AKXA TECH PVT. LTD.
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contact@akxatech.com

Products + Services

PROCESS MONITORING	PROCESS CONTROL	PROCESS OPTIMISATION

Sustainable Solutions

PRODUCTIVITY IMPROVEMENT	QUALITY CONSISTENCY	EQUIPMENT RELIABILITY

Industry Focus

CONTINUOUS PROCESS PLANTS	PROCESS UTILITY EQUIPMENT	DATA ANALYTICS + IoT Solutions

Overview Presentation : Fertilizer, Pharmaceutical and Food Industry case studies

November, 2022

AKXA TECH PVT. LTD.

COMPANY

Research Driven, Technocrat Promoted Engineering Co.

(25+ man years of R&D on process performance enhancement techniques & tools)

TEAM

Qualified, Widely Experienced Multidisciplinary Team

(65+ years combined experience in local & overseas companies, optimization projects)

OFFERING

Decision Support, Performance Enhancement Products / Services

(Data driven, AI Algorithm based, Process Monitoring / Diagnosis / Optimisation, IoT Tools)

CLIENTS

Tested, Proven and Well Appreciated by Continuous Process Industries

(150+ domestic & international clients, 7 different sectors, 10+ Countries)

CII UNIDO — recognized as (Innovative Product)

STARTUP INDIA STAND UP INDIA — approved by GoI (DIPP 2649)

IITM INCUBATION CELL incubation.iitm.ac.in — mentored by (I.I.T. Madras)

AQUA ALLOYS — promoted by (30+ Yrs of Engg Service)

DATA to KNOWLEDGE :: NEW FOCUS::

Harnessing Data >> Extracting Knowledge >> Creating Value

Products / Services / Projects for improving

Process Performance, Quality Consistency, Equipment Uptime

Plant Productivity, Energy Efficiency, Safety and Environmental Parameters

MONITORING

- Process Variability
- Controller Performance
- Equipment Health
- Sensor Analysis

CONTROLING

- PID Tuning
- Multivariate Control
- Feed Forward Logic
- Smart Combustion Control
- Supervisory control

OPTIMIZING

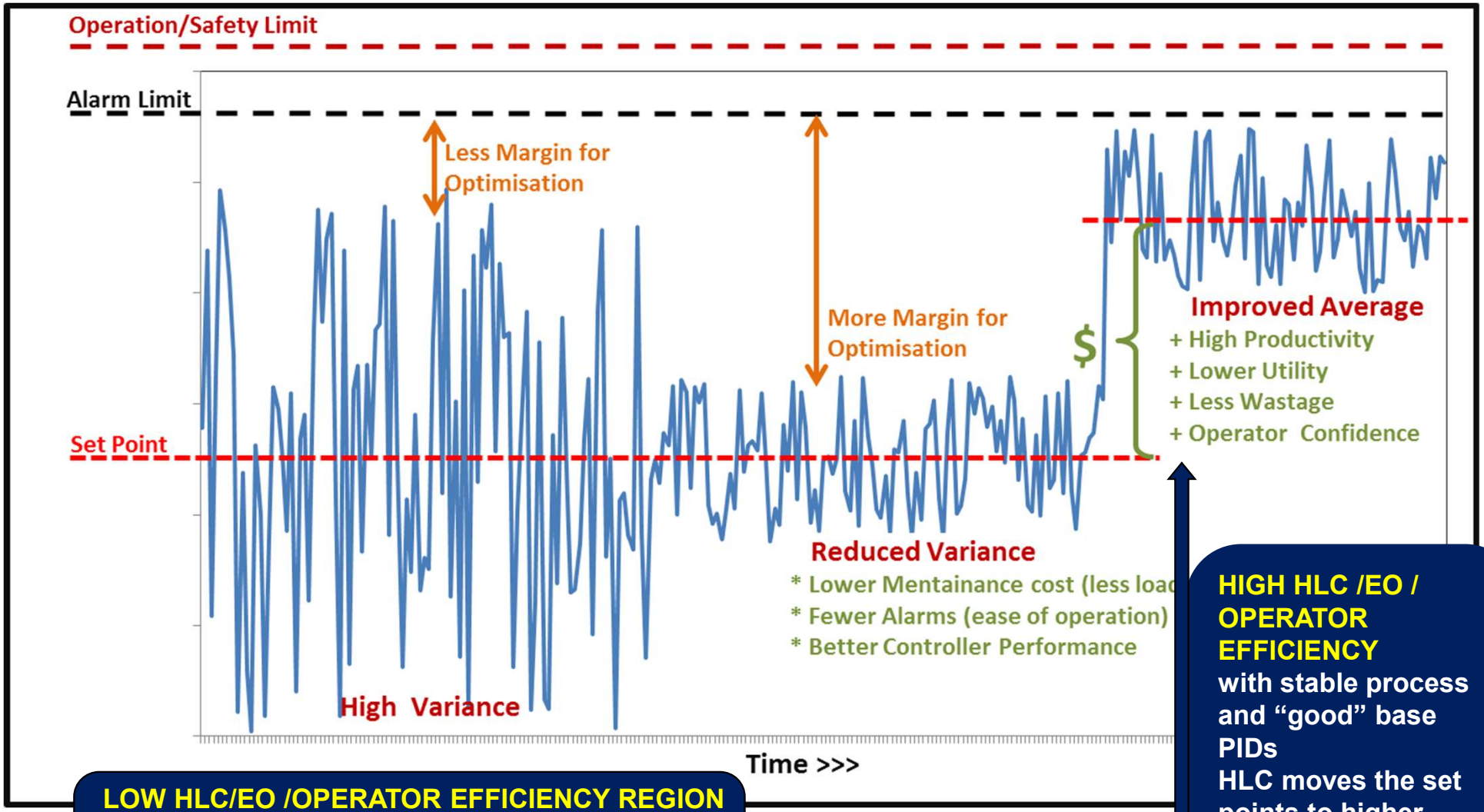
- Mill Operation
- Fuel Efficiency
- Cooler Recuperation
- Quality Consistency

:: Process Fluctuation : Efficiency Limiting Factor..

High Variance >> Inconsistent KPI >> Less confidence/margin for Improvement

REDUCE fluctuations >> IMPROVE variance >> OPTIMIZE averages

>> OPTIMakx adds to STABILITY (low variability) and CREATS MARGINS for EO



LOW HLC/EO /OPERATOR EFFICIENCY REGION

"OPTIMakx" helps diagnose and reduce process variability, and optimizes PIDs/FCEs responses and CREATE MARGINS..

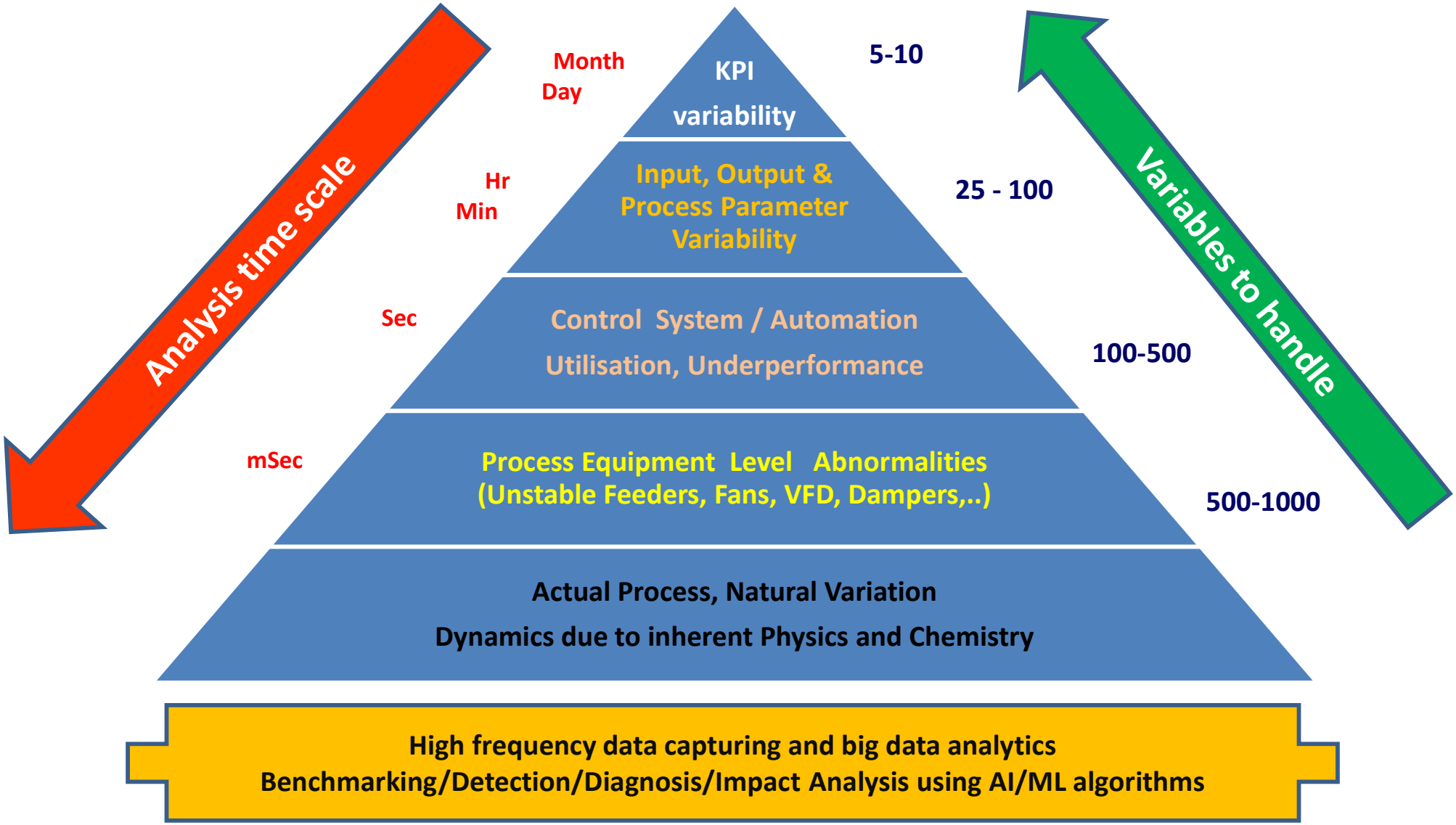
HIGH HLC /EO / OPERATOR EFFICIENCY

with stable process and "good" base PIDs

HLC moves the set points to higher level

APPROACH :: PLANT WIDE FLUCTUATION MAPPING

DETECT (monitor) → DIAGNOSE (assess) → DIMINISH (optimize)



High frequency data capturing and big data analytics
Benchmarking/Detection/Diagnosis/Impact Analysis using AI/ML algorithms

Process Plant Fluctuations :: Sources we chase..

(Process Control)

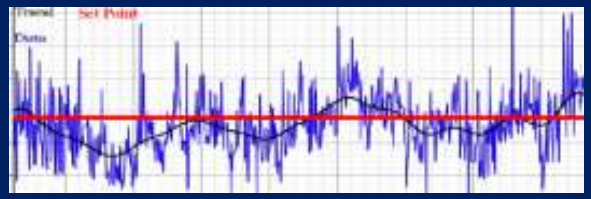
Controller related Issues

(settings, error band, OP limits)

(Automation)

Cascade Loops

(series action, master slave mismatch)



(E & I)

Transmitter/Sensor Issues

(spikes, drifts, resolution)

(Mechanical)

Valve/Damper/Feeder Operation

(sticky valves, choking, nonlinear flows)

(Process/QA)

External Disturbances

(Sampling method, uncontrollable raw material quality or variability from upstream operations)

(Projects)

Design Limitations

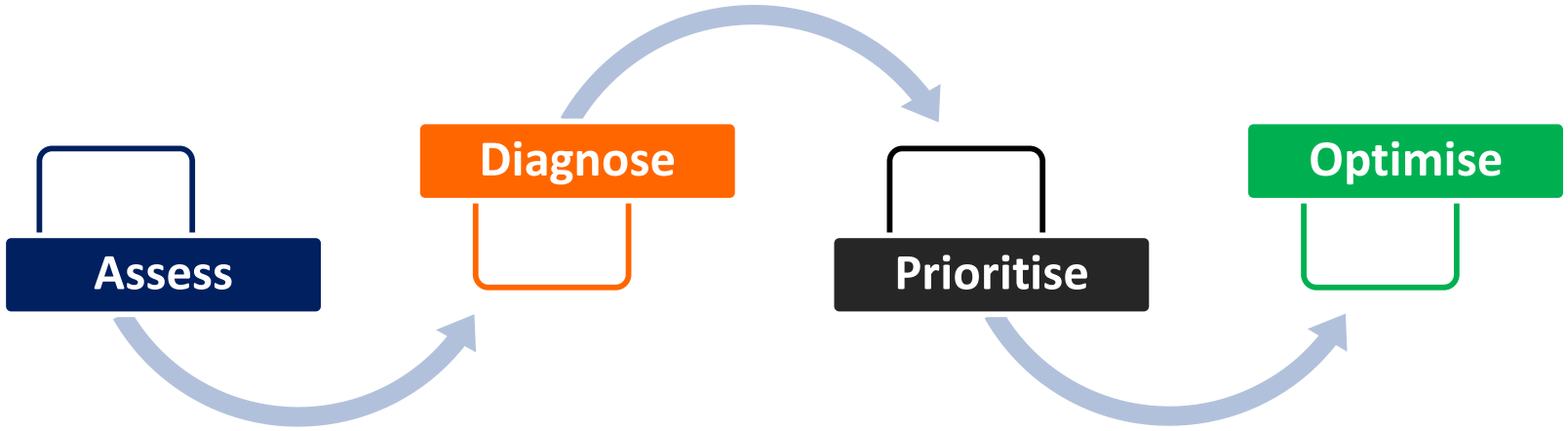
(pumps, valve, VFD capacities)

*** CHALLENGE ***

How to identify, quantify & resolve these in a large/continuous plant.

Algo Based Process Monitoring & Optimization Tool

OPTIMakx®



>> Suite of AI and Statistical Algorithms, researched and developed at IIT Madras.

>> Open Source IT plat form, Web Based Application for IoT and Industry 4.0 needs.

>> Automatic assessment , diagnosis and decision support for continuous improvement

>> Multi plant, Multi process, Multi user configuration for remote monitoring/benchmarking

>> **20+** different scientific/statistical measures for performance benchmarking.

>> **15+** different root causes diagnosed for abnormal operation/high fluctuations.

>> **500+** variables simultaneously tagged, tracked, issues diagnosed, compared.

>> Visuals, Work Flow Annotation, Alarms and Auto Reporting, SuperAdmin features.

