UGEE CHEMICALS	HHC MSG SOP	SOP Standard Operating Procedure

PROCESS CONTROL STRATEGY		
SOP #: UCL/IBDMSG/CD/Q/12.0	Issuance Date:	As at Last Signature	
	Revision Date:	Maximum 2 years from effective date	
	Effective Date:	20 working days from the issuance date	Page #: 1 of 28

PURPOSE:

To outline the measures and procedures to which the MSG Department will adhere in ensuring we consistently produce superior quality products for the consumer with minimal process interruptions. This document prescribes our mission to operate a stable, predictable process and to attain materials and process optimization benefits.

SCOPE:

This SOP outlines the control strategies involved in the total cycle of making synthetic granules. It also provides guidance in training and qualification in Ibadan HHC MSG department.

RESPONSIBILITY:

- Department Process Control Strategy Owner to ensure the Process Control Strategy is updated.
- All MSG Department Personnel are required to follow Process Control Strategy.
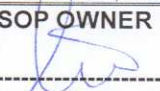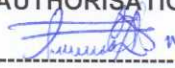
POTENTIAL RISKS

- Not Applicable

REQUIRED PPE:

- Not Applicable

PROCEDURE:

PCS ELEMENTS

Our Process Control Strategy will be derived from the following:

- Quality Evolution Chat (QEC)
- Manufacturing Standard
- RMPI for raw materials
- Process Centerlines and Reblend Matrix
- Formula Card Requirements: addition weight control, manual pre-weighing etc
- Quality Testing and In-Process Checks; RM activity testing
- Statistical data recording and trending
- Alarming and Correction Protocols
- Performance Tracking (PPM Reporting, % PR, PC and Accuracy)
- Autonomous Maintenance (AM) & Preventive Maintenance (PM) Programs
- Standard Operating Procedures
- Education, Training and Qualification

| SOP OWNER	QA APPROVAL	HSE APPROVAL	AUTHORISATION
---------------	---------------	-----------NA-------------	--------------------
Agbadu Lawrence	Alawode Olujide		Nadeeb Daramola
Date:	Date: 11 Feb 2022		Date:

- Education, Training and Qualification

PCS ELEMENTS IN MSG PROCESS

Making Synthetic Detergents involves six (6) process blocks. These are:

1. Raw Materials Receipt.
2. Crutching
3. ODOS Injection
4. Slurry Pumping
5. Spray Drying
6. Admix & Spray On

Fig 1: Unit Operations in MSG;
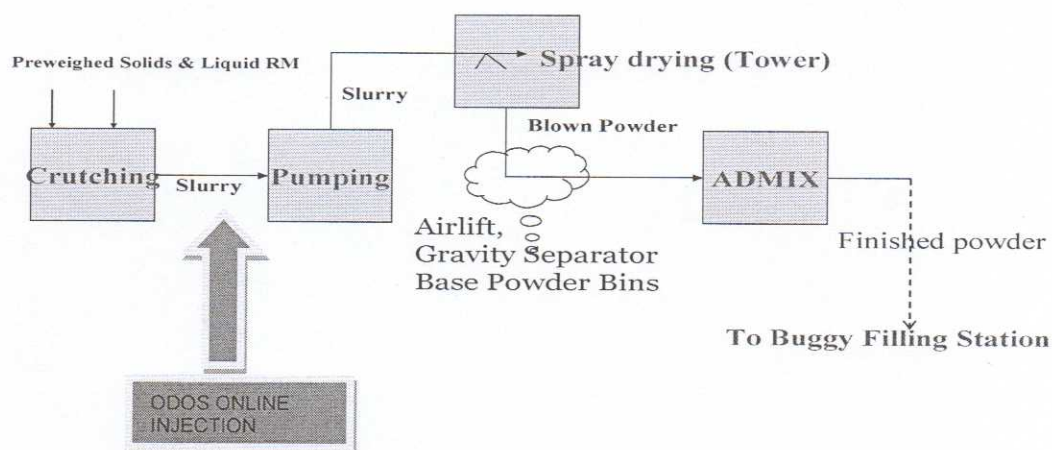
PRINCIPLES

A. Identifying all sources of quality failures and defects

Product quality failures and defects are introduced by 6 identified sources (also known as sigma). The imperative of the MSG Process Control Strategy is to identify the relative variability contributions from each of these sources and deploy actions aimed at controlling and eliminating them.

