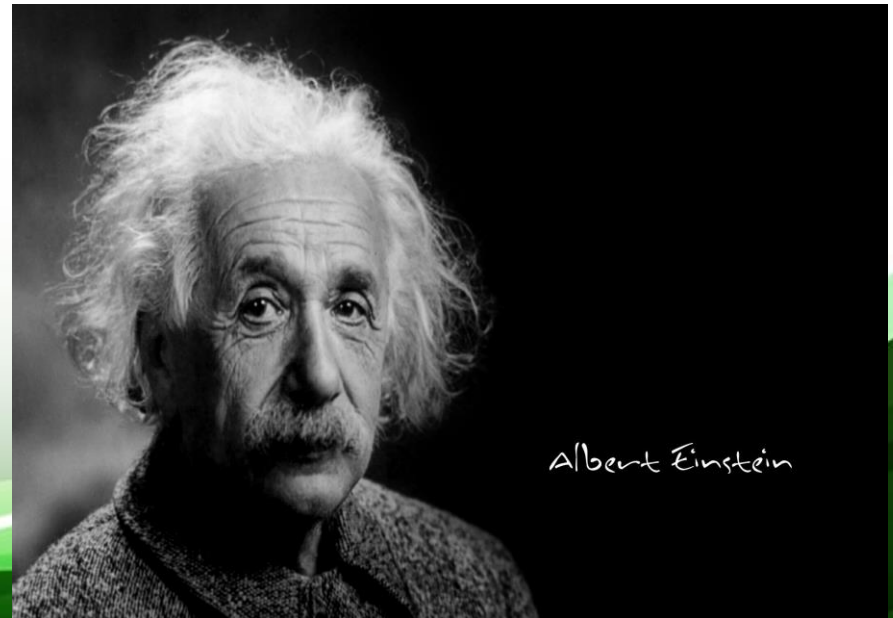
PRAGMATECH OFFERINGS TO CLIENTS

PragmaTech Waste Consulting Services
- Waste Audits
- Recycling Programs
- Certification Programs
- Waste Collection Assessments
- Signage

Leveraging The Pandora Platform
Fullness Monitoring of Compactors and Containers
Remote Equipment Diagnostics
Preventative Maintenance
Asset Management
Use Big Data Analysis for Data Mining

PRAGMATECH WASTE SOLUTIONS SERVICES

Waste Audits (unbiased, third party fine-sort analysis)

Energy Audits, C & D Audits

Data Mining Software –Pandora Remote Monitoring System

Green Room/Disposal **Room Design**

Development of Waste Management **Polices**

Creation of **Disposal Best Practices**

Depot Collection and Diversion **Training**

Waste Management **Signage Development**

Building Certifications

Development and Management of **RFP Processes**

Waste Management **Consulting**

Equipment Recommendations

Management of **Haulage/Recycling Programs**

THE PANDORA "TRIFECTA"

FULLNESS MONITORING

PREVENTATIVE MAINTENANCE

ASSET MANAGEMENT

PRAGMATECH IS POWERED BY PANDORA

Pandora RMS (Remote Monitoring System) sends data to Pandora Server via Custom Secure Wireless VPNs

Data collected by Pandora is always available to customers and service providers via web portals or APIs and can be customized for general or specific requirements.

Pandora Platform

Based on Pre-set Rules, Pandora sends out or publishes to web portals Notifications and Alarms

Notifications and Alarms are sent as Emails or SMS messages to Property Managers, Maintenance & Services Personnel and/or Haulers, but can be also accessed via web portals with PCs, Tablets & Smart Phones

Smartphone   Tablet   Laptop 1   Laptop 2

![PragmaTech waste solutions]
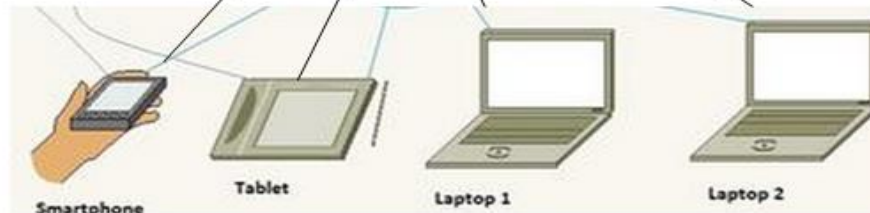
STARTING WITH THE "LOW HANGING" FRUIT... EXPECT 30% - 50% SAVINGS ON HAULAGE COSTS

View. Learn. Save.

