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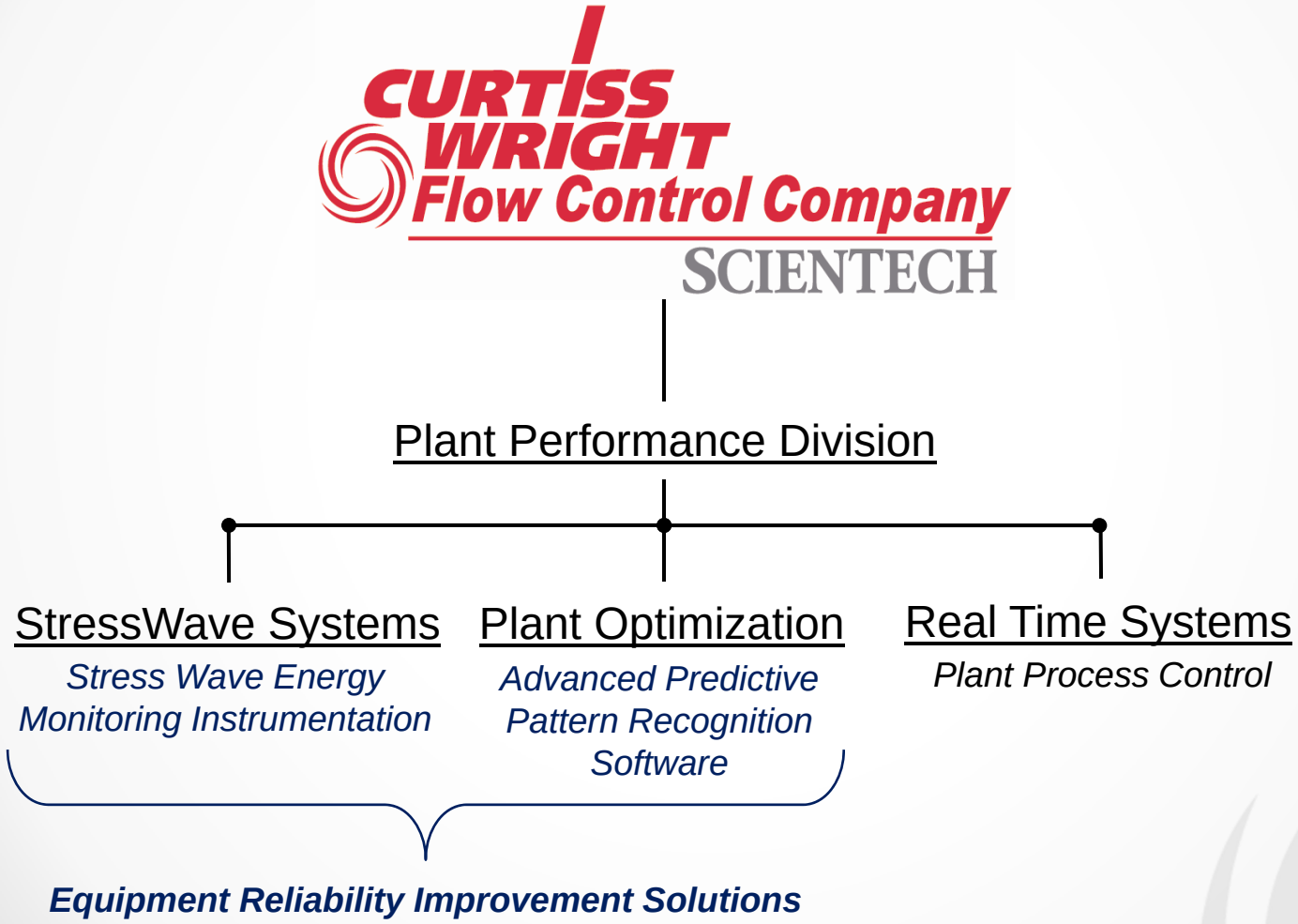
sscheeren@CurtissWright.com

2011 – CWFC Subsidiary Company Rationalization

Swantech becomes **StressWave Systems** Business Segment



Renewable & Fossil Utility Customers

AMP American Municipal Power

Nova Scotia POWER An Emera Company

Nebraska Public Power District
Always there when you need us

SaskPower

Invenergy

ComEd
An Exelon Company

Duke Energy

EVONIK INDUSTRIES

CalWind Resources

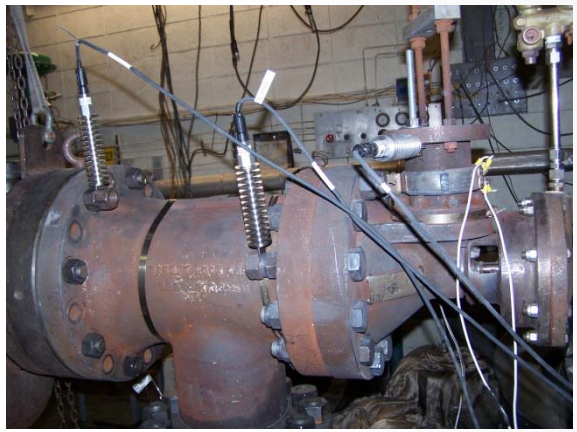
EDISON INTERNATIONAL

Progress Energy

Valve Leak Detection Projects

eni stogit

Exelon



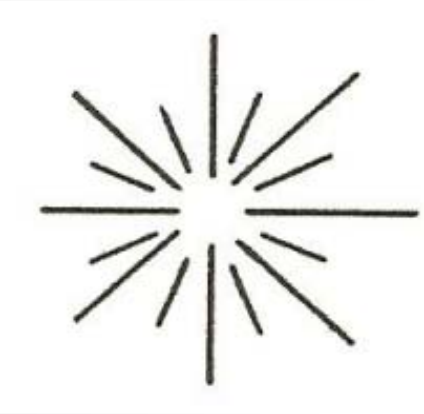
Target Rock
A COMPANY OF CURTISS WRIGHT FLOW CONTROL

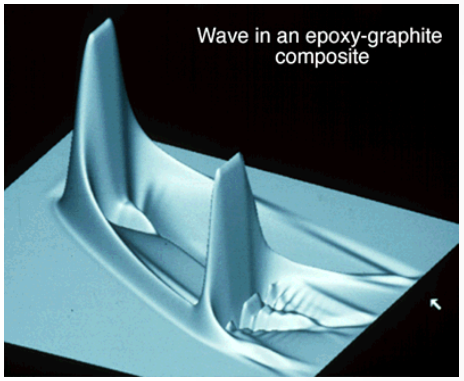
KINDER MORGAN

TVA TENNESSEE VALLEY AUTHORITY

What Are Stress Waves?

Stress Waves are acoustic energy impulses that radiate through solid, liquid and gas in all directions.





Stress Wave Visualization – Virginia Tech

Relative motion produces friction.

Friction generates stress waves.