INDUSTRIES / PROCESS PLANTS : *we can contribute*

Services and Automated Decision Support Tools for

Productivity Optimisation, Energy Efficiency Enhancement and Quality Consistency

CEMENT, MINERAL & METAL PROCESSING

FERTILIZER & PESTICIDE, PHARMA

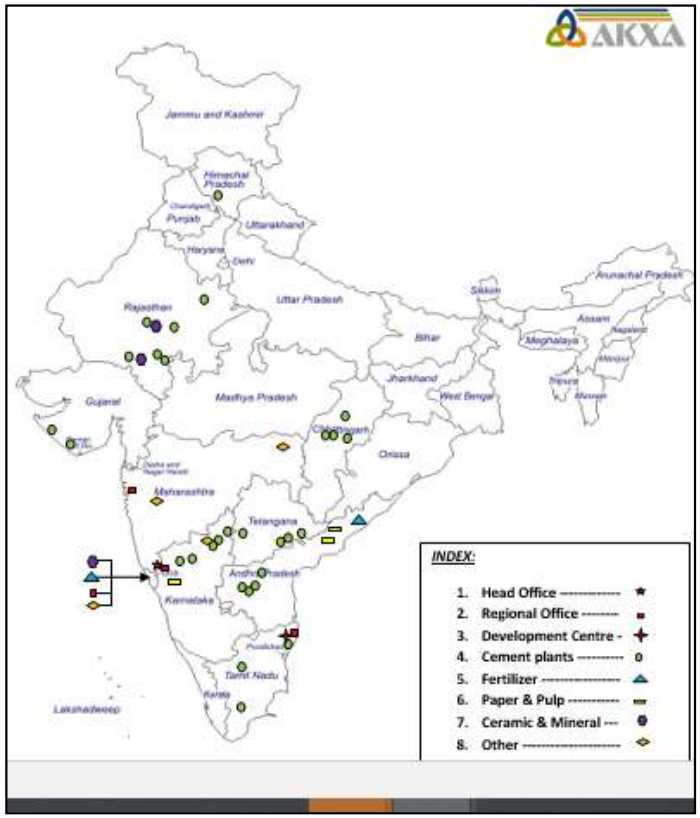
PULP PROCESSING & PAPER / BOARDS

GLASS & CERAMICS

POWER PLANTS CAPTIVE / CO-GEN

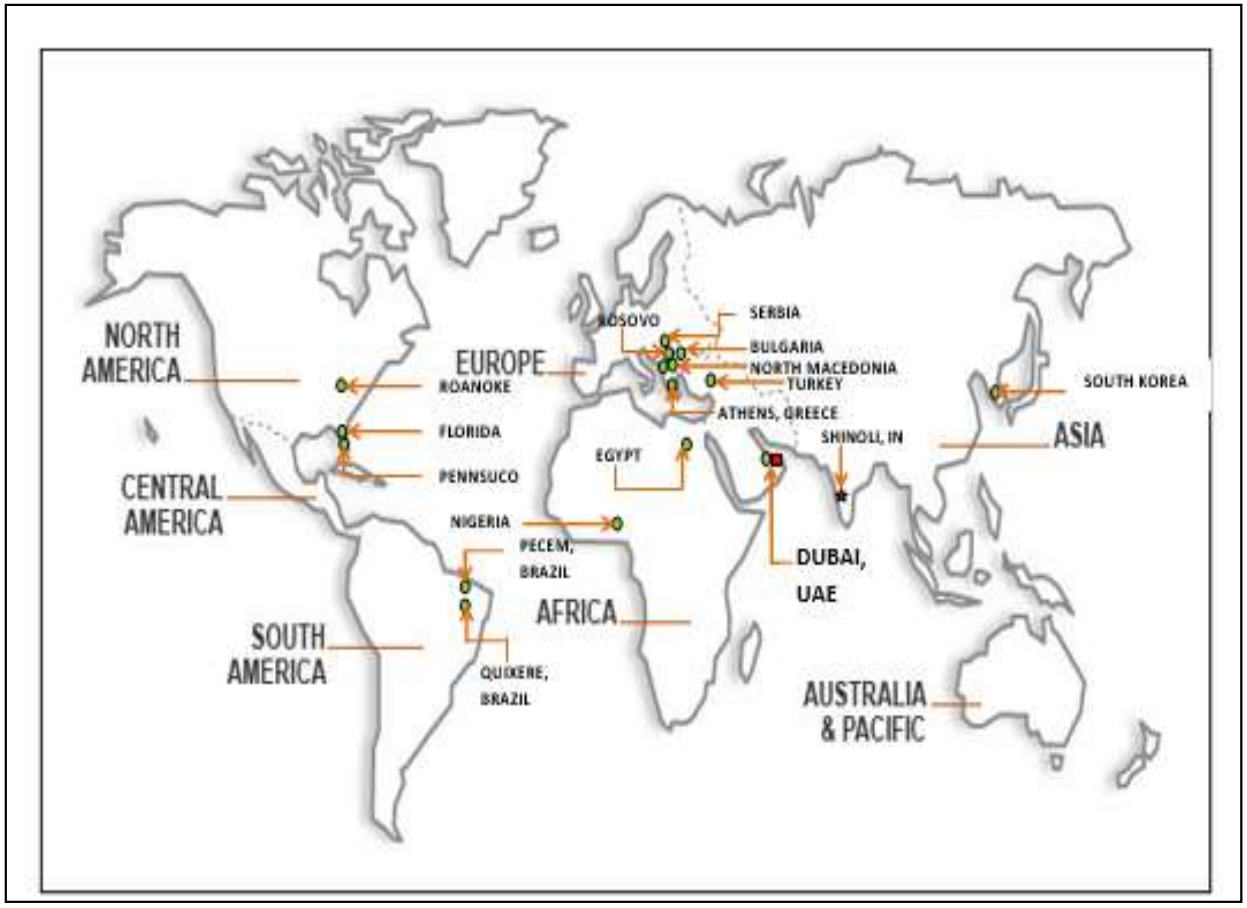
ANY CONTINUOUS PROCESS PLANT

Domestic and International Presence…



- **TEN CORE SECTORS**
- **160+ plants in INDIA / Global**

- **International Projects, Nine Countries**



Range of Process Industries (Services Offered)

10+
Analytics & IoT products

155+
Assets Investigated

~10%
Energy Savings Achieved

ZUARI AGRO CHEMICALS LTD.

Coromandel
FUTURE POSITIVE

Coromandel Fertiliser (Vizag)

LUPIN

ITC Limited

Binani
3B the fibreglass company
BRAJ BINANI GROUP

JSW Steel

vedanta
transforming elements

TITAN
CEMENT GROUP

Europe, US, Brazil

WÜRTH | IT

UltraTech
CEMENT

LafargeHolcim

VICAT

INTERNATIONAL PAPER

THERMAX

TNPL

SAINT-GOBAIN

ADITYA BIRLA
HINDALCO

Belgaum (KA)
Renukoot (UP)

Prestigious Clients (CEMENT) – in last TWO YEARS..

THE RAMCO CEMENTS LIMITED
RAMCO
TN & AP

PENNA CEMENT
ALL 5 Plants
–TS / AP

TITAN CEMENT GROUP
17 plants
(Europe/Americas)

DANGOTE
AFRICA

FUJAIRAH CEMENT INDUSTRIES
UAE

SHREE CEMENT LIMITED
10 Lines, RJ

ACC
12 plants

UltraTech CEMENT
40 plants

BIRLA SHAKTI CEMENT
Sedam (E&I team)

HALLA CEMENT
KOREA

Dalmia cement
FUTURE TODAY

Ambuja Cement

JK LAKSHMI CEMENT

SAGAR CEMENT

emami DOUBLE BULL CEMENT

HATHI CEMENT
Saurashtra Cements LTd.

MAHA CEMENT
BUILD IT STRONG
Kurnool (AP)

VICAT
Kalburgi Cement

JK Cement LTD.

IKN
ENGINEERING THE FUTURE

… with the support and inputs from innovative Technology
& continuous service offered by team-AKXA …

Our clients have improved the Productivity & Energy Efficiency
of various equipment of their plants

CASE STUDIES

THE RESULT OF AKXA INTERVENTION
ON EXISTING OPTIMIZED PROCESSES

-using the OPTIMakx suite of Decision Support Tools-

Benefits leading to Total Savings

with Pay Back Period of LESS THAN ONE YEAR on Investment / Fees.

NPK FERTILIZER SECTOR SCOPE OF SERVICES

Process Fluctuation Assessment

-- NPK product quality data assessment (Different Grades)

-- Fluctuation Source Assessment (Flow / Sampling / Valve / Instrument / Controller issues)

AUTO Sampler : automated, composite sampling.

-- Fully automated AUTO SAMPLER – customized design (Chute and Belt Type)

-- Reduces sampling related quality variation by over 50%.

Controller Performance Diagnosis and Optimisation

-- Control System performance assessment / diagnosis and Optimization

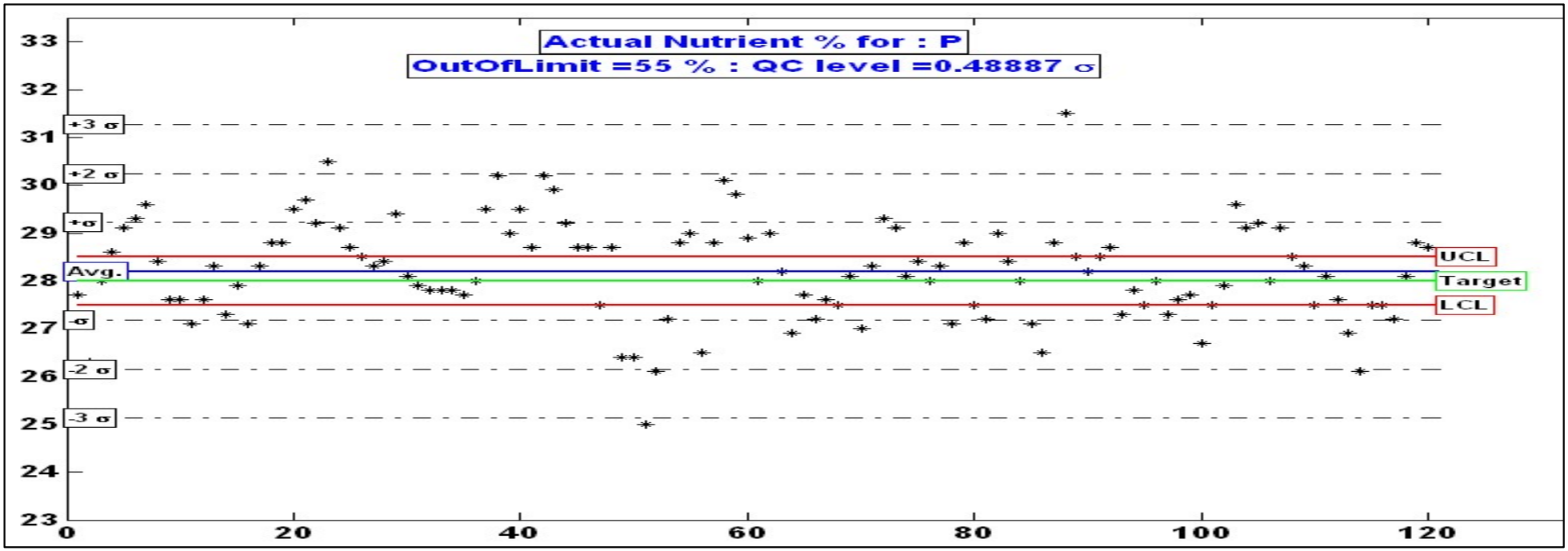
NPK Nutrient Prediction Model (both off line and online version)

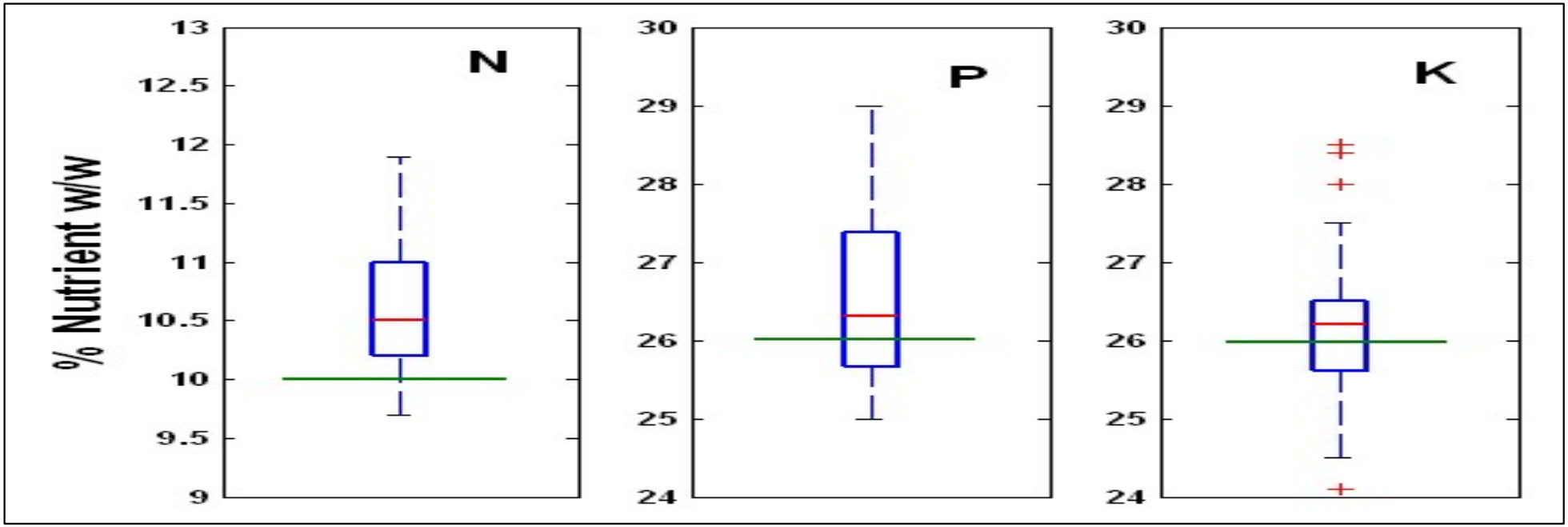
-- Steady State / Dynamic material balance model - Fine tuned to site conditions.
30 to 45 minutes ahead prediction of NPK nutrient % (80-90% accuracy)
-- Generalizable to different grades in single plant.