How does Pandora save you money?

Repairs & Replacements	Pick-ups	Network management
• Schedule repairs before breakdowns occur. • Identify and correct misuse. • Keep machines at peak efficiency. • Reduce service and replacement costs.	• Set threshold for pick-ups. • Monitor compactor fullness. • Automatically notify hauler. • Pay only for necessary pick-ups.	• View historic trends. • Rectify areas of inefficiency. • Optimize compactor and network performance.

"LIGHT UP" YOUR EQUIPMENT

A Pandora box gets hooked up to the power pack of your equipment....PLC + Modem in a box

Pandora's Key Parameters

| DAYS BETWEEN | PSI READING | % FULL | WEIGHT | # OF RAM CYCLES |

FULLNESS MONITORING IMPACT

Sample Customer – Pre and Post Pandora
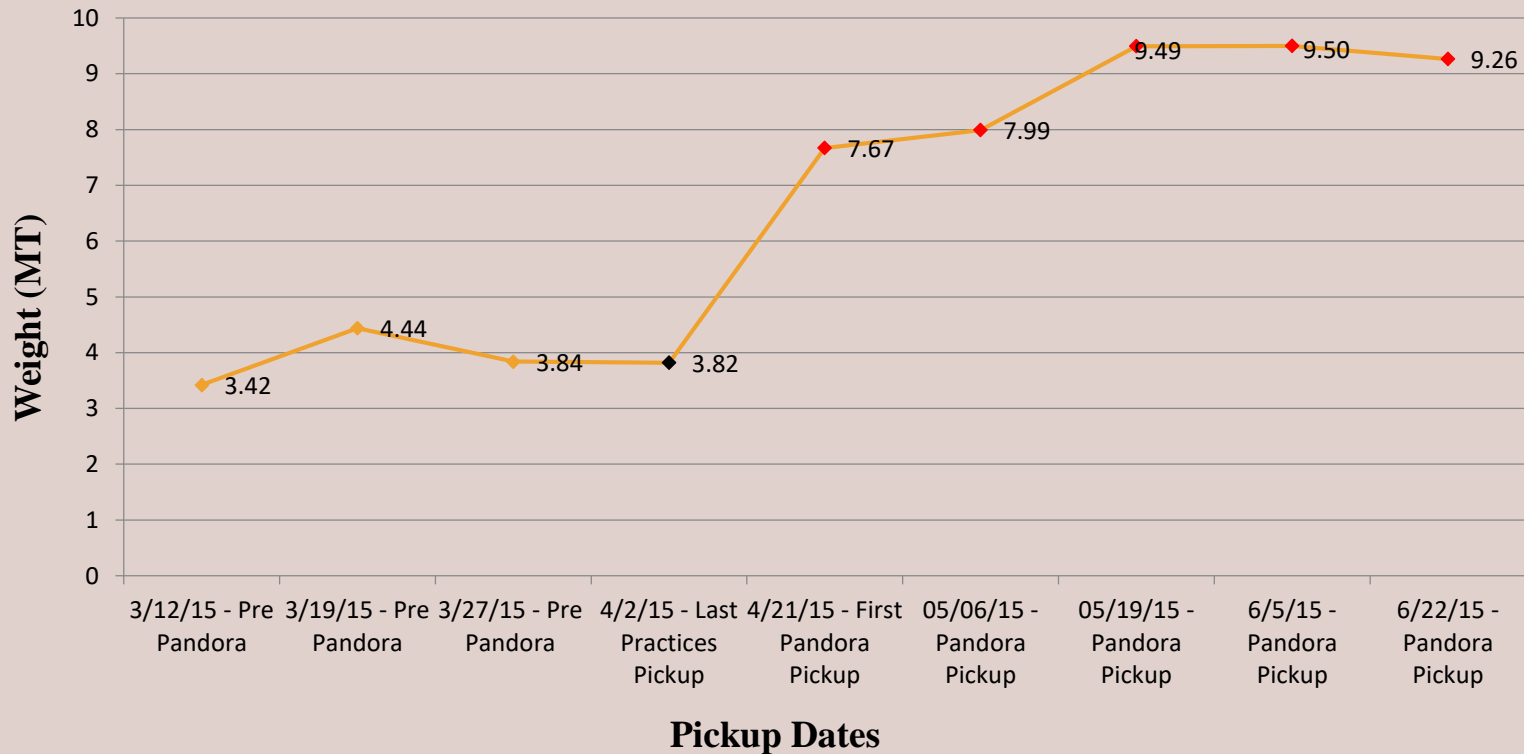
ALERTS - BLOCKED PHOTO EYE

• The Photo-Eye sensor triggers a compactor to activate & run continuously

• PANDORA can indicate when the compactor "Photo-Eye" is blocked, sending an alert to staff

• It measures normal run time and recognizes when the run time exceeds what is acceptable – could save you $$ on energy consumption + avoidable wear & tear!