Causes of STRESS WAVE ENERGY

Relative Motion

FRICTION

Contact Pressure
Contact Surface Area
Roughness - Smoothness
Relative Surface Speeds
Lubricant Condition
Operating Load
Operating Speed

SHOCK & IMPULSE

Impact Velocity
Damage/Imperfection Size
- Depth
- Area

Gas or Fluid FLOW

Turbulence
Cavitation

PREDICTIVE PATTERN RECOGNITION

Specific Component

REAL-TIME DATA

- Load
- Voltages
- Currents
- Temperatures
- Oil Analysis
- Performance results
- Calculated values
- Stress Wave Energy

PdP

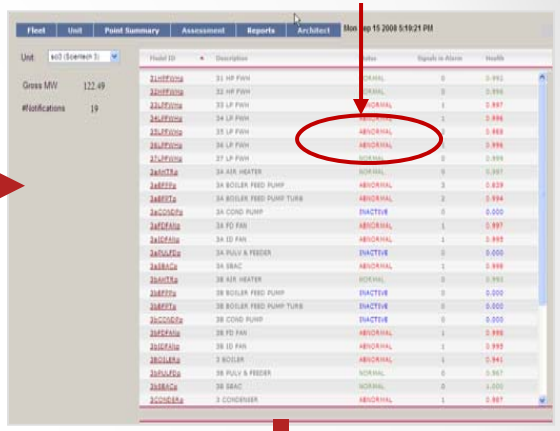
Prediction Algorithm (SSA)

Actual Sensor Values

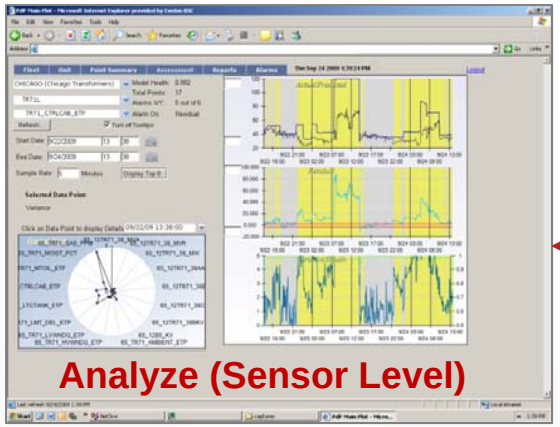
Expected Value for Each Sensor

Actual vs. Expected

Early Warning (System Level)

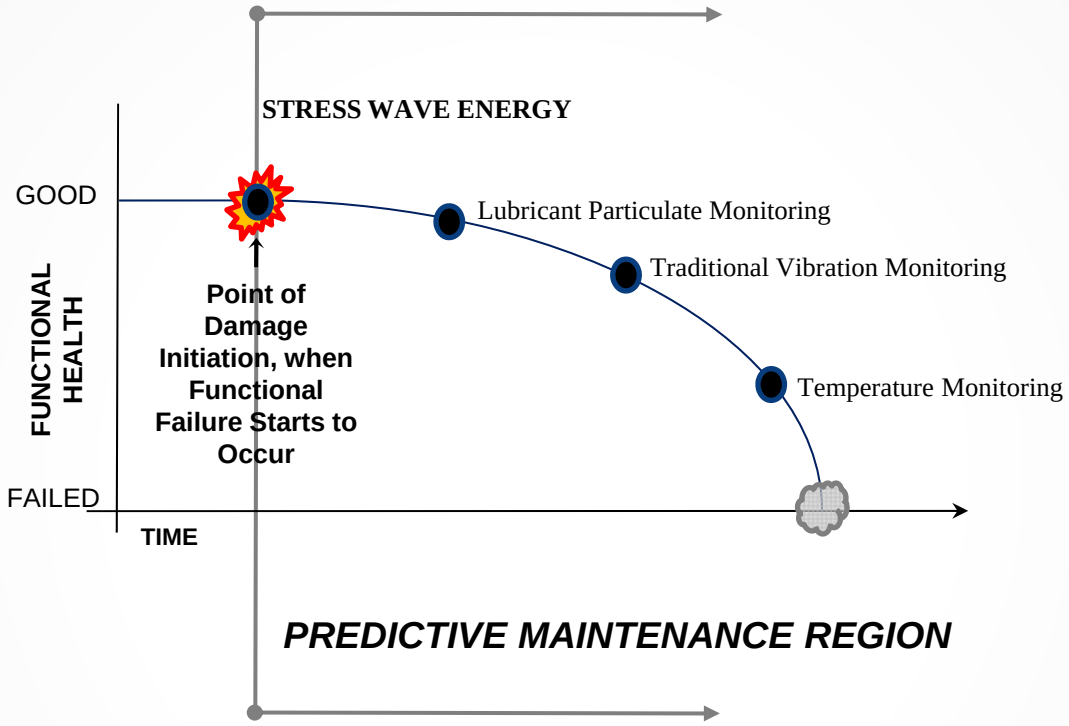


Alarm (Asset Level)



Analyze (Sensor Level)

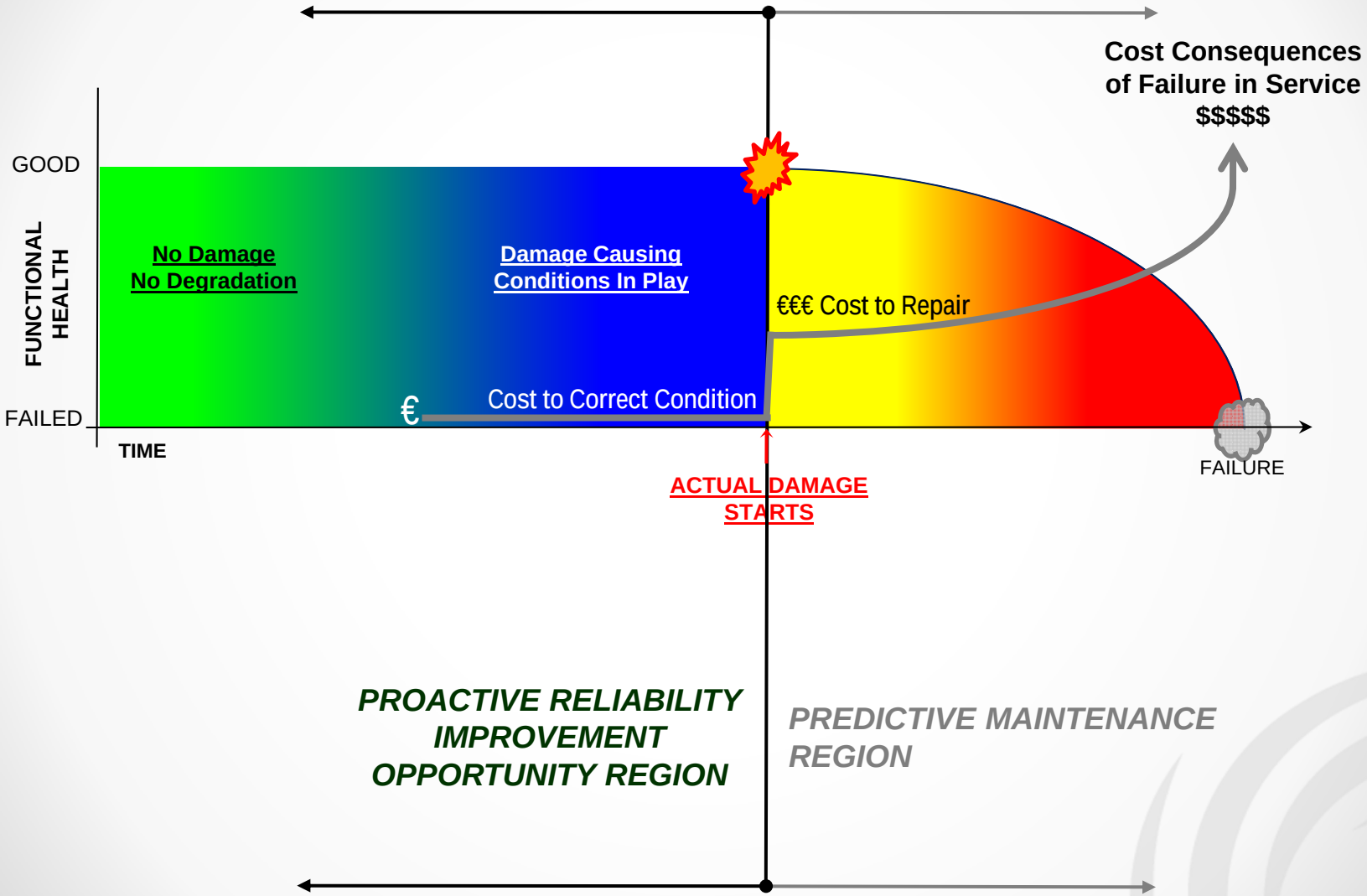
Predictive Maintenance Monitoring Technologies