NPK Plant Process Variability Assessment & Correlation

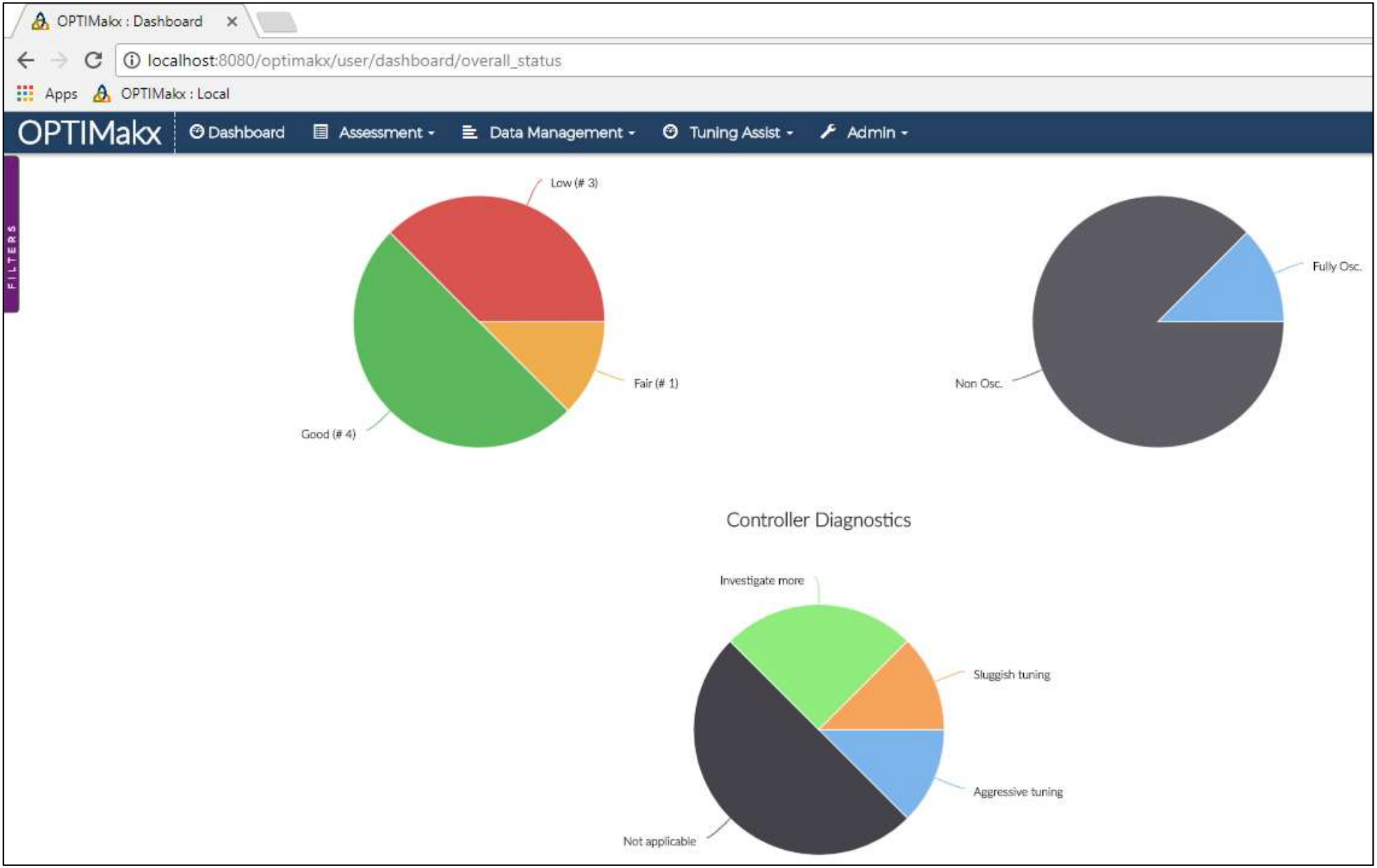
TAG	Description	BEFORE			AFTER		
		Avg.	Std. Dev.	% Variability	Avg.	Std. Dev.	% Variability
xxxPICx0xB	PN NH3 PRESSURE	10.4	1.1	10.5	10.3	1.0	9.7
xxxFICx4xB	PN NH3 FLOW	5.1	0.7	13.7	5.0	0.5	10
xxxPICx06B	GRAN NH3 PRESSURE	12.6	1.2	9.5	12.2	0.8	6.5
xxxFICx48A	GRAN NH3 FLOW	1.4	0.1	7.1	1.4	0.06	4.2
xxxFICx63	PN 48%	201.7	26.5	13.1	202.0	17.9	8.8
xxxFICx63B	PreScrubber 48%	40.7	5.2	12.7	40	3.7	9.25
xxxFICx42	H2SO4	5.0	1.3	26	5.0	0.4	8
xxxFICx42A	PS H2SO4	11.8	2.8	23.7	11.0	1.2	10.9
xxxWICx21	WEST FEEDER	17.7	1.9	10.7	18	0.95	5.3
Failure Rates		High (>42%)			Low (<20.2%)		

Statistical Control Chart & Variance Analysis : VISIBILITY

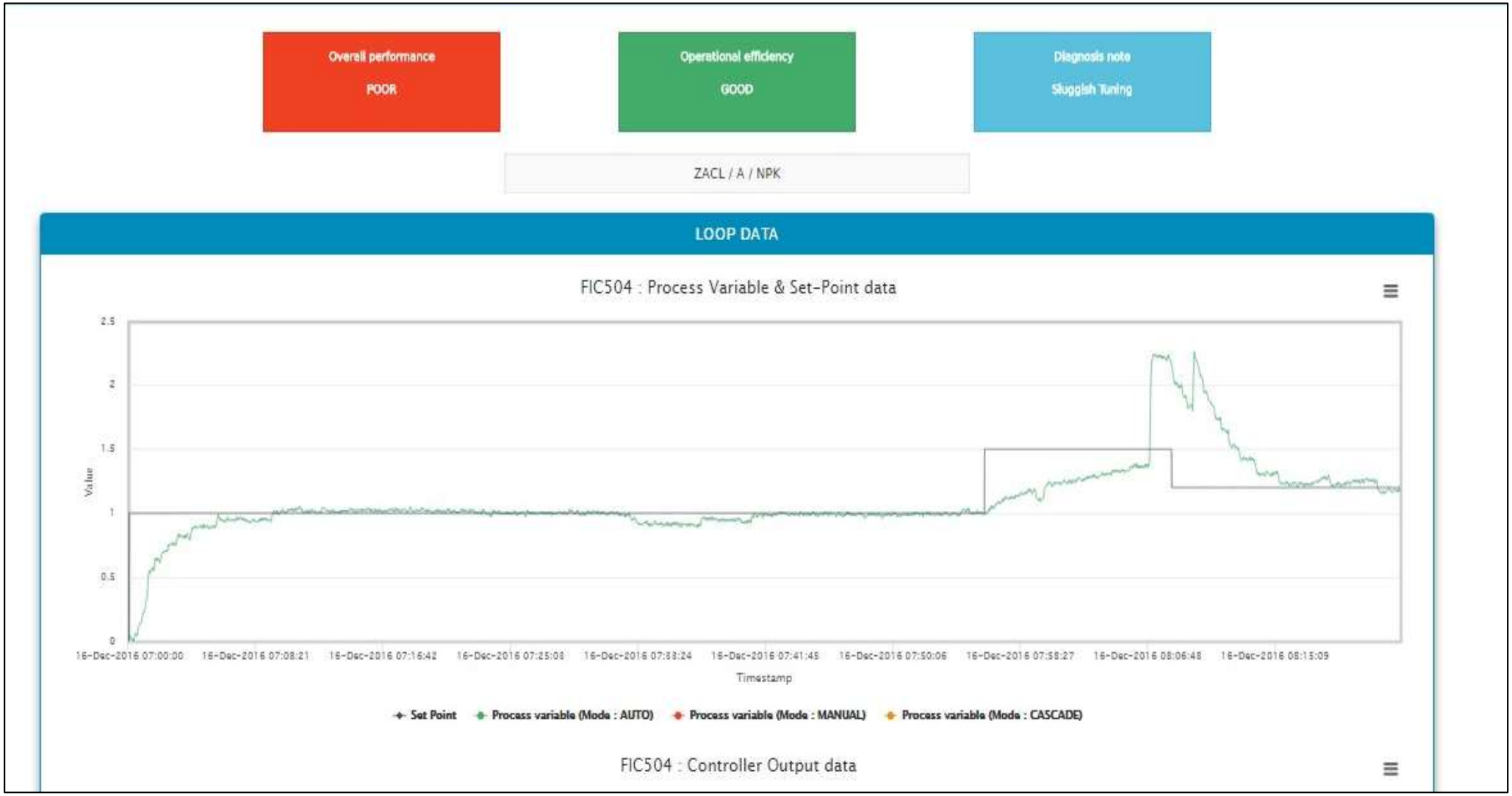




OPTIMakx : Controller System Assessment & Optimization



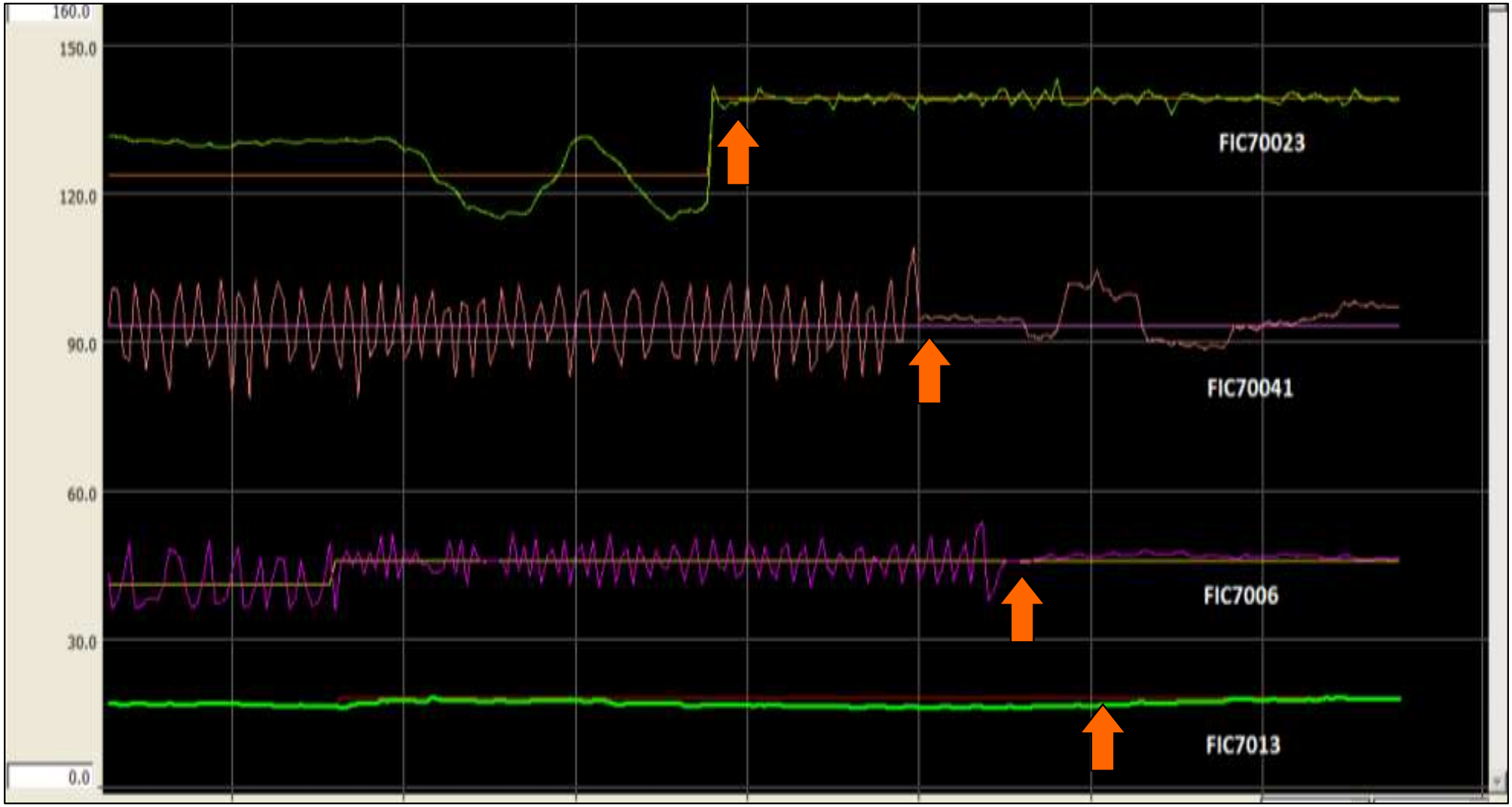
Sluggish Tuning Detected in Flow PID loop



Actuator Valve related issues highlighted (predictive maintenance)

Control System Optimization

Continuous oscillations eliminated. OFFSET removed. Process Stabilized

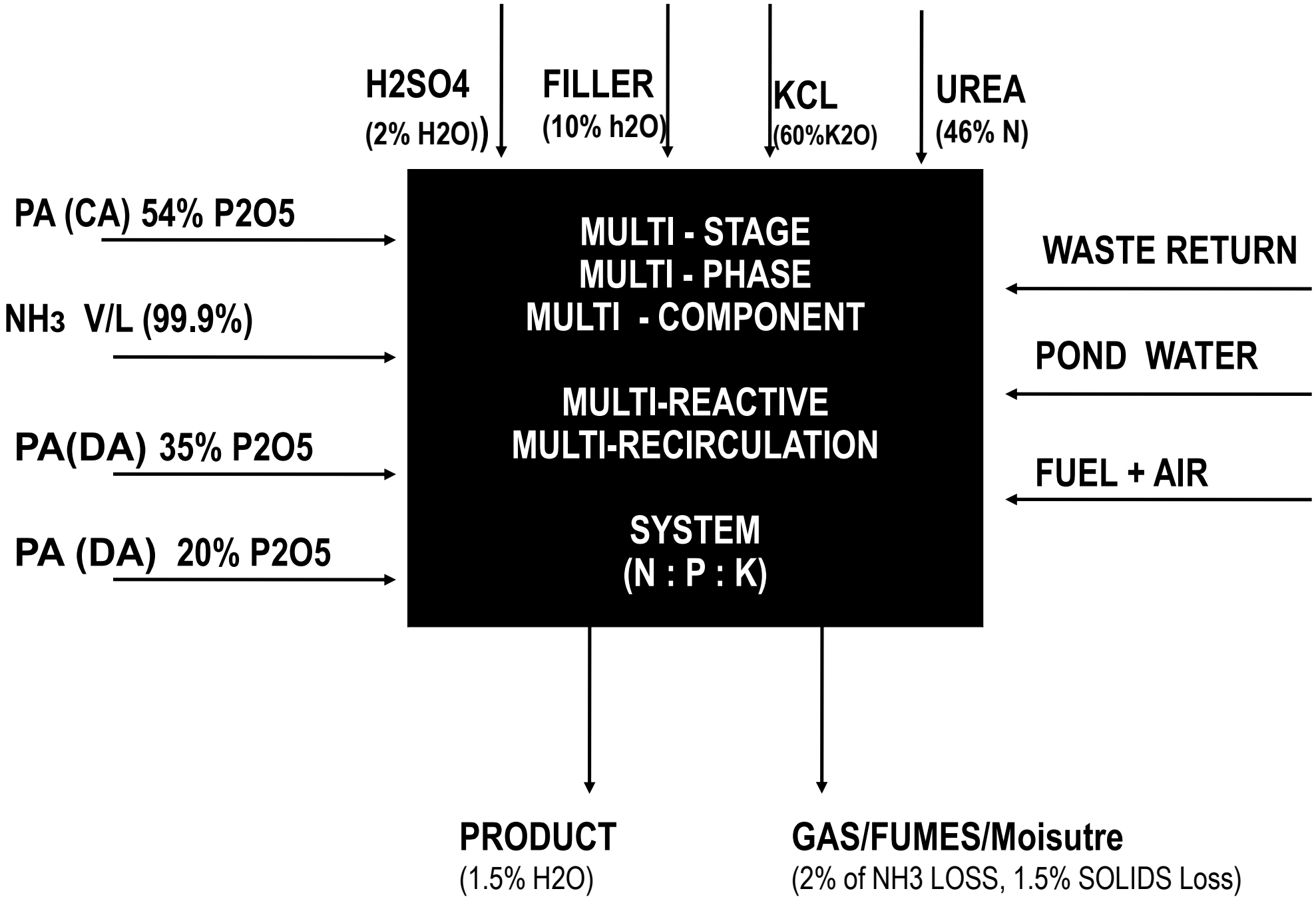


Belt Conveyer (Horizontal or Inclided) based AUTO sampler

>> Compressed air (4 to 6 kg) operated sampler
>> Automatically draws samples at fixed intervals – Swipes across Belt
>> Customized to fit into existing site.
>> Flexible levers for height, scoop length and angle adjustment.
>> Elastic scooper tip – does not damage the belt even during belt sways.