These sources are:

1. Raw Material Activity
2. Process Conditions
3. Analytical Methods
4. Addition Systems & Metering
5. Brand Change-over/ Start-Up/Re-blend Management
6. Homogeneity

$$\sigma^2_{\text{F.P. Quality}} = \sigma^2_{\text{R.M. ACTIVITY}} + \sigma^2_{\text{PROCESS CONDITIONS}} + \sigma^2_{\text{ANALYTICAL METHODS}} + \sigma^2_{\text{ADDITION SYSTEMS}} + \sigma^2_{\text{CHANGEOVER}} + \sigma^2_{\text{HOMOGENEITY}}$$

σ^2 represents variation (Square of Standard Deviation).

B. DMS, Work Processes & Reports

DMS, work processes and reports will ensure continuous improvement is the theme of department operations. Identifying the sources of product and process quality defects will set a clear priority of what parameters are critical to control. Once identified, these key parameters will be tracked, reported and controlled on a continuous, on-going basis. Our approach will comprise of:

- Internal PCS assessment would be conducted at least annually at the department.
- Daily Process Audits
- Data logging on Quality Windows (Level 0)
- PC & Accuracy Report for Addition Systems and Process Conditions (Level 1 & 2 reports)
- Material Storage Condition Tracking (Level 1 & 2 reports)
- MQS reporting
- Why Why Analyses
- Line performance tracking
- AM and PM
- Reblend Generation and Consumption Tracking
- Start-up and Shut-down procedures
- Alarming and Correction Protocols (Level 0)

MSG Process Control Strategy emphasizes clear department-wide activities and measures deployed, such that for each of these process blocks, we identify, track, control and continuously improve upon the following:

- Process conditions that are related to Quality
- Process conditions that are Critical to Reliability
- Process conditions that are Critical to Cost.

RUNNING TO TARGET

It is expected that the production process is running to target.

PROCESS CONTROL STRATEGY SCOPE

1. Three levels of Controls

Three levels of control have been defined to ensure Process Control. Each level is related to the type of data collection / analysis carried out and the response taken.

Level	Intent	Control	Freq of Review	Point of Review
0	Detection and response to failure modes. Process parameters are compared versus targets & Centerlines in Real-time. Alarms alert operators of deviations / OOL data logging	* Operator intervention. *Troubleshooting Guide *Visuals Standards	Instantaneous / Shiftly	* On the Floor * Shift Hand-Over
1	Compliance reporting of data obtained at L0, to determine any trends over daily / weekly production run. Serves as a predictive tool to avoid OOL tendencies.	*Quality windows update. *PC & Accuracy Report *Actions from root cause analysis	Daily / Weekly	*MSG DDS Meeting, Action Planning Sheet
2	Assessment of the robustness of our control strategy to achieve our performance objective and establish statistical reassurance.	* PCS Monthly Report *Monthly Gap Analysis *PQM reports	Monthly	*Module Meeting *PCS Action Review

Process Control Strategy to address sources of variability within each Process block

> Raw Material Receipt Operation

Level 0

RM Receipt

- Receives RM that has corresponding RMS # with that on the RM receipt document or visual display, if not the RM is rejected out rightly.
- Receives RM that has QA release Label and rejects out rightly any RM without this Label.
- Reject out rightly RM that is dirty, dented, in a torn package or generally with missing QA release label. Material Unloading into the correct tank or dump spot, as applicable; padlocks on pump for tanks, Bar code scanner system for dump spot.
-

PROCESS CONDITION

- Set the temperature of Silicate to 60°C for ODOS formulation only.
- Temperature monitoring of materials at Tank farm, and warehouse
- Temperature monitoring of Percarbonate at the day bin where available.

Level 1

RM Activity

- RM Activity tracking for materials requiring active balance

BRAND CHANGEOVER/START-UP

- RM MU Tracking
- Quality Failure Appearance tracking for Aesthetic contamination in the FP

RAW MATERIAL ADDITIONS.

- Calibration Schedule Compliance for feeders and flowmeters
- Daily PQM reporting.
- % MU tracking for RM

Level 2

RM Activity

- Monthly RM Compliance tracking and reporting for all materials
- RM Activity tracking for materials requiring active balancing
- Monthly MQS reporting.
- MQS Gap analysis and improvement where MQS result is less than target.

BRAND CHANGEOVER/START-UP

- Review & Conduct Gap Analysis for Quality failures related to Start Ups and Change Overs.

