

**Vinyl Sustainability Council
Recycling Summit
July 26, 2021**

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7/21/2021

Smart Manufacturing

Resource Recycling/Re-Manufacturing

in

PLASTICS MANUFACTURING

For

**Profitability , Competitiveness &
Sustainability**

**Presentation
by**

Dr. Hebab A Quazi, PE

- ▶ **Director – Smart Manufacturing -
MARTECH International Inc.**
- ▶ **Director – Emerging Technologies -
AngelNet EWE Systems Corp.**
- ▶ **Editor – Smart Manufacturing –
“Transformational Technologies for
Competitiveness & Sustainability”**

Professional Society Experiences

Dr. Hebab A Quazi, PE

- ▶ ASME (Life Member)
 - ▶ Vice Chair – Energy Storage Committee;
- ▶ Environmental Systems Division (Executive Committee)
 - ▶ AIChE (Fellow)
- ▶ Advanced Manufacturing & Processing Society (Member);
Climate Solutions Community: Sustainable Engineering Forum
 - ▶ ISA (Senior Life Member)
 - ▶ Smart Manufacturing & IIOT Division Member;
 - ▶ Vice-Chair - Digital Twin & Simulation Committee

Integrating Transformational Technologies

In

Plastics Industries

Also, will be Sharing Lessons Learned from

- (1) International Program (16 Existing Plants):
Plastics/Petrochemicals Plants
(Process /Operational Rationalization)**
- (2) US Program (Existing Plant) : 2-Year Resource
Recovery, \$5 Million Program**
- (3) US Program (New Plant): Hydrogen Plant,
\$60+ Million, 35% Capital Costs Savings**

Experiences with Other Industries

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- Oil Refinery
- *Chemicals Manufacturing*
- Petrochemicals Manufacturing

- Safety-Glass Manufacturing
 - *Pulp & Paper Mills*
- Gas Processing

Transformational Technologies

Adoption and Integration

Requires

Technology Readiness Assessment

Prototyping and Testing, if needed

Sustainability Planning

Risks Assessment / Mitigation

Manufacturing Modifications

Program Financing

Marketing / Customer Acceptance

MARTECH - TEAM

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University of Massachusetts-Lowell

(Department of Plastics Engineering)

Process Development

University of Kentucky

(Department of Chemical & Materials Engineering)

Optimization Models for Recycling

The Vinyl Institute

Industry Coordination (as Required)

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Transformational Technology Implementation,
Manpower Development & Project Economics

“Transformational Technologies”

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Advanced Sensing

Modeling & Advanced Analytics

Process Control & Optimization

Also Adopting

Digitization & Artificial Intelligence

Machine Learning & Digital Twins

Internet of Things/Cyber Security

Energy Productivity & Conservation

Manufacturing Process

- ▶ **Improving Reliability, Operability, Competitiveness & Profitability**
- ▶ **Eliminating Interruptions and Wastes**
- ▶ **Adopting Agile Methodologies and Techniques**

Objectives

Product Design

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- ▶ **Maximizing Digitizing Real-Time Data**
- ▶ **Analyzing and Optimizing for Competitiveness & Sustainability**
- ▶ **Obtaining Top Operational Performance and Maintaining Market Leadership**

Objectives

Technology Platforms

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- ▶ **Adopting Smart Manufacturing Technologies**
- ▶ **Focusing on Continuous Improvement Process**
- ▶ **Building Agile Systems**

Competitiveness & Sustainability

Challenges

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Competitiveness

- ▶ **Market Leadership (US / International)**
- ▶ **Financial Stability & Profitability (Short-term / Long Term)**
- ▶ **Product Quality and Pricing**
- ▶ **Technological Leadership**
- ▶ **Human Resources (Multi-Discipline Team)**

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Competitiveness & Sustainability

Challenges

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Sustainability

- ▶ **Regulatory :** Including Environmental Regulatory Compliance
- ▶ **Leadership:** Technology / Market / Financial
- ▶ **Safety:** Personnel / Plant / Process
- ▶ **Security:** Facility / Process
(Vulnerability Detection & Mitigation)

Actions

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Identify Target Plant for Application

Focus on Targeting Competitive Advantages

Screen for Risk Aversion

Select Pilot Plant for Construction, if required

Operate for Design Conformance

Analyze Data / Prepare Compliance Reports

Demonstrate in Commercial Plant

SUMMARY

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Transformational Technologies Development, Testing and Commercialization

Requires

Well Defined Road Map for End-to-End Solution

Demanding Competitive Advantages

Appropriate Industrial Partner(s)

Realistic, Flexible Strategic Plan

On-Time Financial Support

Modifiable Action Plan

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THANK YOU
&
Q&A

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