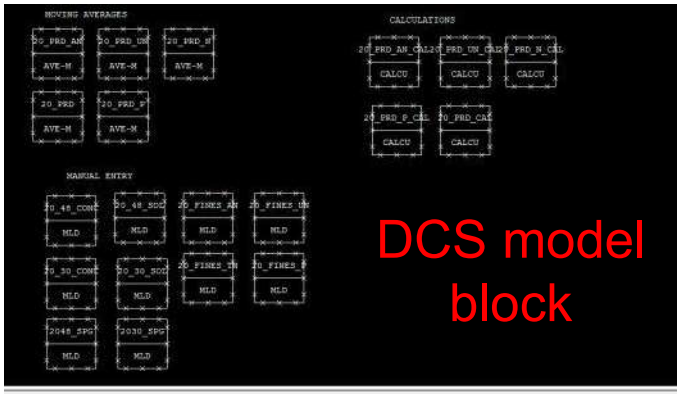
(located at cooler outlet or product belt conveyor sampling points)

NPK Predict Model ::: System Definition

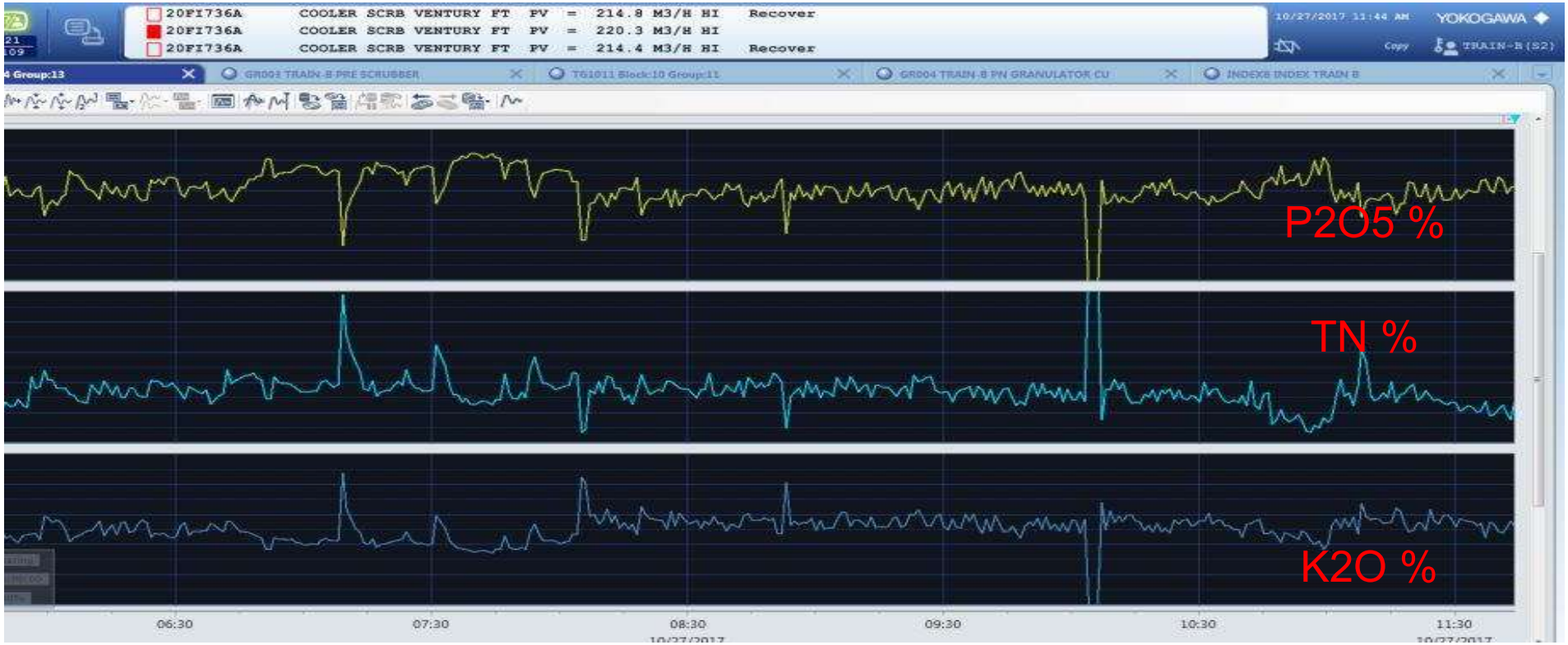


NPK predict :: ONLINE model..

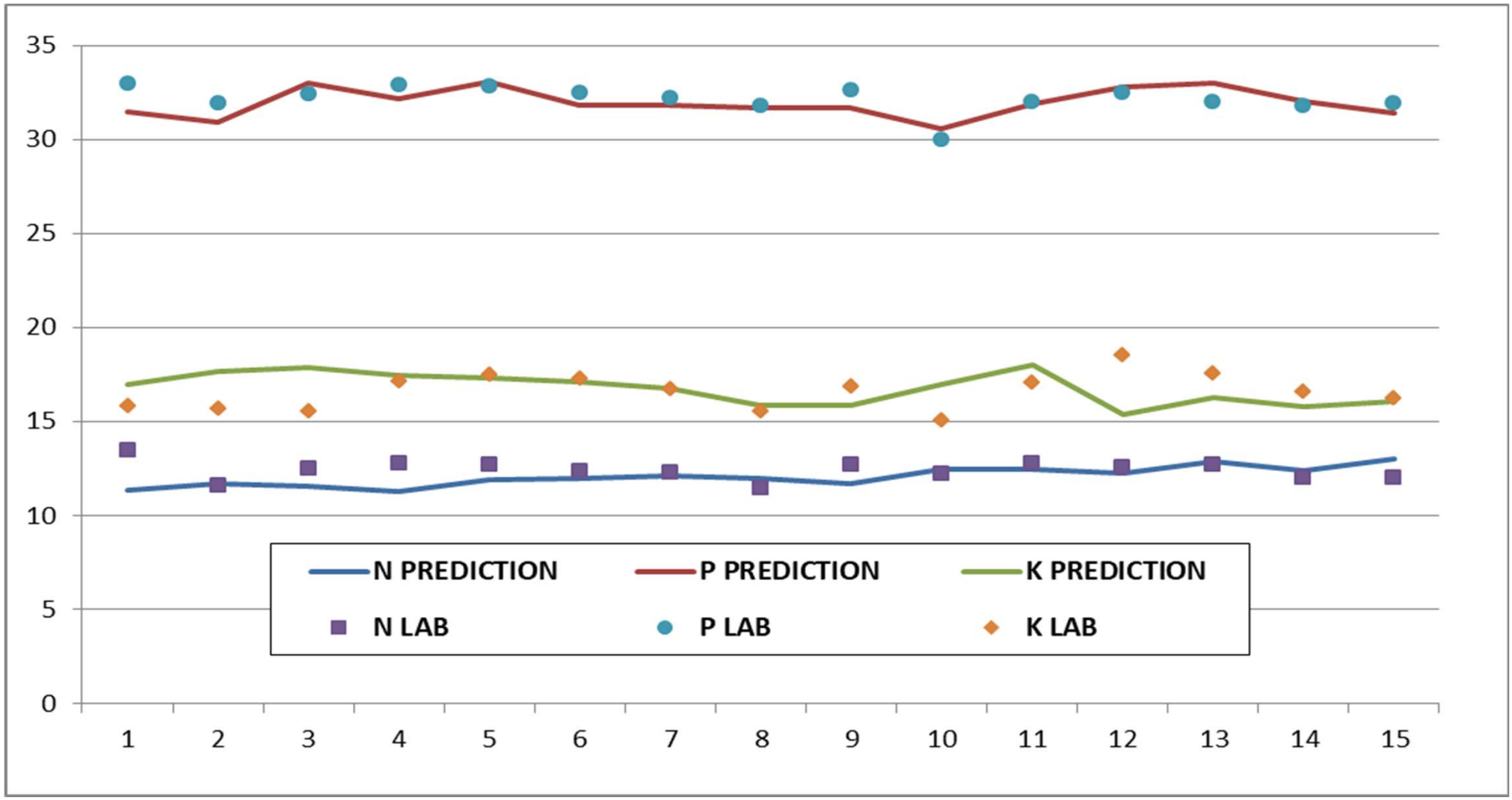
NPK Predict :: ONLINE Model
as implemented in B train



Model Prediction Trends



Online Model Validation – Different Grades



NPK Predict Overall Result

N% prediction :: 94.5%
P% prediction :: 97.4%
K% prediction :: 94.2%

NPK Prediction Model – Prediction & Control

>> Nutrient (Product Quality) fluctuations.

>> Actions : Nutrient Prediction Model, Auto Sampler, Input Flow controller Tuning

** analysis over Twelve Days of production data **

BEFORE → **AFTER**

	N	P	K
Avg.	X	Y	Z
Std Dev	0.52	1.00	0.89
Min	-0.3	-1.0	-1.5
Max	+1.9	+2	+2.9
%>UCL	34.2%	39.7%	21.9%
%<LCL	0.0%	15.5%	16.4%

	N	P	K
Avg.	X	Y	Z
Std Dev	0.34	0.64	0.68
Min	-0.2	-1	-1
Max	+1.5	+1.5	+2
%>UCL	23.6%	26.8%	17.1%
%<LCL	0.0%	3.2%	2.3%

15 - 20% Lower Rejection

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Ammonia and Urea Plant: Plant Wide Fluctuation Assessment and Root Cause Analysis

1. KPI variability assessment for Ammonia and Urea Plant. (Production, NG Conumption, Steam, Power and Energy consumption).and Quality parameter variability assessment
2. Process Variables data variability Assessment (Input variables, Inprocess variables and Output variables from each section of the Ammonia and Urea plant almost up to 500 Process Variables).
3. Controller Performance Evaluation for all types of situations (Disturbance, Rejection, Set Point Change . .) to be analysed. (almost up to 200 control loops in typical Ammonia and Urea Plant) and Diagnosis for underperforming control systems and establishing reasons for the same.
4. Benchmarking of Fluctuation and their impact on KPIs (Energy Efficiency and Productivity.)
5. Potential to Implement new Feed forward logics and development of Soft sensors to be Evaluated.
6. Establishing overall scope for reduction in “Plant Wide Process Fluctuations” and Potential IMPROVEMENT in the performance of High Level Controller (APC).

Harnessing Data , Creating Value

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Ammonia Plant: Process Fluctuation Analysis Summary

Overall Variability Heat Map

	I	P	O
NG PREHEATER	60	25	15
Final Desulphurisation Section	-	25	10
Primary Reforming Section	50	70	10
Secondary Reforming & Steam Drum	75	45	30
CO Shift Conversion	15	10	25
CO2 Removal Section	40	50	75
Methanation Section	80	65	10
Synthesis Section	65	30	85
DM Water & Steam Condensate	70	90	-
Steam Circuit	15	-	70
Process Air & Instrument Air	10	-	-

0 - 20	Stability
20 - 40	
40 - 60	
60 - 80	
80 - 100	Unstability
-	No Variables categorized

- **Input Variations :** Some of the input variables like NG fuel and NG process gas , Process air, Combustion Air, Steam and Recycle gases shows abnormal oscillations they could be due to Cascade effects and Abnormal controller behaviour or continuous disturbance from the APC >> These input variations to be studied and Root cause for that to be established.
- **Inprocess Variations :** Inprocess Variables (such as Primary Reformer Combustion Air Temperatures, Excess Oxygen,H2/N2 Ratio, Primary Reformer Collector Temperature 2, Reforming Temperature, Methanator Temperature, WHB level etc >> Further investigation of the controllers required.
- **Output Variations :** Once Input and Inprocess variations stabilised then automatically these output variations will be controlled.

Ammonia plant Control Systems Analysis Summary

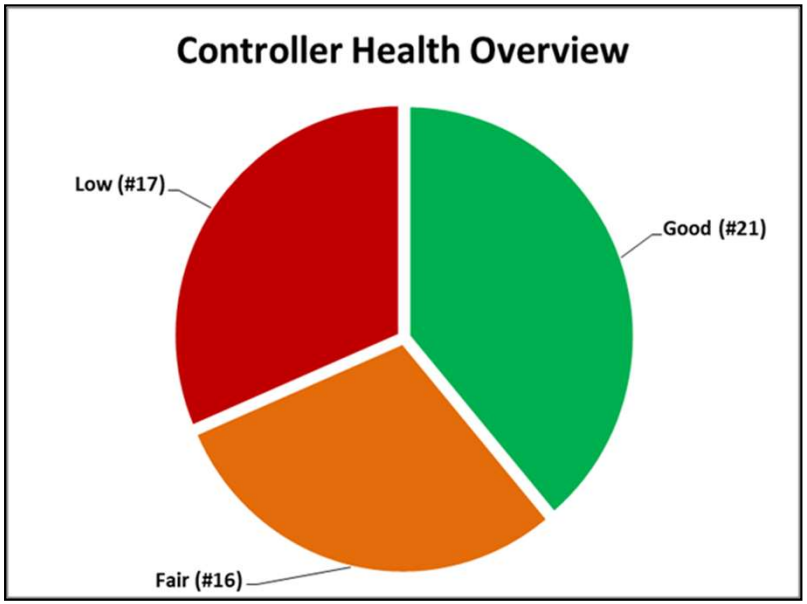
OVERALL Base Case Performance Assessed and Classified using OPTIMakxCORP ®

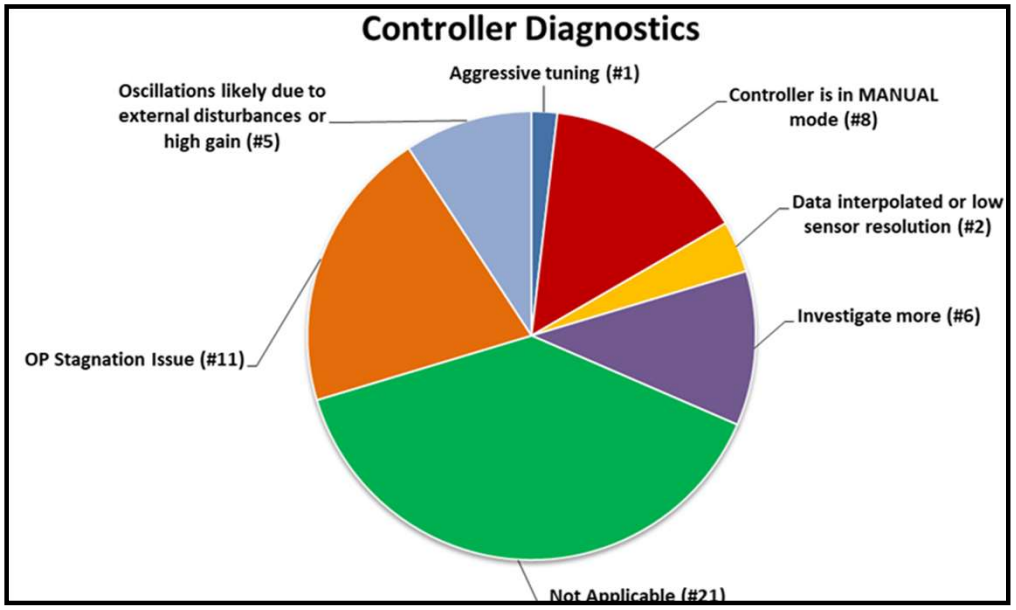
Classification based on average controller error%.