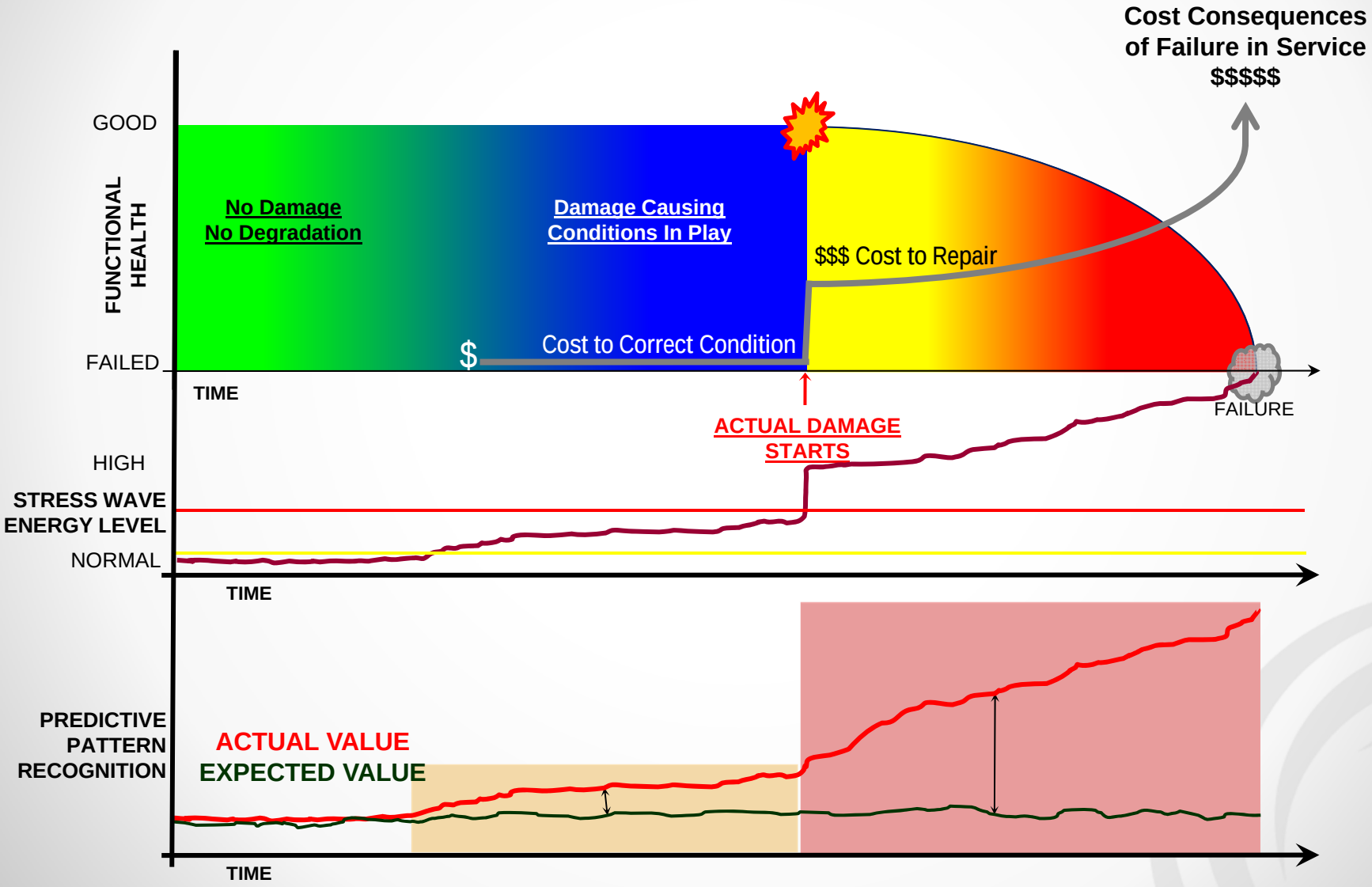
John Moubray,
Reliability Centered Maintenance II
1991