RAW MATERIAL ADDITIONS.

- Conduct & Review Monthly Scale Calibration Compliance check and fixes
- Conduct & Review monthly PQM compliance
- Review & Conduct RM MU compliance and Gap Analysis

PROCESS CONDITION

- Conduct & Review monthly CL compliance reports and Gap analysis
- Conduct & Review Monthly PC & Accuracy compliance gap analysis
- Define improvement areas and outline clear action plan for long term.

Crutching Operation

Level 0

PROCESS CONDITION

- Set limit for current reading (AMPS) on Crutcher Agitator motor. In the event of an OOL, visual alarm comes up mandating Crutcher operator intervention.
- Set Crutcher mix temperature limits for different formulations as indicated on the BPRs. If Crutcher mix temperature exceeds this limit the Visual alarm prompts the Operator's intervention.
- Set level alarms 'High', 'High High' and 'Low' on the Ageing vessel. Pop-up alarms are activated when limits are exceeded. Request operator intervention and shut off slurry transfer pump or High Pressure Pump (INTERLOCK STRATEGY).

RAW MATERIAL ADDITIONS

- Set material addition limits on SCADA GUI data entry point at the beginning of a new formulation or changeover. Use the Approved Batch Production Record as reference.
- Formulation SCADA set points are activated for automatic run of batches.
- When value is not acknowledged – by ENTER, no value appears, prompting operator intervention.
- Fix 10% tolerance for all Crutcher Load Cells controlled raw material additions for Solids (i.e. Sulphate) and 5% tolerance for Liquids (i.e. EW Base). If addition weight for any material exceeds set tolerance, pop-up alarms are activated to hold the batch, requesting operator intervention
- Load cell & Flow meter calibration checks conducted as per schedule.

CHANGE OVER AND STARTUP

Follow Changeover procedures

Level 1

RAW MATERIAL ADDITIONS

- Review Process Capability and Accuracy report on raw material addition on daily and weekly (%PC<=5%, Acc.< 1%)
- Calibration of Crutcher Load Cells (CLC) and flow meters as per schedule.

PROCESS CONDITION

- Daily review of Crutcher Mix Moisture compliance via Tower Report Summary
- Daily review BP density, Moisture via Tower Summary report and BP $CatSO_3$ on QW

Level 2

RAW MATERIAL ADDITIONS

- Monthly report of Rm Addition Compliance via PC and Accuracy for all CLC controlled raw materials additions.
- Review Bulk RM addition compliance on the MUV sheet
- Calibration Schedule Report for Flowmeters and Crutcher load cell.
- Gap Analysis with corrective and systemic actions plan to address outages.

PROCESS CONDITION

- Review Monthly Crutcher Mix Moisture compliance.
- Review monthly Blown Powder, density, moisture and $CatSO_3$ using applicable statistical measures as PC & Acc, Cr & Tz C_{pm}.
- Gap Analysis with corrective and systemic actions plan to address outages

> **ODOS**

Level 0

RAW MATERIAL ADDITIONS

- Set Material addition limits to SCADA data entry point at the beginning of a new formulation or changeover. Use the Approved Batch Production Record as reference
- Formulation SCADA set points are activated for automatic run of batches.
- When Value is not acknowledged- By <u>ENTER</u>, NO value appears, prompting operator intervention.

PROCESS CONDITION

- In feed pressure into HPP Visual alarms are activated when the limit is exceeded. Operator intervention is required.
- Set limits for Caustic & HLAS pumps speed. Visual alarms are activated when the limit is exceeded. Operator intervention is required.
- Set limits for Caustic & HLAS Silo level. Visual alarms are activated when OOL situation occurs. Operator intervention is prompted.
- Set limits for Temperature before ODOS Injection & after Injection on the SCADA GUI. Visual alarms are activated when OOL situation occurs. Operator intervention is required.
- Program start-up sequence for Tower & the ODOS HLAS & Caustic injection into the SCADA controls. Visual alarms are activated when the prescribed start-up sequence is violated.

Level 1

PROCESS CONDITION

- Review ODOS parameter centerline Compliance on daily basis.
- Daily review of Blown Powder $CatSO_3$ compliance.