GOOD – working well in AUTO, FAIR – Need more observation, POOR– SubOptimal (scope for improvement)

OPTIMakx PID performance : Overall

Total 54 loops = 21 in Good + 16 in Fair + 17 in Low performance (Scope for Improvement)



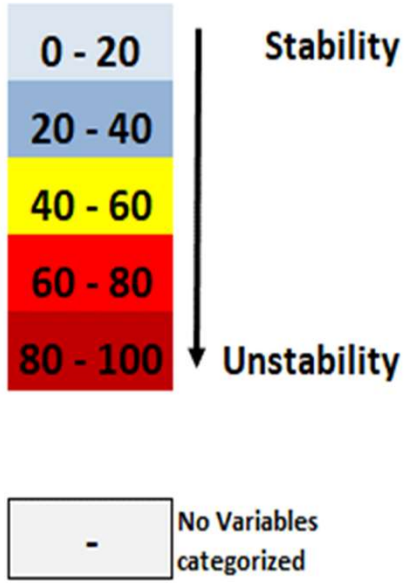


- Nearly 39% of the loops are stable and need no intervention
- 30% loops needs observation and action
- Remaining 31% (17 loops) are underperforming with scope for improvement.

Urea Plant : Process Fluctuation Analysis Summary

Overall Variability Heat Map

	I	P	O
Synthesis Section 1 and 2	70	25	10
First and Second Stage Rectifying Section	65	85	15
Vaccum and Crystallisation section	20	70	-
Prilling Section	60	75	25
Utility Section	-	85	10
Hydrolyser Stripper Section	15	65	25



- **Input Variations :** Some of the input variables (Ammonia inlet flow, preheater temp,CO2 from regenerator,CCP main pump discharge pressure, CCP suction flow and Steam pressure inlet to Remelter heater) shows abnormal oscillations they could be due to Cascade effects and Abnormal controller behaviour >> These input variations to be studied and Root cause for that to be established.
- **Inprocess Variations :** Inprocess Variables (such as Reactor B bottom temperature, Ammonia Scrubber inlet temperature, Reflux condenser level tank outlet temperature ,Evaporator heater level , Urea Solution pump discharge, Prilling Tower) >> Further investigation of the controllers required
- **Output Variations :** Once Input and Inprocess variations stabilised then automatically these output variations will be controlled.

Urea plant Control Systems Analysis Summary

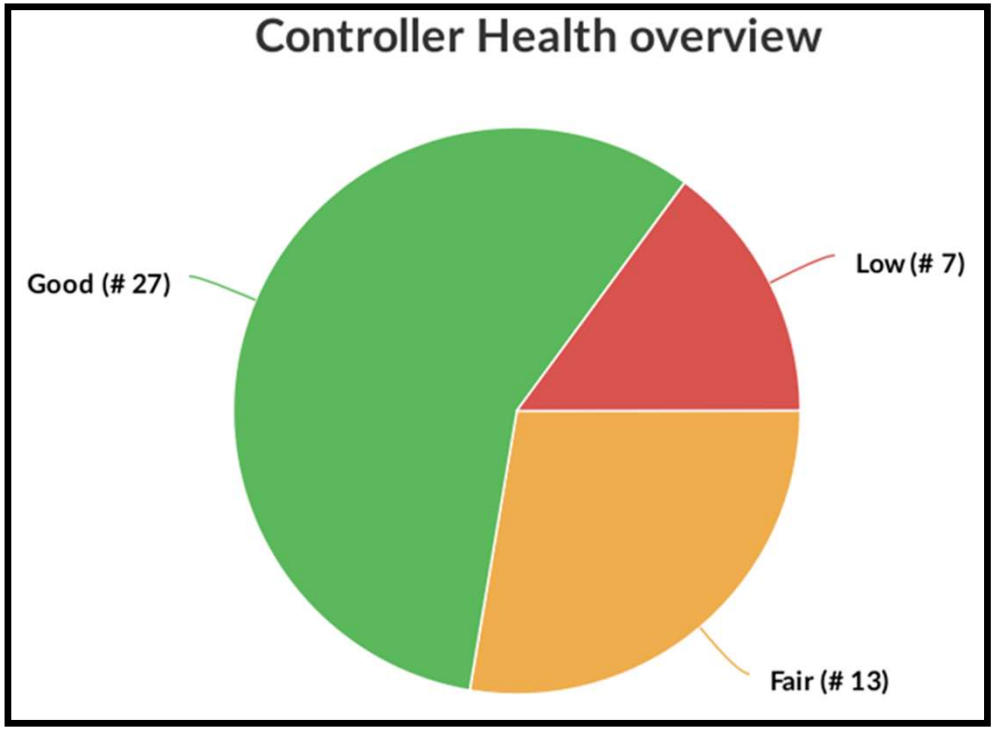
OVERALL Base Case Performance Assessed and Classified using OPTIMakxCORP ®

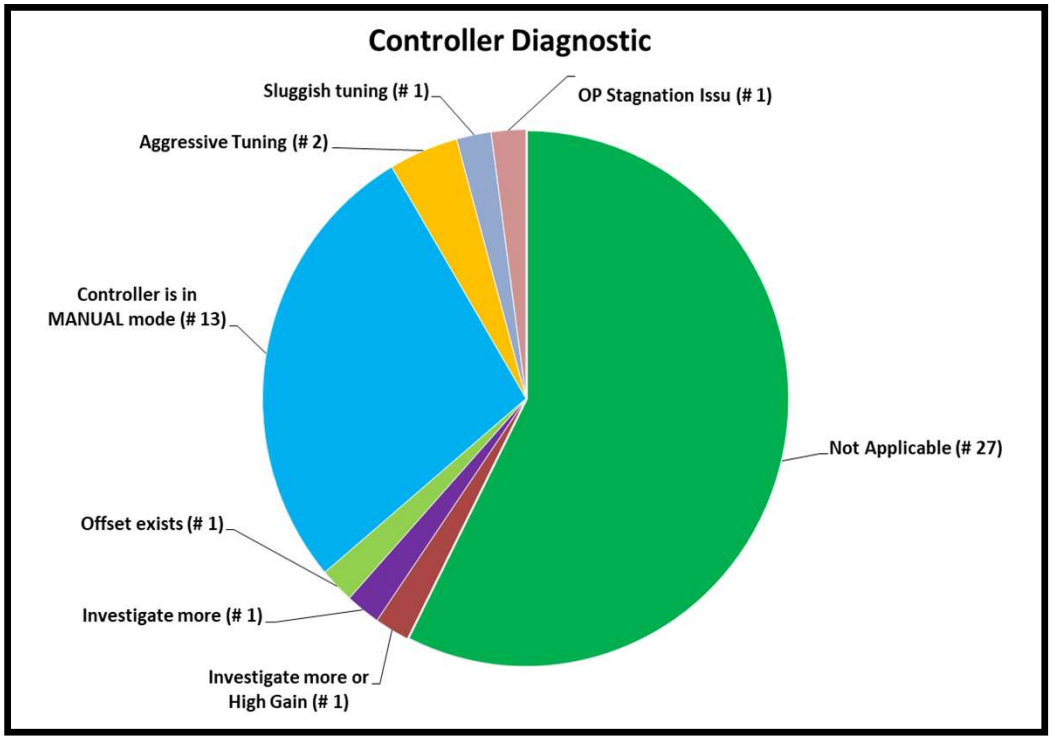
Classification based on average controller error%.

GOOD – working well in AUTO, FAIR – Need more observation, POOR– SubOptimal (scope for improvement)

OPTIMakx PID performance : Overall

Total 47 loops = 27 in Good + 13 in Fair + 7 in Low performance (Scope for Improvement)





- Nearly 58 % of the loops are stable and need no intervention
- 28% loops needs observation and action
- Remaining 14% (7 loops) are underperforming with scope for improvement.

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Pharmaceutical Plant: Plant Wide Fluctuation Assessment and Root Cause Analysis

- **PID Optimization** for Temp/Flow/RH /pH/Ozone control @ Coating Machines, FBDs, Packing m/cs, WTP
- **AHU :** performance review, detecting limitations, optimizing responses
- **VFD optimization** for major drives on blowers, compressors and fans
- **Valve diagnostics**: Nonlinearity assessment of all process and actuator valves
- Assessment and diagnosis of rejection/quality inconsistency data.

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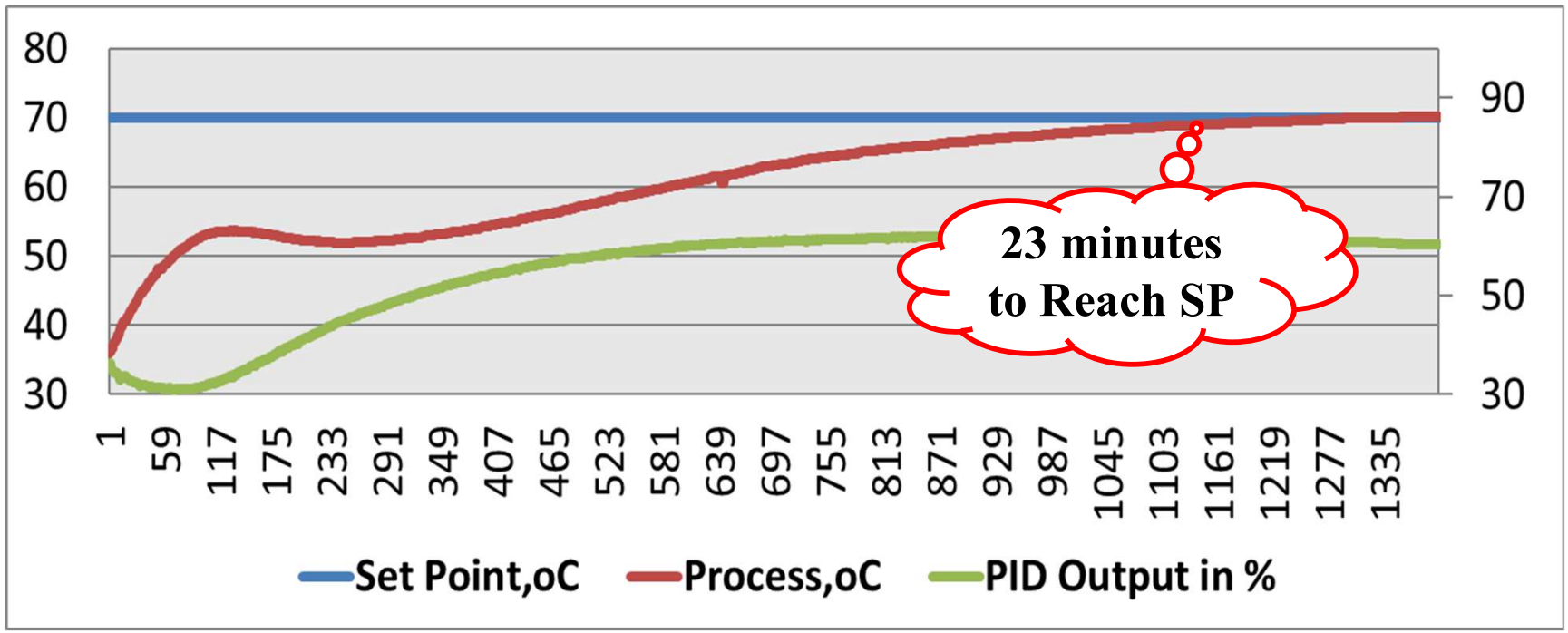
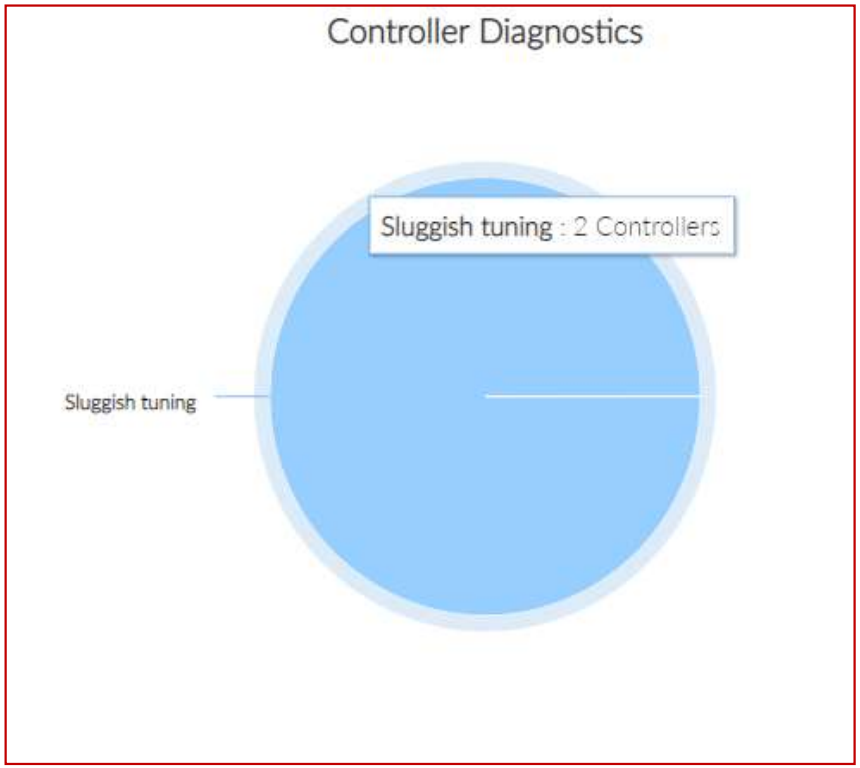
Coating Machines : DigitEyes tool Video to Data conversion



Temperature Control loop	AUTO
Absolute Control Error %	19.74



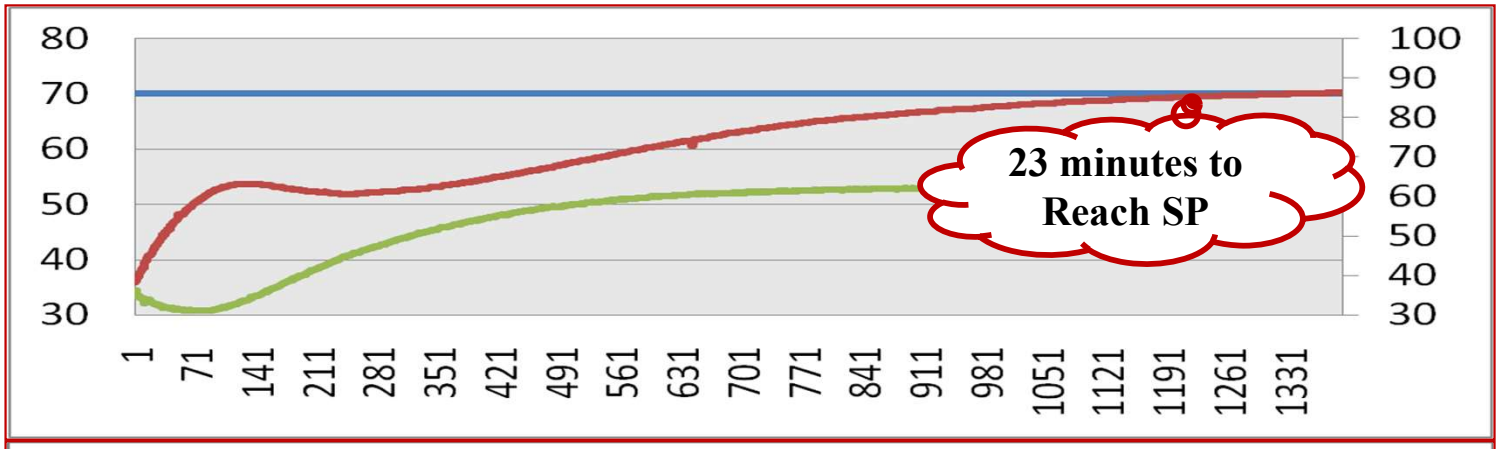
Assessment clearly showed that both the loops have higher controller error during Start-up cycle.