Anatomy of UNReliability

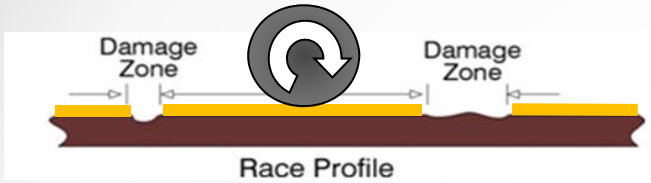
Failure is a Process, Not an Event

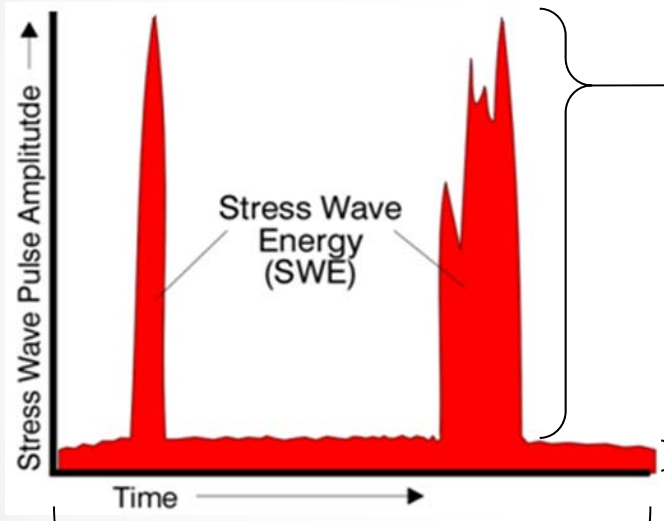


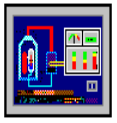
Scientech Technology Applied

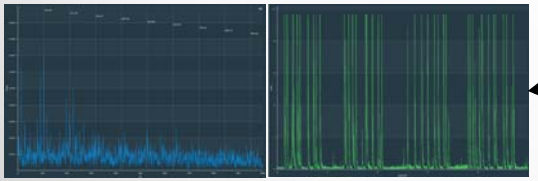


Complete Mechanical Process Solution



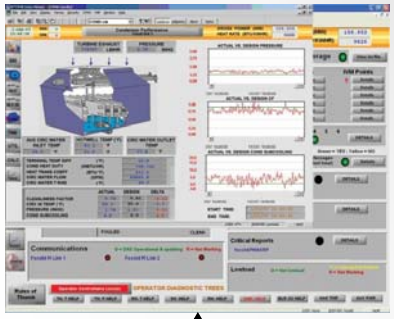




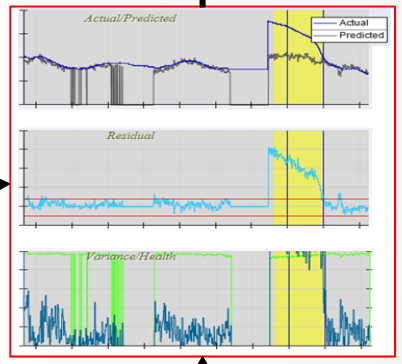


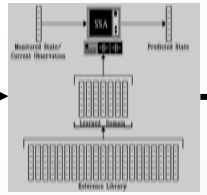
Mechanical Diagnostics

Fault Prediction & Diagnostics



Anomaly Detection

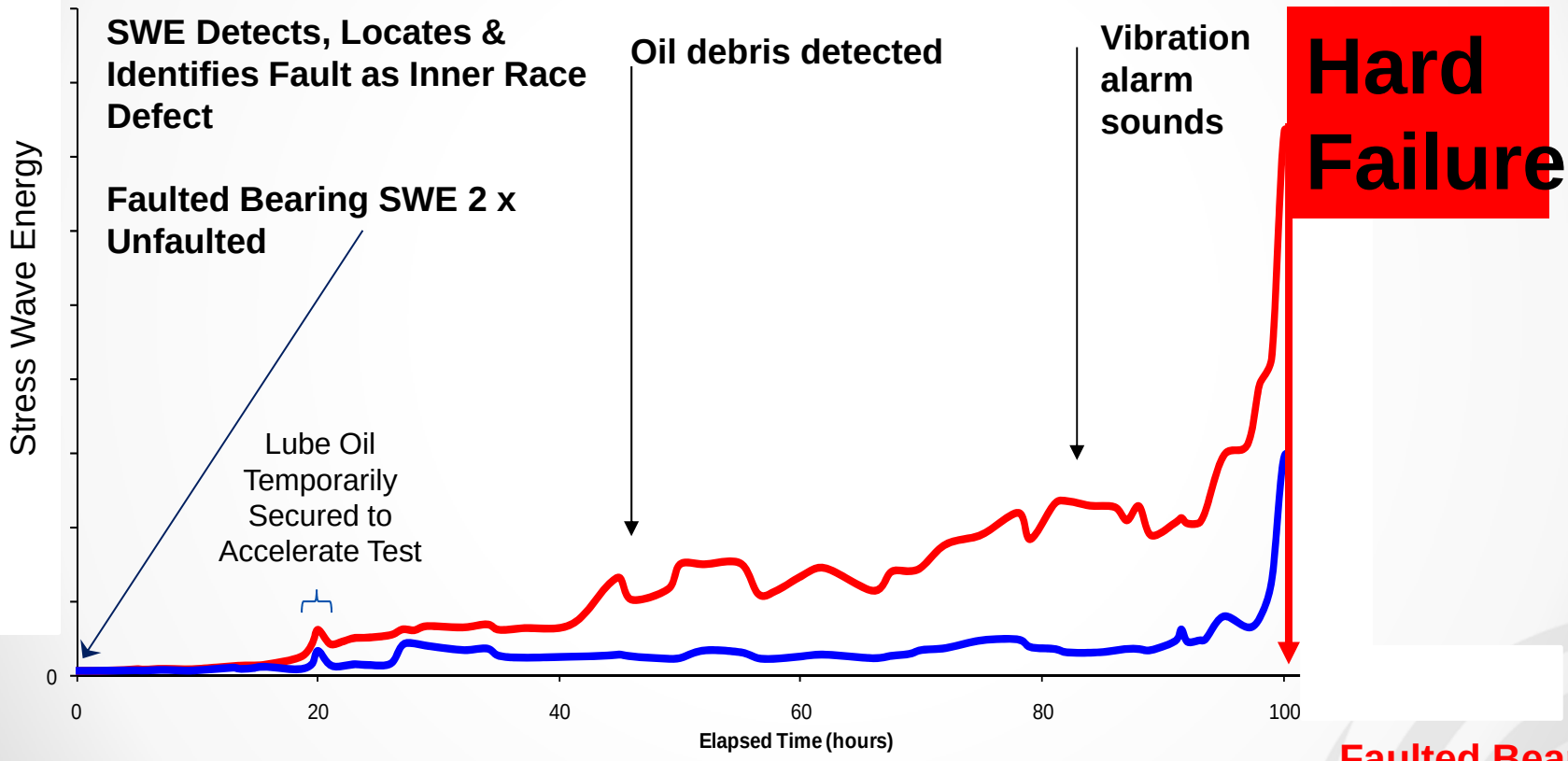




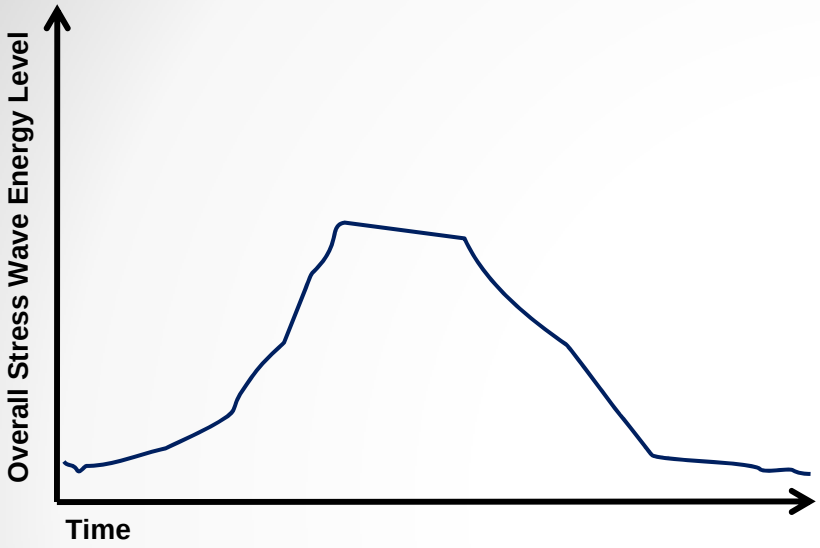
Prediction Algorithm

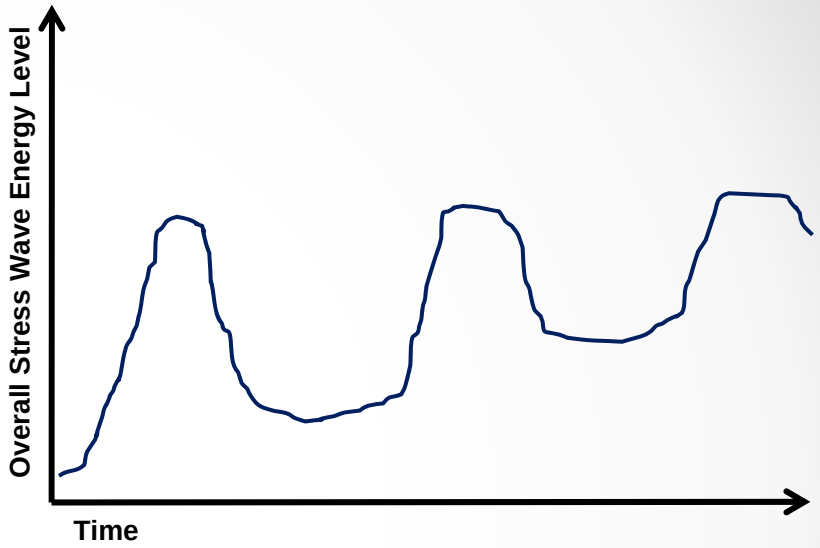
Expected Value for Each Sensor

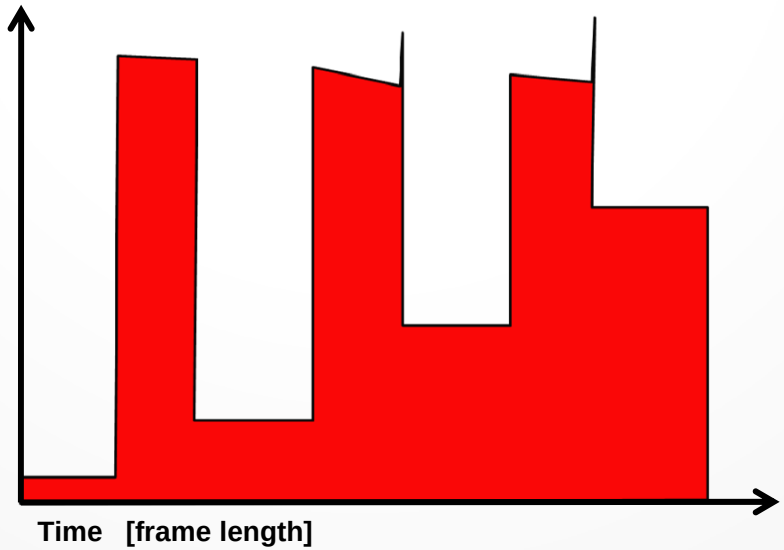
STRESS WAVE ENERGY
The Leading Indicator