•Unnecessary runtime use will prematurely wear out a compactor

•Recycling Sorter Systems – Recycle – Organic bin fullness alerts

•Tracking Data for bins assists with your diversion goals!

REDUCED ENERGY USE & WEAR

PICK UP DATE	DAYS BETWEEN PICKUP	PSI	PERCENTAGE FULL	# OF CYCLES	OPERATING TIME (MIN)
9/14/2016 9:26	7	957	87%	881	443
9/7/2016 9:20	6	741	67%	6160	2882
8/31/2016 9:24	6	771	70%	1091	552
8/24/2016 9:25	6	915	83%	7526	3537
8/17/2016 9:27	7	711	65%	3144	1522

BENEFITS OF DATA MINING

Data mining and optimization leads to the ability to:

1. Identify compactor inefficiencies for example:
   - Improper bin sizing
   - Compactor operation time variance from specification

2. Indicate problems with site operating procedures such as:
   - Excessive cycling
   - Undesired waste composition

Optimization Success Rate

	Manufacturer A	Manufacturer B	Manufacturer C	Manufacturer D
Optimized Success Rate	45%	81%	75%	75%
Investigation Rate	56%	19%	26%	25%

Average Cycles per Pickup

Manufacturer A	Manufacturer B	Manufacturer C	Manufacturer D
661	208	454	437
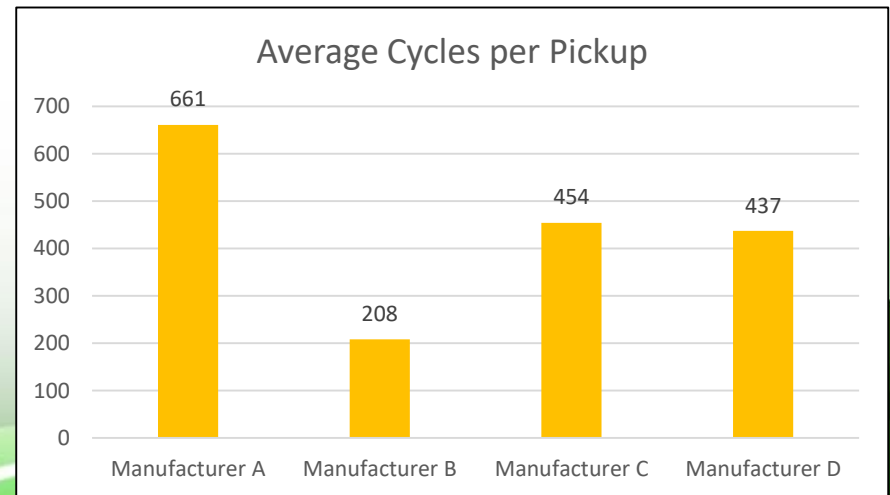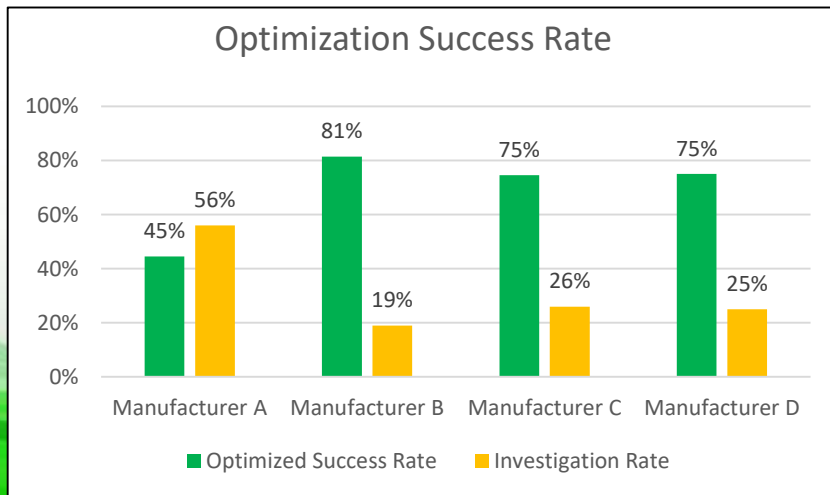
BASIC PANDORA RMS DIAGNOSTIC FEATURES