Diagnosis Results: Sluggish Tuning

Suggestion: Increase gain by up to 25%.
Observe More for 2nd round improvement .

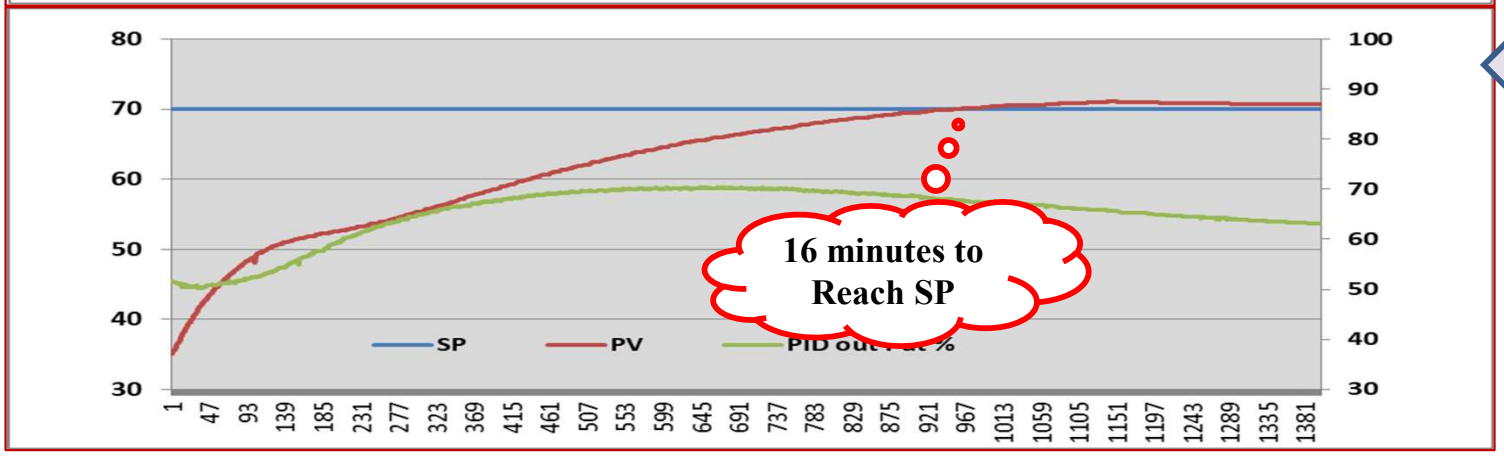
Loop Name	Loop Type	Status	Diagnosis	Osc.Status	Var.Idx	Avg.Abs.%.Err	Ctrl.Elem.Reversals/hr	Ctrl.Elem.Travel/hr	Tot.Sat %	Ov
LupinGoa_GAC006TIC	Temperature	Low	Sluggish tuning	Non Oscillatory	0.1067	5.0322	286.9703	138.5275	0	
LupinGoa_GAC004TIC	Temperature	Low	Sluggish tuning	Non Oscillatory	0.0762	4.4889	111.2472	69.2539	0	

Coating Process : Temperature Set Profile- @ start up " Stage wise improvement



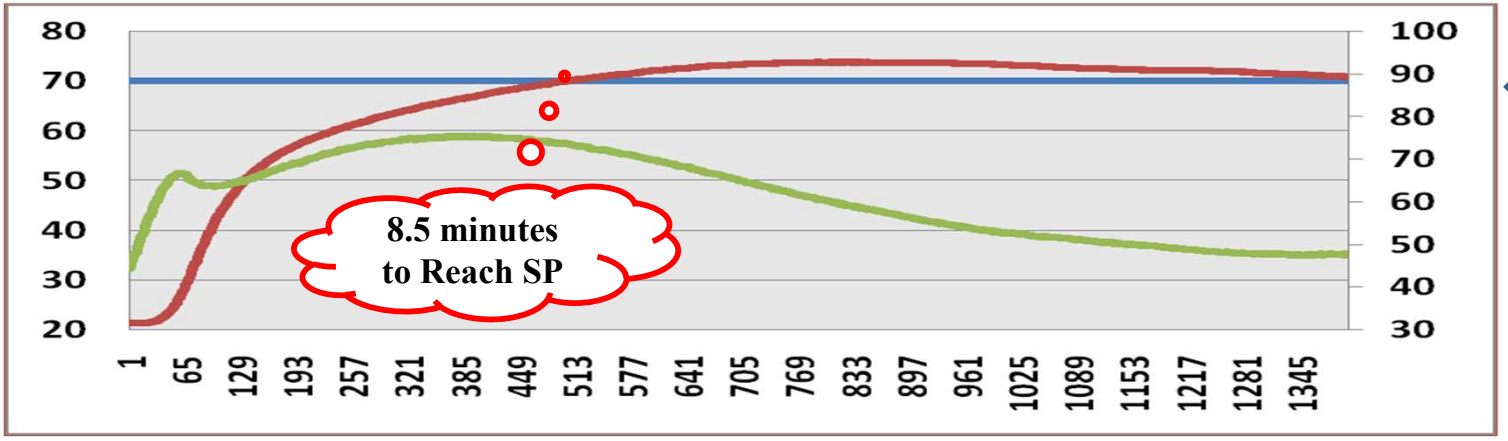
Before

Temperature PID loop	Before
Control Error%	19.74



After 1st Stage

Temperature PID loop	After
Control Error%	11.3



After 2nd Stage

Temperature PID loop	After
Control Error%	10.1

Similarly Assessment and Optimisation of "Inlet Hot Air Temperature PID System" done at all 5 Coating Machines using "OPTIMakx" assessment tool.

Optimization of FIVE other Tablet Coating Machine

➢AKXA team with Lupin Team successfully optimized Inlet Hot Air Temperature for the Set points of **25,70/65,55/50 and 80°C for all five coating machine and Observation given for Limitations.**

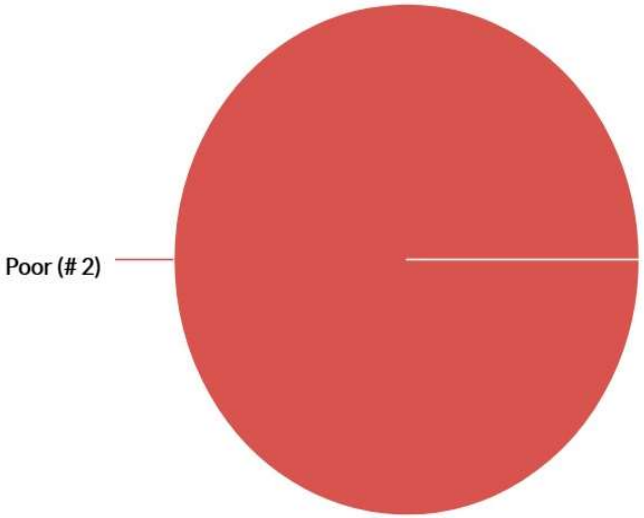
Tablet Coating Machine	Inlet Hot Air Temperature Set point				Remarks
	80 °C	70/65° C	55/50° C	25°C	
GAC600	√	√	√	√	Optimized for All Temp Set points
GAC800-900	x	√	√	√	Steam Valve saturation at 80 degree cent - Design capacity
GAC1200	√	√	√	√	Optimized for All Temp Set points
GAC1500	x	√	√	x	Steam Condensate Drain Issue
GAC1700	√	√	√	x	Chilled Water Circulation issue

➢ Overall Result:

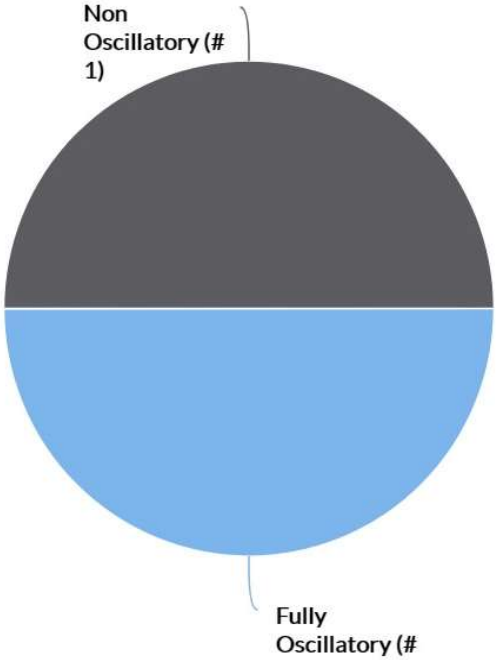
67% **reduction in Idle Time** (higher machine and labour productivity) + **52% reduction in Steam Wastage** (during the start Up period and also for Re-Starts during Power Failures) + **Quality consistency** as the Set Point is not allowed to deviate for longer time during any unscheduled stoppage.

Ozone and pH OPTIMakx assessment with base case data….

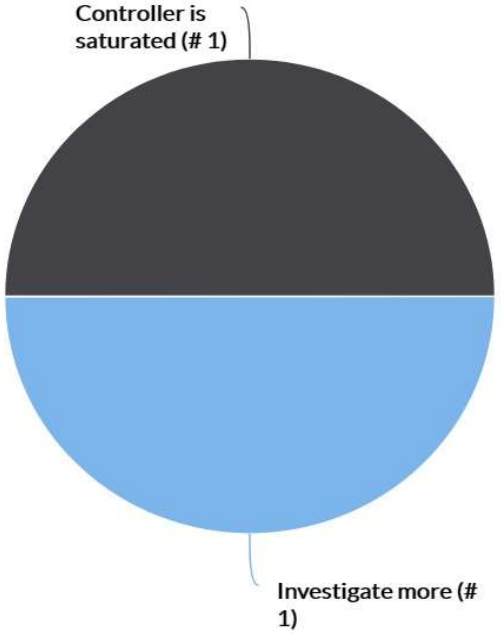
Controller Health Overview



Controller Oscillation Characteristics



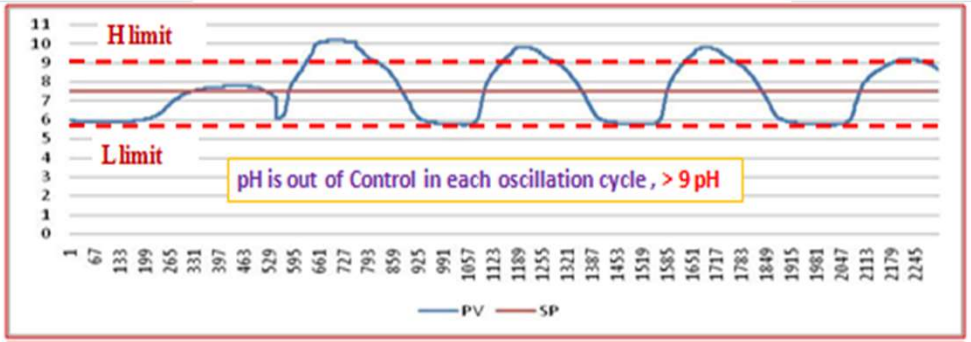
Controller Diagnostics

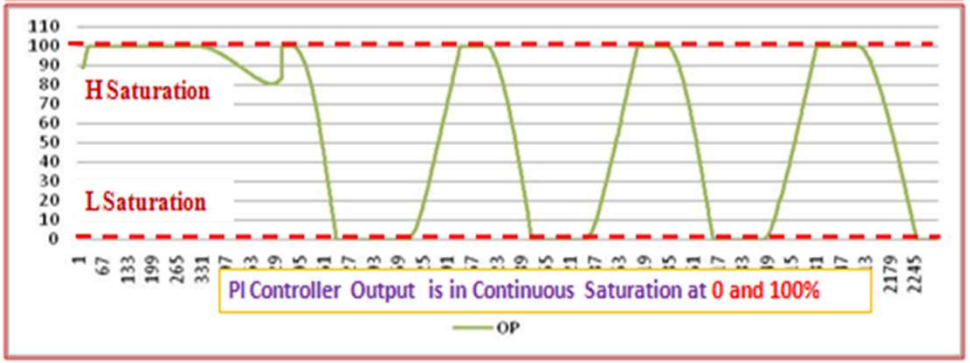


Controller Name	Status	Diagnosis	Osc.Status	Avg.Abs. %.Err	Tot.Sat %	Overshoot %	Out of Control %	High.Sat %	Low.Sat %	P/V.Std. Dev.
LUPINGOA_PWS Ozone	Poor	Controller is saturated	Non-Oscillatory	35	90	209	34	25	65	23.6
LUPINGOA_PWS pH	Poor	Investigate More or Ext. Disrturb.	Fully Oscillatory	17.8	51	36	70	28.	23	1.5

pH Control :Before/After Optimization Results

BEFORE





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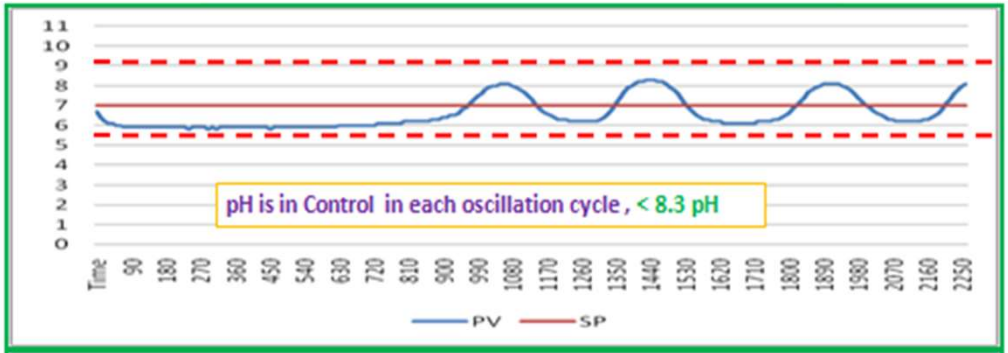
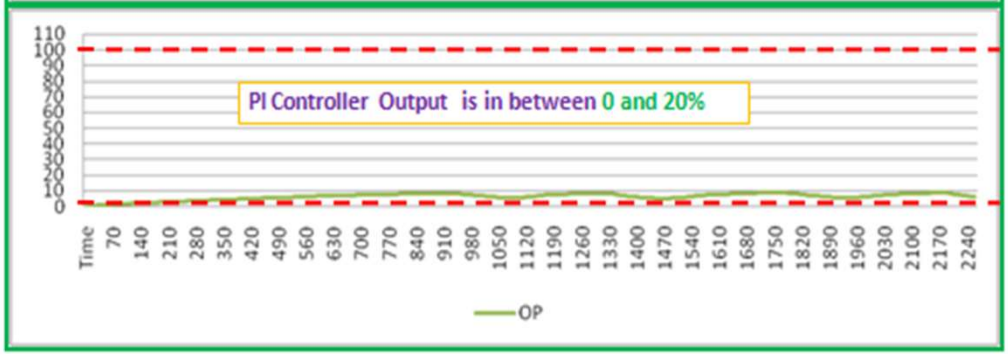
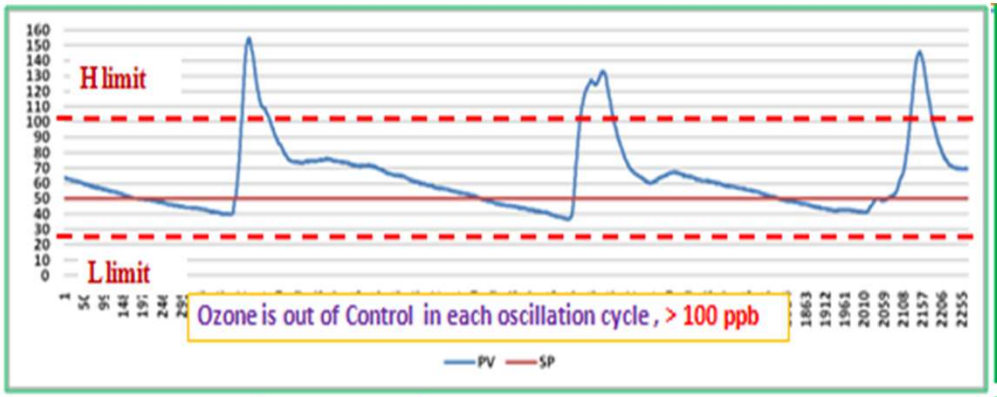