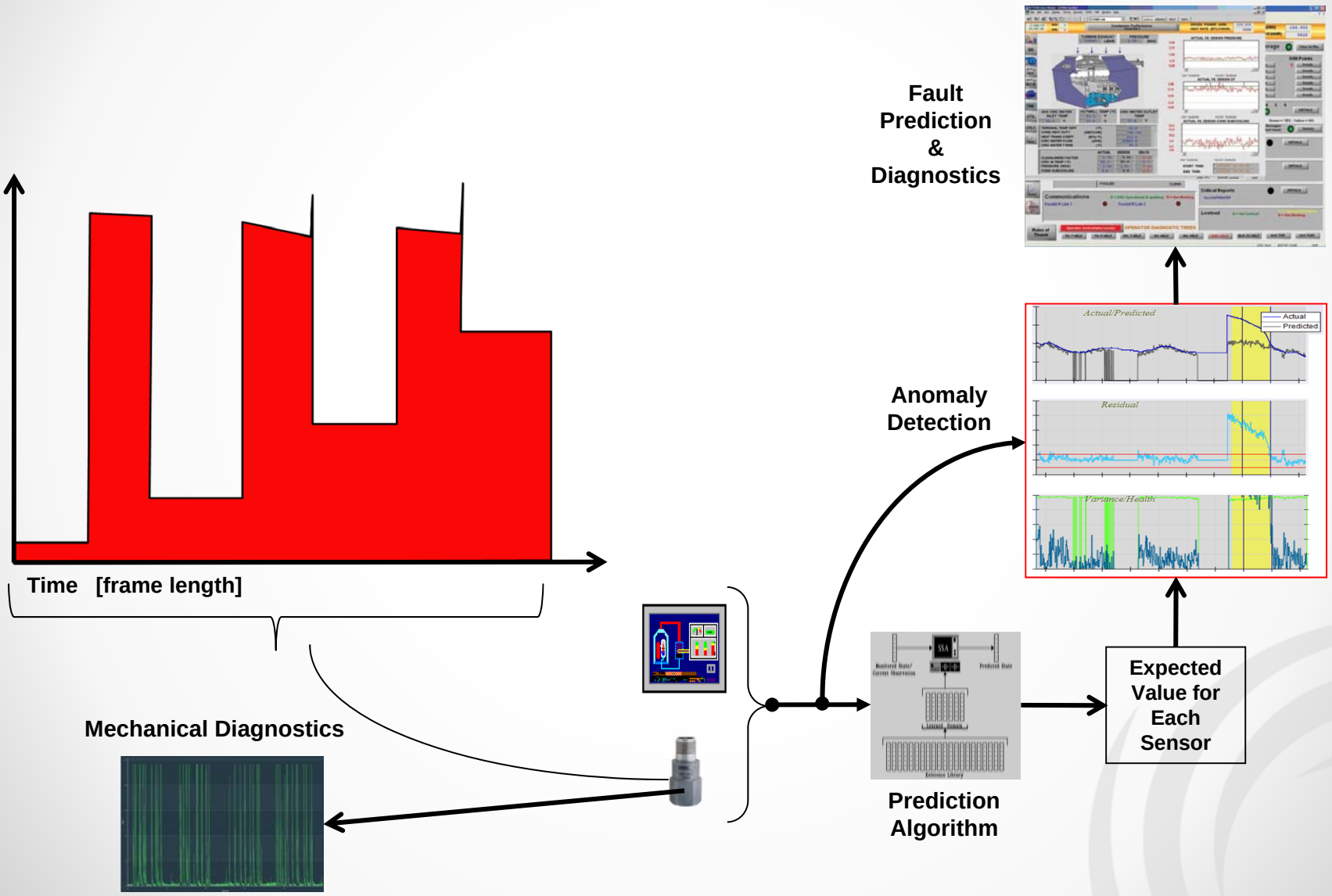
Valve Leakage





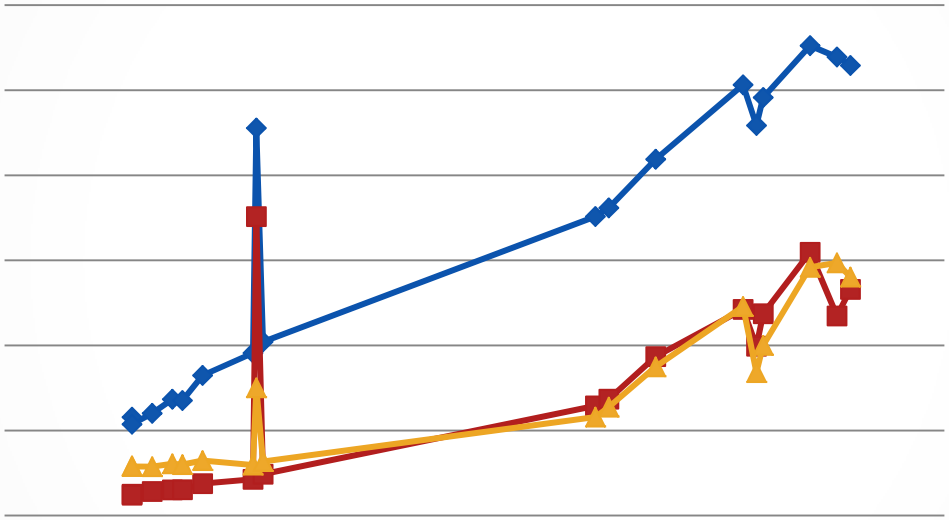


Complete Valve Process Solution



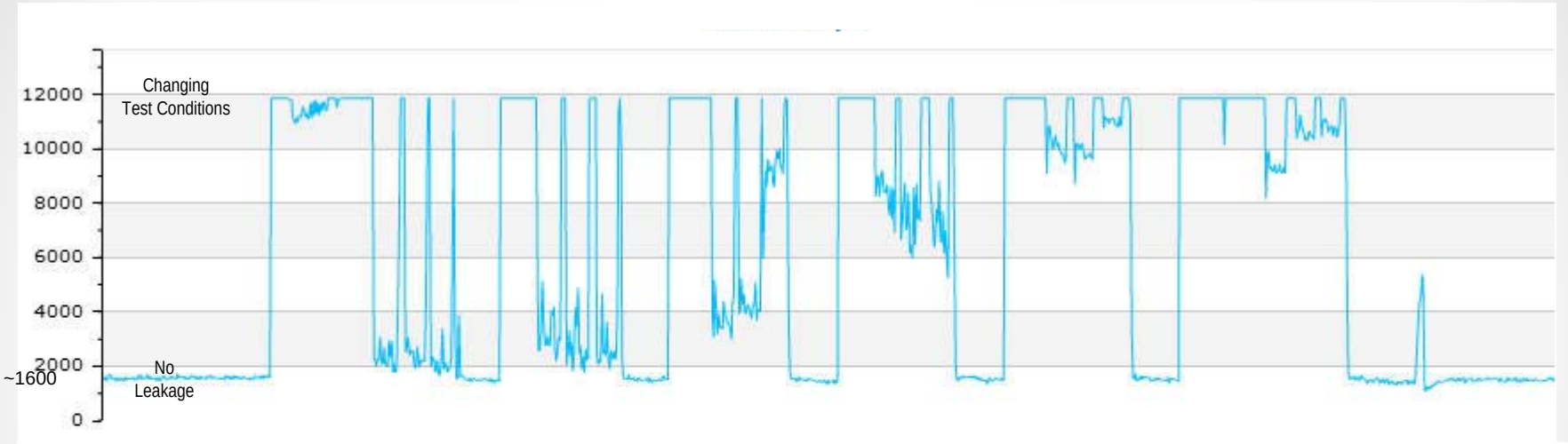
Example Data

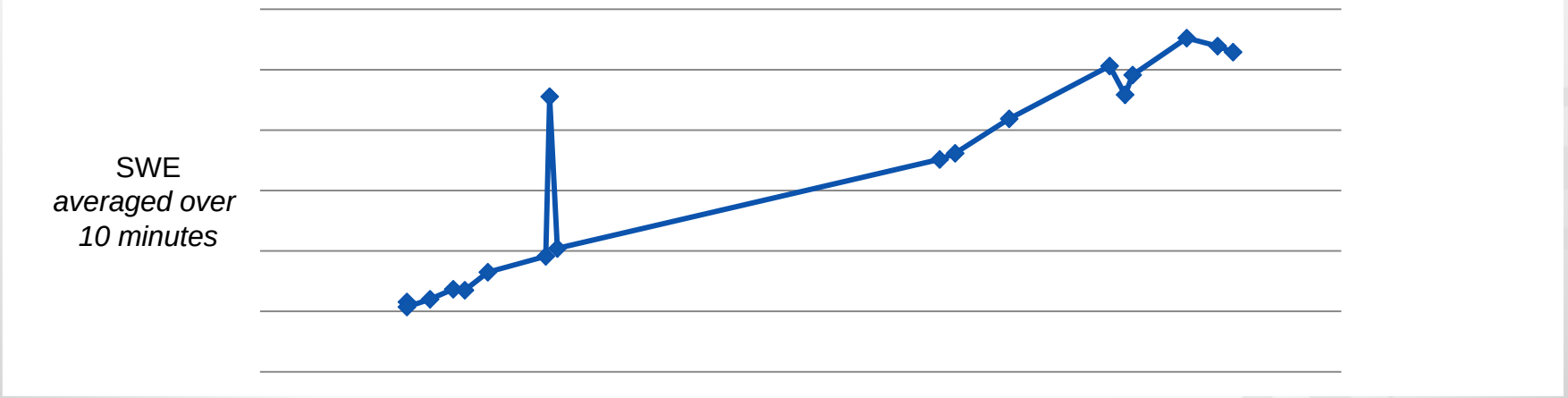
SWE
averaged over
10 minutes



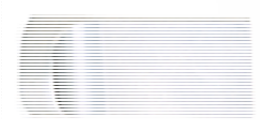
Measured Leakage

Pilot Test – Pilot Sensor





Stress Wave Energy Sensor & Mounts



Certified Intrinsically Safe for the Following Hazardous Locations:

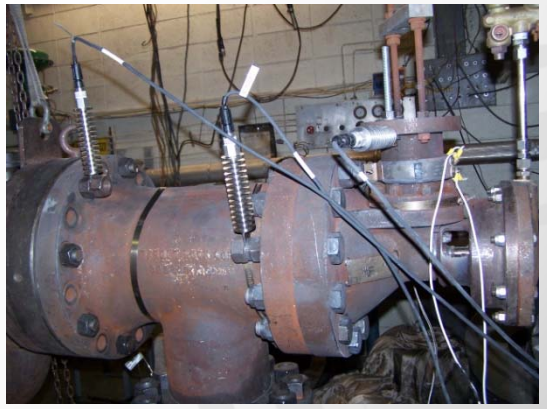
- Atex Ii 1g Ex Ia Iic T4
- Zones 0, 1, 2
- Class I, Division 1, Groups A, B, C & D
- Temperature Code T4