- Last PSI Read
- Daily PSI
- Spike in Pressure
- Pressure Not Reading
- Pressure Not Changing
- Hoses Not Connected
- Pick-up
- Bin Installed

- Operation Time
- Motor Running 10 Min
- Forward Timer
- Reverse Timer
- Reverse > Forward
- Reverse Pressure
- Power Failure

ADVANCED PANDORA RMS DIAGNOSTIC FEATURES

- Emergency Stop Push/Release
- Low Oil Level
- High Oil Temp
- Overload Tripped
- Chute Blocked
- High Level Photo
- Gate Counter / Open / Access Door Open

- Diverter Fault
- Chute System Disabled
- Hauler Over-ride On/ Off
- Auto Shutdown is On
- Shut Off Power Supply
- Manual / Auto

MULTIPLE WASTE STREAMS

PragmaTech waste solutions

The Pandora RMS is able to track all waste streams. On-site staff are then able to send pickup requests to haulers by logging into the Pandora portal remotely or directly from the bin by pushing a designated button on the Pandora RMS. Pickup requests are then sent directly to the hauler, processing facility or service provider with a unique PO/Ref number for traceability.

Compacted Waste

Organics

Rear Load Service

Recycling Waste

Electronics

Hazardous Waste Containment

Pandora can also be used as a live waste auditing tool. Data can be collected from all waste/recycling streams in one easy portal that can be organized to your specifications within Pandora or exported to Excel for analysis.

PANDORA INTELLIGENT NETWORKS®
Unique Benefits

- **Complete customization** to suit specific customer needs

- **Pick-up requests** are sent directly to service providers

- **Eliminates** unnecessary service calls

- Provides online equipment **diagnostics**

- **Recommends** preventative maintenance based on number of cycles vs. number of months → Extended warranties available

- **Ability to track** multiple waste streams

PANDORA INTELLIGENT NETWORKS®
Unique Benefits

- Identify invoice inaccuracies, **saving many hours** of administrative work

- Coast to coast **secure wireless infrastructure** throughout North America

- Provides better **transparency** at the site and from hauling operations

- Haulers can **access collected data** to their advantage

- **Maximizes** equipment efficiencies/fullness

- **Reduces** overall carbon footprint and GHG emissions

- **Verifies** from startup, that equipment operates in accordance with manufacturer's specs

- Repository of broad data collection for **future data mining, key performance metrics, carbon credit calculations**, etc..

CONCLUSIONS

- PragmaTech's mission is to bring transparency, accountability, efficiency, and the best solutions practices to its customers around waste management.

- PragmaTech is powered by Pandora Intelligent Networks [®]
  - Because the Pandora platform was built from the ground up, it allows for a unique blend of flexibility, robustness and customization capability to meet any customer's needs

- PragmaTech is hyper-focused on using today's technology to transform "dumb" waste equipment into intelligent waste equipment
  - Collecting and analyzing data to help clients make intelligent choices around waste

- Real Data → Real Insight → Real Accountability → Real Change

- "Experts in Managing Waste Equipment"

HOW ARE YOU PREPARING FOR BILL 151?

Bill 151 is coming! → *Information is key to moving forward!*

- Understand how to improve Waste Diversion *(reduce garbage)*

- Effectively managing various "Streams of Waste" *(add new ones)*

- Primary 3 streams: Garbage; Recycle & *Organics (by 2017-18?)*

- Phased Materials Implementation: *Hazardous: Lights etc.*

ACTION PLAN

Establish a baseline! → *measure data & track all 3 Key Streams!*

- **PANDORA** is ideally designed to collect & track this DATA!

"GARBAGE IN, GARBAGE OUT"

Almost half of Toronto residents live in apartments, condos, and co-ops, but they recycle and compost only 27% of their waste compared to 65% of waste in single-family homes

VS

The City of Toronto's goal of 70% diversion from landfill

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