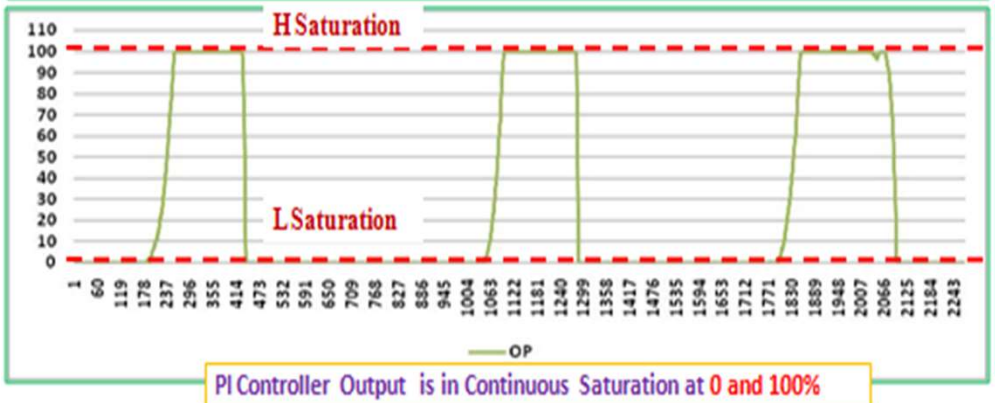


pH Set point 7		BEFORE	AFTER	
		Base Case	Stage 1 Improvement	Stage 2 Improvement
pH	Minimum	5.7	5.8	5.8*
	Maximum	10.2	8.4	8.3
	Average	7.6	7.3	6.9
Controller Performance Indicator	Diagnosis	External disturbance	Not Applicable	Not Applicable
	Avg.Abs.% Control Error	17.8	10.5	10.2
	Total OP Saturation %	48	0	0
	pH Overshoot %	36	12	19
	Out of Control % (6 to 9 pH)	70	23	0
	pH Standard Deviation	1.5	0.8	0.8

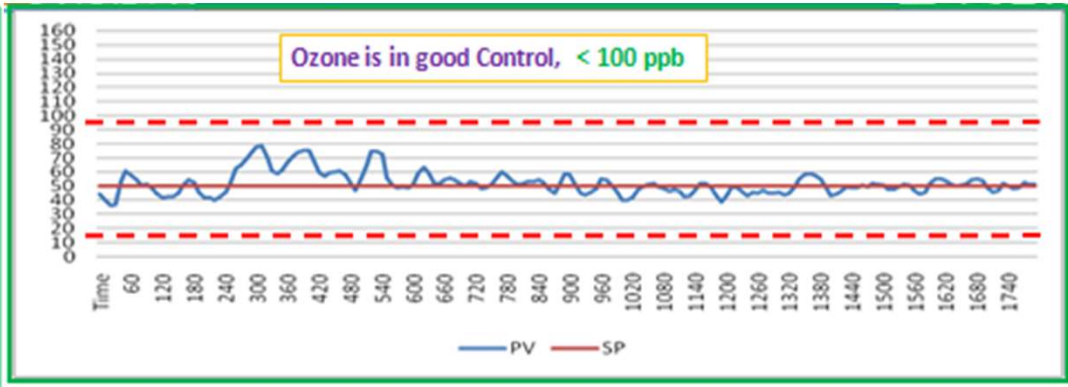
Ozone Control :Before/After Optimization

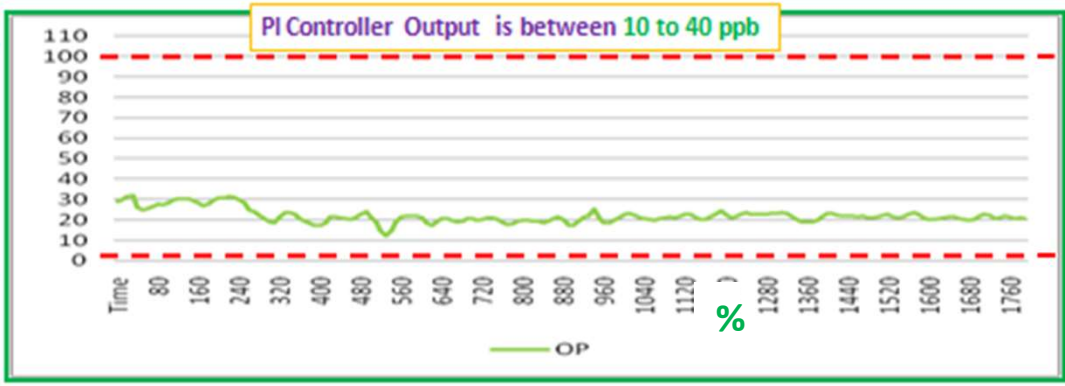
BEFORE





AFTER





Ozone Set point 50 ppb		BEFORE	AFTER	
		Base Case	Stage 1 Improvement	Stage 2 Improvement
OZONE	Minimum	37	31	36
	Maximum	155	78	79
	Average	64	50	50
Controller Performance Indicator	Diagnosis	Controller saturated	Not Applicable	Not Applicable
	Avg.Abs.% Control Error	35	16.8	7.4
	Total OP Saturation %	90	0	0
	Ozone Overshoot %	209	56	57
	Out of Control % (Range limit 40 to 100 ppb)	34	16	0
	Ozone Standard Deviation	23.6	10.7	4.8

AKXA TECH PVT. LTD.

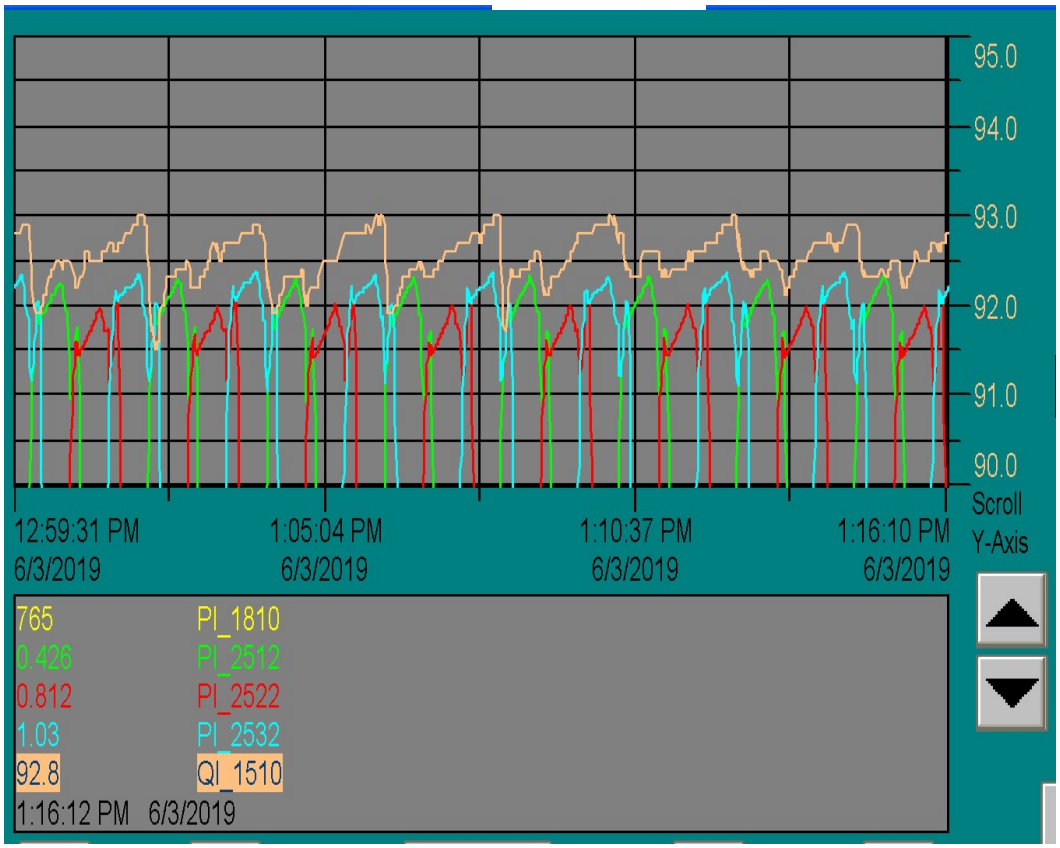
Food Plant Utility Section: Plant Wide Fluctuation Assessment and Root Cause Analysis.

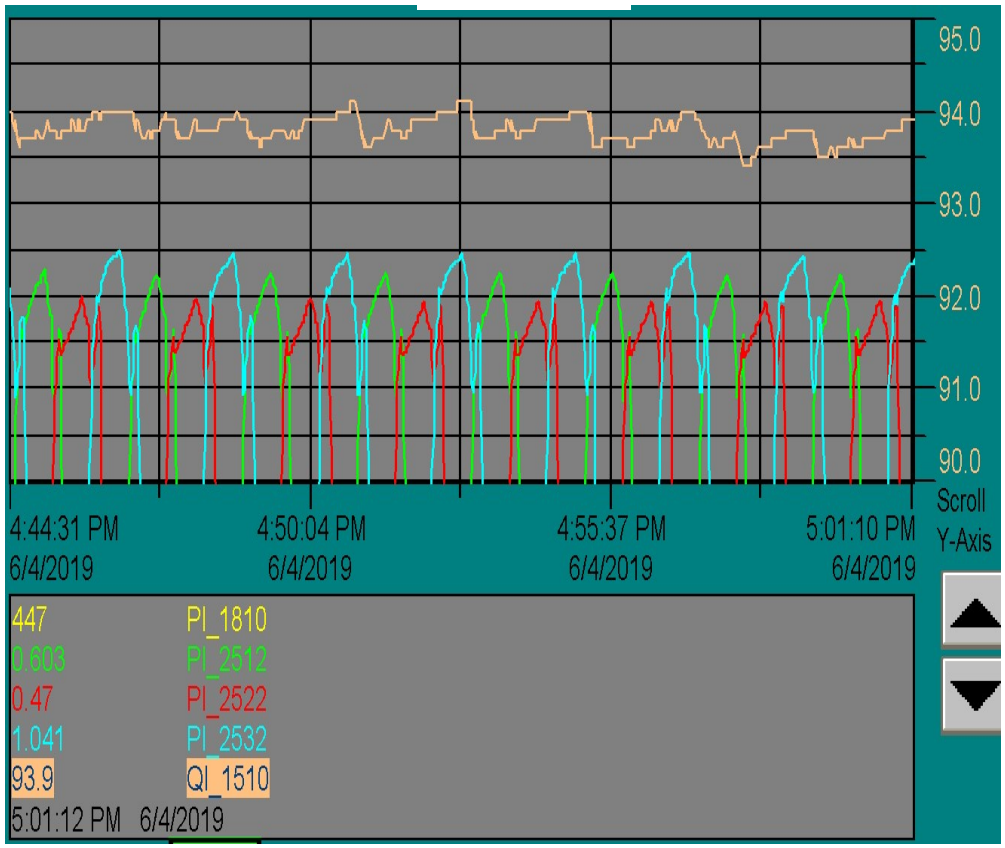
Harnessing Data , Creating Value

www.akxatech.com
contact@akxatech.com
+91-9243209569

Oxygen Plant O2 Purity Improvement….