- Process Temperature -50°C To 120°C
- Temperature Ambient 85°C

Environmental Characteristics

Temperature	°C	-50 To +120
Shock Limit	G Pk	5000
Humidity	Hermetically Sealed	
Protection	Meets Or Exceeds Ip67	

Certified To Comply With The Following Entity Parameters:

- Ui = Vmax = 30v
- Ii = Imax = 100 Ma
- Ci = 10.2nf
- Li = O Uh



SWANguard+

CE Approved

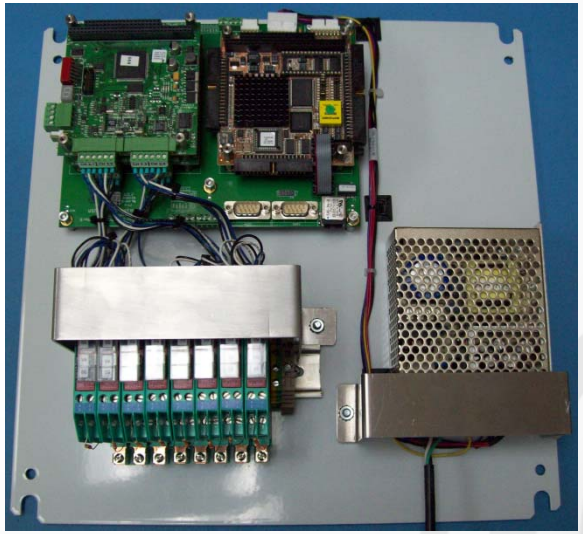
Operating Temperature: -13 to 149°F (-25 to + 65° C)
Humidity: 20 – 90%, non-condensing

Industrial, weatherized 16 gauge steel enclosure
ANSI/ASA 61 powder coat grey finish
Suitable for: NEMA 4, 12, 13, or IP66 environments.

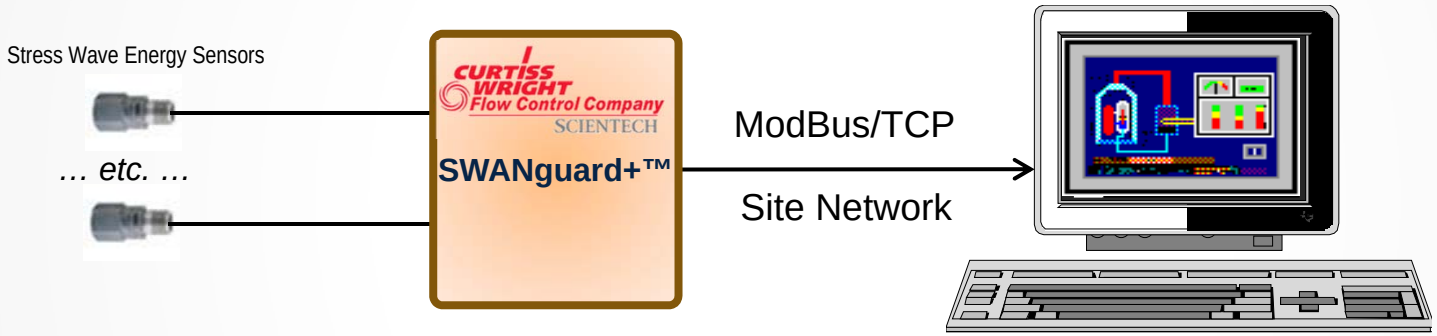
IS Barriers may be included, Internally or Externally

100 – 240 VAC, 50/60Hz

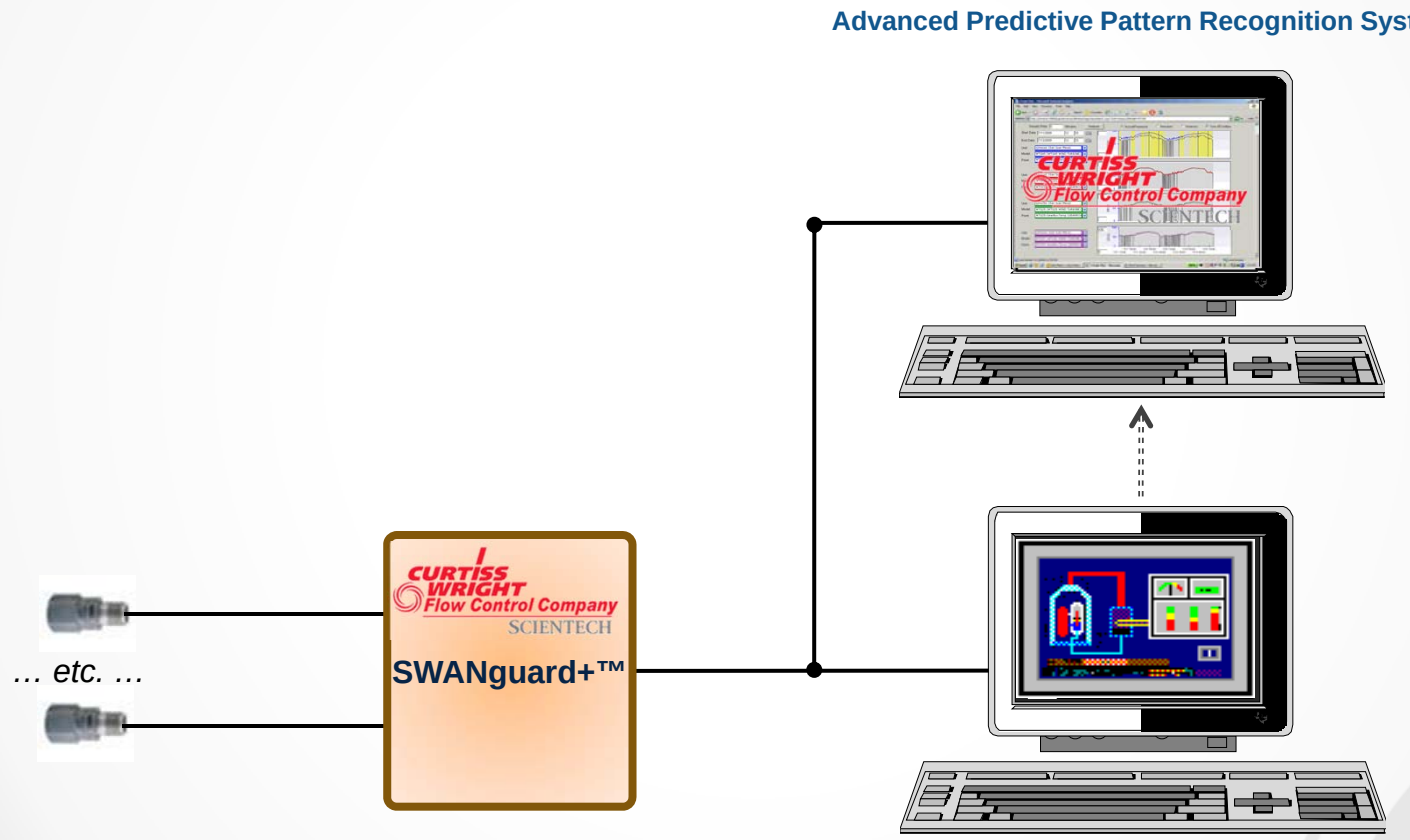
RJ-45 Ethernet, Optional Media Converters may be included