BEFORE → **AFTER**



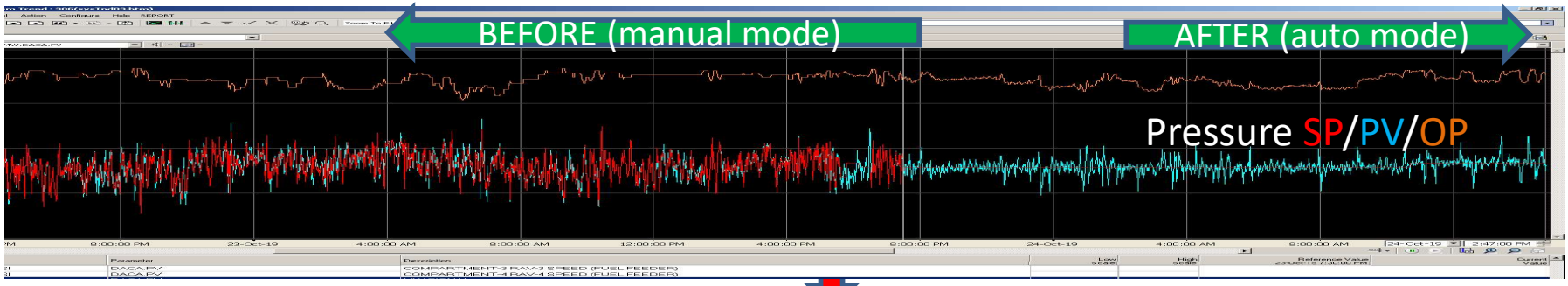


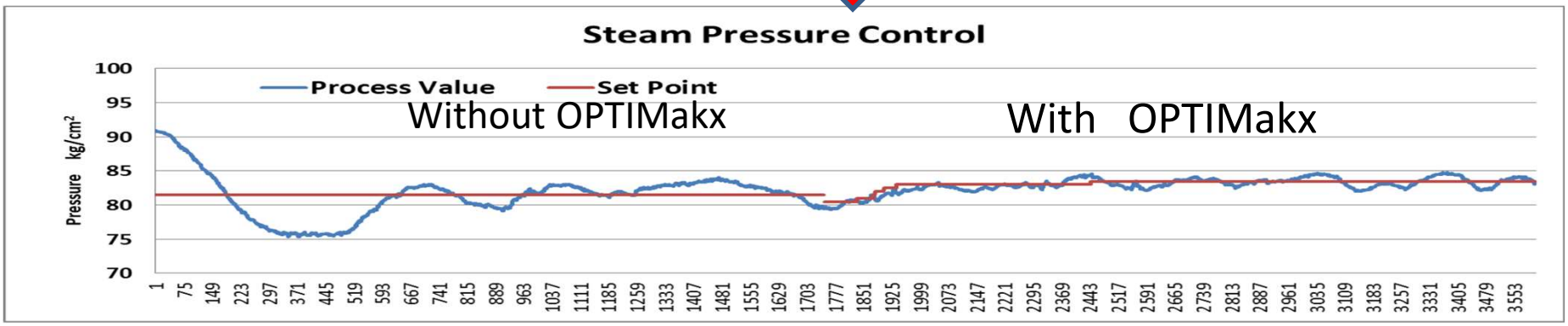
+3%
Higher Purity Average

+75%
LOWER Liquid O_2

Saving 2,00,000 $ /yr

BOILER : Steam Pressure Variation Optimisation





Parameter	BEFORE (24 hrs)	AFTER (24 hrs)
Average Stream Pressure (kg/cm2)	84.8	84.05
Steam Pressure Std. Dev.	5.2	2.1
Heat Rate (Kcal/kWH)	3207	3172

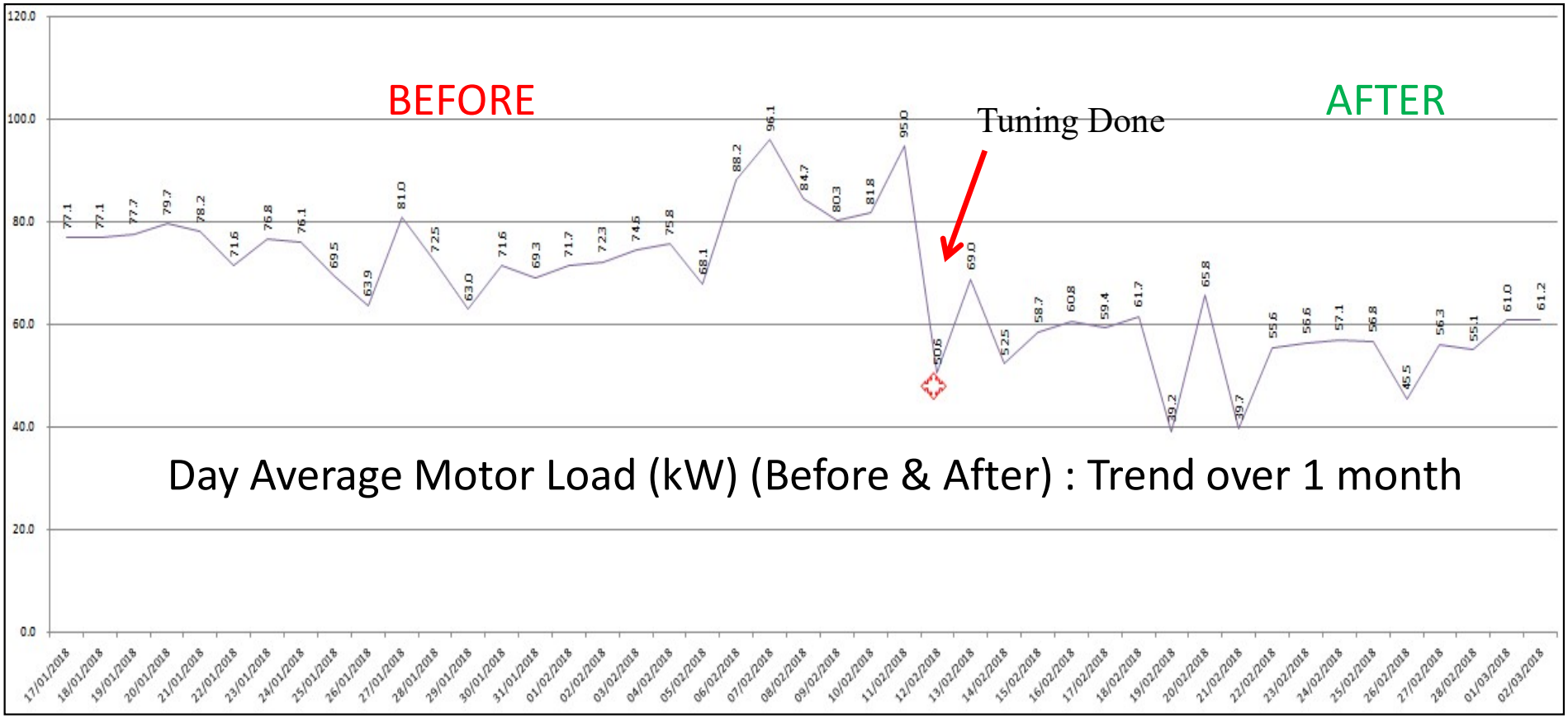
1%
LOWER
HEAT RATE

Effect of VFD setting optimisation for Compressor...

* STEEL PLANT - UTILITY SECTION * *(Danfoss VFD panel : Data through RS 485 logger)*

>> Issue: RPM saturation at upper limit and Aggressive Response by VFD for load changes

>> ACTION: VFD panel settings for Process Control Module - optimized



17% Lower kW

300 units / day savings

OPTIMakx – usage / commercial options

- **TRAINING** (on site, customized workshops, offsite at IITs)
- **AUDIT SERVICES** (site visit, benchmarking, scope identification)
- **ANNUAL CONTRACT** (continuous improvement, assured benefits)
- **SUBSCRIPTION** (SAS mode, Remote Access, IoT based Alerts)
- **PRODUCT** (Potable Device, onSite Installation, Corporate Licensing)
- **CASE SPECIFIC PROJECTS** (Troubleshooting, Optimisation, WCM, Industry 4.0, Virtual Sensors, Early Warning Systems, Predictive Models)

Stagewise Time Line ....

Project Execution Stages and Time Line (Total : 8 to 10 Weeks)

KICK OFF MEETING online / opening meeting with key stake holders

START

PRE-AUDIT CHECK list with plant, facilities, equipment and capacity details

1 Week

DATA COLLECTION customized template, long range/short range data

2 Weeks

DATA ANALYSIS Variability in KPI, PV, Quality, Equipment performances

2 Weeks

ASSESSMENT Gaps, scope for improvement, impact on savings/ROI

2 Weeks

REPORTING Detailed Technical Report, Review Presentations, Action Plan

1 Week

RECOGNITIONS /CLIENT TESTIMONIALS

Certificate No.:DIPP2649

Department of Industrial Policy & Promotion
Ministry of Commerce & Industry
Government of India

CERTIFICATE OF RECOGNITION

Department of Industrial Promotion and Policy

This is to certify that ***AKXA TECH PRIVATE LIMITED*** incorporated/ registered as a ***Private Limited Company*** on ***28-07-2016,*** is recognized as a startup by the Department of Industrial Policy and Promotion.

Date of Issue: 22-04-2017
Place of Issue:New Delhi

The certificate shall only be valid for the entity:
- Up to five years from the date of its incorporation/ registration; and
- If its turnover for any of the financial years has not exceeds Rupees 25 crore.

Note:
- **Authorities accepting this Certificate may check its validity on the Startup India portal(www.startupindia.gov.in)**
- This certificate is not the Certificate issued by the Inter Ministerial Board and is not valid for availing Tax benefits
- This is a system generated certificate and hence does not require physical signature

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Binani 38
BRAJ BINANI GROUP

Dated: 12th July, 2019

CERTIFICATE OF APPRECIATION FOR OPTIMISATION SERVICES

We herewith confirm in appreciation, that **M/s AKXA TECH PVT. LTD.** has successfully completed their technical service contract for "Process Fluctuation Assessment and Optimisation" using their unique tool "OPTIMakx" at **Goa Glass Fibre Ltd., Colvale Bardez, Goa Plant** (*vide., service contract order: 4504119429 dated 31.05.2019*). They have carried out troubleshooting and process optimisation activities at our **"Oxygen Plant"**section and have optimized the process for stable operation and improved product purity.

Adjustments of Cycle Step Times, Valve Responses and fine-tuning of operational settings and changes made in operational PID loops has directly contributed to **reduction of up to 75% average liquid oxygen (LOX)** consumption.

We are satisfied with the team AKXA's timely visits, dedicated efforts to resolve challenging problems and most importantly positive results. We are considering their services/products for further assignments in other sections.

We strongly recommend their expertise and services to other process plants.

Mr. P.V.V.S. Rao
(President – Operations)

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صـــناعـات أسمنت الفجـــيرة

www.fujairahcement.com
fujcem82@eim.ae

Date : 07/06/2018

CERTIFICATE OF APPRECIATION

This is to certify that M/s. AKXA TECH PVT. LTD., India has provided "OPTIMakx" technical service at Fujairah Cement Industries, UAE during the period of 13th Jan 2018 to 20th Jan 2018 (vide our Works Order – W/025/002 dated 06/12/2017). They have carried out various troubleshooting and process optimization activities in Cement Mill-2 in order to stabilize the fluctuations and improve the mill performance.

Problems identified, resolved and changes made in air flow circuit & mill internals, stabilization of auto feeding and water spraying systems have contributed to overall **improvement of 8% in the production and Mill output**. Their expert services were useful in identifying bottlenecks, conducting trials with improved settings and making several observations for further improvement.

We are satisfied with the AKXA TECH's efforts and involvement and appreciate their contributions and we highly recommend their expertise services to other plants.

With best regards,

For 'Fujairah Cement Industries'

Adi Narayana Murthy
Works Manager (Acting)

Saqib Azamul Quadri
Sr. Manager-Prod. & Quality Control

Penna Cement Industries Limited.

LETTER OF APPRECIATION FOR SERVICE PROVIDED

This is to certify that **M/s AKXA TECH PVT. LTD.** has successfully completed their technical servicecontract for "Process Fluctuation Assessment and Control System Optimisation" using their unique tool "OPTIMakx" at our PCIL-Boyareddy palli Cement Plant (*vide., works order number : PCIL/WO/02/2017-18 dated 22.03.2018*).

Their audit visits involved assessment and diagnosis of all major control systems, weigh feeder responses and PID responses in PYRO and Mill sections. Their optimisation activities have helped us stabilize the fluctuations in PC Temperature, Hood Draft and Undergrate Pressure in PYRO section. Variability in Feeders, Pre-Calciner temperature variation and hood draft fluctuations have reduced by over 30% from base case and PIDs are running consistently stable in AUTO mode.

This has contributed indirectly for improvement in our plant performance to achieve consistently higher clinker production over last six months and savings in Specific Fuel consumption of upto 0.3%. Their recommendations in cement mill section also have helped us to improve the monthly average specific power consumption by 2%.

We are satisfied with the AKXA TECH's services and contributions.

Place: Boyareddy palli, AP.

Date :11th July, 2019

Yours Truly

Mr. C. V. Subba Reddy
(GM – Production and QC)

CII
Confederation of Indian Industry

18th National Award for Excellence in Energy Management 2017

This is to certify that

AKXA TECH PVT. LTD.

Has been rated as "Innovative Energy Saving Product"

This is being given on completion of the National Competition For Excellence in Energy Mnagement held on 30 ,31 August & 1 September 2017.at Hyderabad

S RAGHUPATHY
Deputy Director General
Confederation of Indian Industry

MEHER PUDUMJEE
Chairperson - Energy Efficiency Council
CII – Godrej GBC

L.S.GANAPATI
Chairman
National Award for Excellence
In Energy Management 2017

BIRLA SHAKTI CEMENT
Trusted Technology - Solid Strength

KESORAM
www.kesocorp.com

Date: 10th August, 2017

TO WHOMSOEVER IT MAY CONCERN

This is to acknowledge in appreciation that the specialized services offered by **M/s AKXA TECH PVT. LTD.** in the area of "control systems data analytics" are unique, technologically advanced and beneficial for process optimisation.

The training program, they conducted for our technical team on 8th August, 2017 on ***"Performance monitoring, assessment and optimisation of process control systems"*** was very insightful, practical and effective.

We positively recommend their innovative "decision support system" products/services to continuous process plants with basic automation system.

We also wish them best of success in their technology Start Up venture.

G. Raja Rao
GM - Instrumentation

FAPCCI

Anjani Portland Cement Ltd

15.07.2016

TO WHOM SO EVER IT MAY CONCERN

Aqua Alloys Pvt. Ltd., (AAPL) has supplied Coal mill liners to Anjani Portland Cement Ltd., and the liners were installed in the month of April, 2016. We requested AAPL to study the performance of the mill after liners installation. AAPL representatives Dr. Raghuraj K. Rao & Mr. Vinayak Jambotkar, have completely studied the performance of Coal Mill operation and given the below suggestions.

a) Continuing to run the mill feed Vs mill sound level in PID control by keeping feed limits between min 12 tph to max 18 tph with a sound level of 40-45 dB.
b) To remove 3 MT of bigger size grinding media from the mill. This will create more grinding volume to handle higher recirculation load in present case.
c) Considering the finer size raw coal and PC coal fines, it is suggested to top up only 40 or 50mm media as top up size whenever required in future.
d) Gradual improvement in media and liner surface (over minimum two three months) will bring the charge to equilibrium distribution which will further contribute to higher output.

Coal mill output has been increased to 16-17 tph against the rated capacity 12-13 tph.
APCL is appreciating AAPL team for quick response on APCL request and assessed the performance of Coal mill operation and contributed in improving the output.

Vice President (Works)
APCL, Anjanipuram.

Dalmia
Bharat Cement

newthink! cement! sugar! refractories! power!

TO WHOMESOEVER IT MAY CONCERN

This is to certify that **M/s AKXA TECH PVT. LTD.** has successfully completed their technical service contract for "Process Fluctuation Assessment and Control System Optimisation" using their unique tool "OPTIMakx" at Dalmia Cement (Bharat) Ltd., Yadwad Plant (*vide., service contract order number : 8000005742/PBS dated 22.06.2018*). As part of this they have carried out various troubleshooting and process optimisation activities in PYRO section in order to stabilize the process and improve the performance.

We have changed the PID settings of Calciner temperature controller as well as Cooler Lane DP controller as per recommendations of M/s AKXATECH and we are satisfied with the above mentioned PID operations which has helped to improve stability in Kiln & cooler operations.

We recommend their expertise and services to other process plants.

We also wish this new Tech Start Up company team all the very Best and success in their venture.

Place: YADWAD, Belagavi.

Date : 25th June, 2019

Anil Mishra
(Technical Head)

THANK YOU..

"Give us chance

to bring the BENEFITS of INNOVATIVE CONCEPT and ADVANCED TECHNOLOGY to your PROCESS PLANT.."

for Training, one time AUDIT, Annual Service Contract, Projects, Products

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Head-Technical Services
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