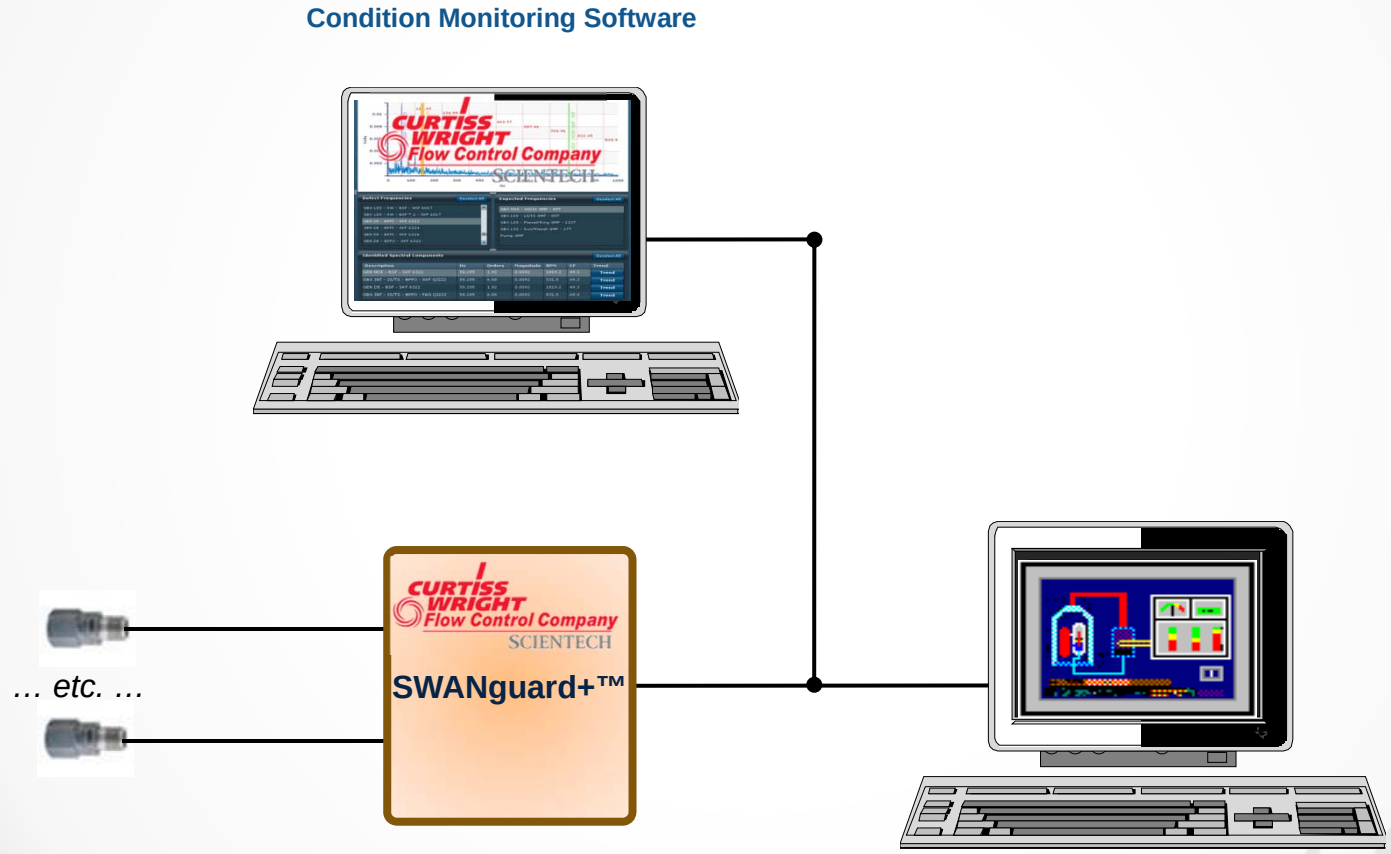
Stress Wave Energy into Process Control Only



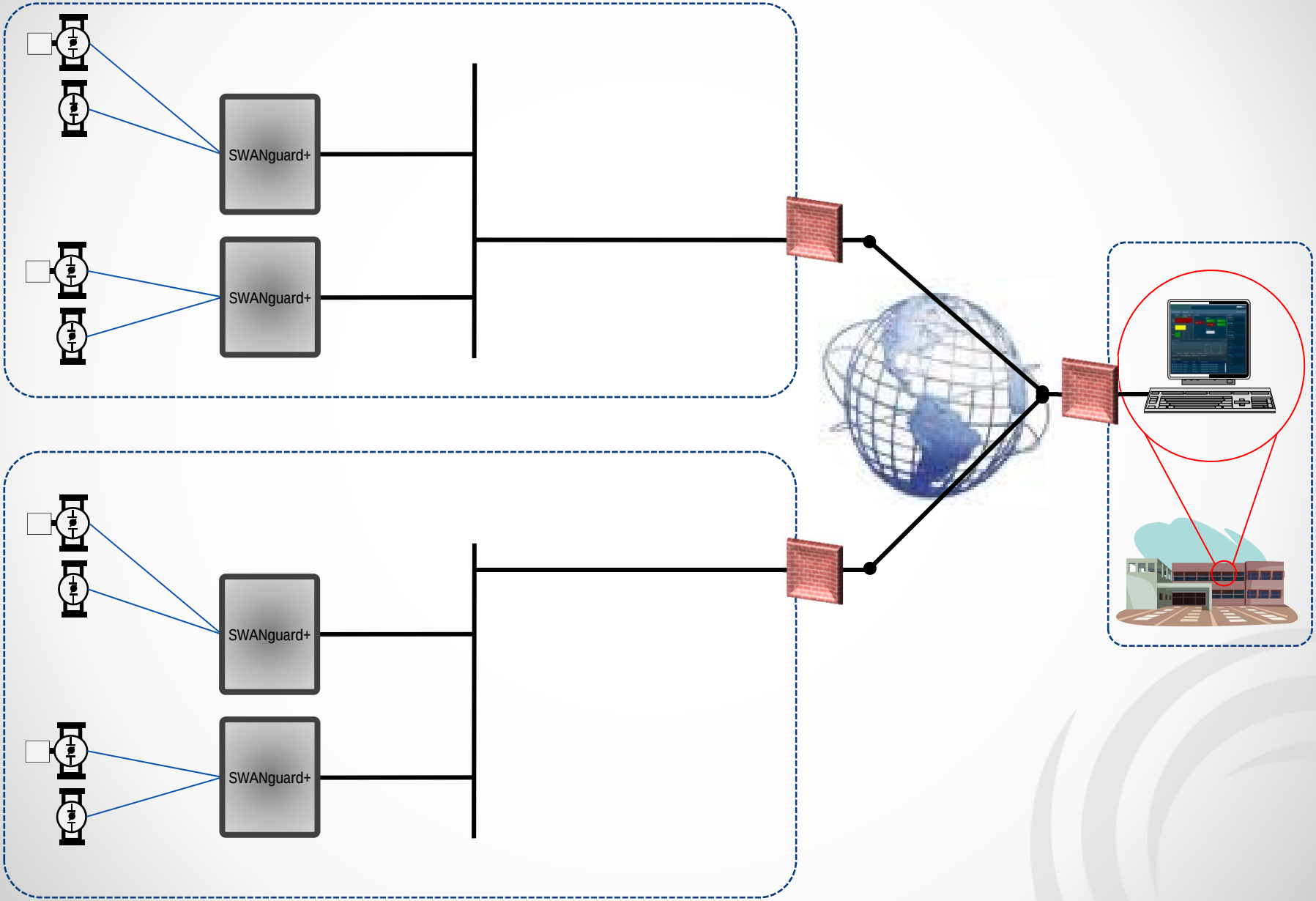
Stress Wave Energy and Advanced Pattern Recognition



Stress Wave Energy with Mechanical Diagnostics



Globally Deployed, Centrally Monitored



Questions, Comments, Concerns, ... ???

Steve Scheeren

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