Level 2

PROCESS CONDITION

- Monthly review of BP Moisture using statistical means e.g. Cr & Tz, PC & Acc., C_{pm}.
- Monthly review of BP Density using statistical means e.g. Cr & Tz, PC & Acc., C_{pm}.
- Monthly review of PPM level for BP $CatSO_3$.
- Gap Analysis with corrective and systemic actions plan to address outages

> Pumping & Spray drying

Level 0

PROCESS CONDITION

- It is expected that operators review QW data at least once every hour. They check to ensure it is auto pulling data correctly.
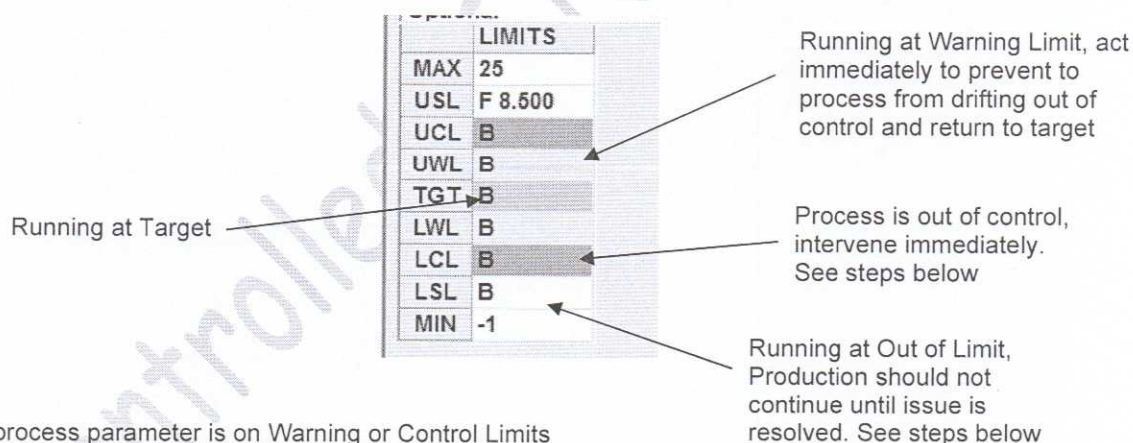
- It is expected that operators review the Level Zero alarming software at least once every 15 minutes. The alarming software page will always be in front of them during the run.
- Set limits for discharge pressure from the HPP.
- Set limits for HPP RPM % as defined in Centerline document. Operation should be run at Target speed. When maximum limit the pump is exceeded, HPP should shut off.
- Set limits for Pressure balance in the tower visual alarms are activated when the limit is exceeded. Operator intervention is required.
- Set limits for Tower exhaust temperature. Switch Burner to stack when OOL situation occurs. Operator intervention is prompted.
- Set limits for air inlet temperature at the tower. Switch Burner to stack when OOL situation occurs. Operator intervention is prompted.
- Program start-up sequence for the Air heater into the Control panel. Alarms are displayed when the prescribed start-up sequence is violated.
- All process data are auto-pulled to QW and QW is setup to give a visual alarm if the process is in control or out of control.
- Out-of–specs parameters like BP Density, BP moisture & BP $CatSO_3$ during start-up or during on-going operation is visually popped-up by the QW.
- If QW Flags out-of-specs in the following BP parameters; BP Density, BP Moisture, BP $CatSO_3$, the Operator should divert BP Spray into the streamlining bin. The BP in the streamlining bin should be mixed out in Quantities prescribed in Reblend Matrix.
- For Out-of-specs BP spray lasting enough to fill the Streamline bin, the Operator must stop spray drying operation to fix the Out-of-Spec parameter(s), & the streamlining Bin emptied (Reduce) into Buggies (or Big Bags).
- Furthermore, the Finished Product Buggy produced when the OOS was discovered and the previous buggy MUST be put **ON HOLD** and re-blended as per the re-blend matrix.
- The following parameters (as shown in the Table below) are read-off and auto -pulled or entered into QW by the control room operator(s) & Quality control technician(s) and checked versus centerlines.

| 2. Key Factors | | | 5. Level 0 - Process Control | | | | |
Unit Operation	Key Factors	4. Design-in Controls	Description	Frequency	Action Limit	Interface with operator	Fixed / Adjustable
Crutcher	Batch Size (kg)	recipe download / upload	Recipe	NA	Range	NA	Fixed
Crutcher	Crutcher weight at end of batch (Kg)	-	indication on HMI	Real time	Range	Alarm on HMI	Fixed
Crutcher	Dry scrap SP (% of Crutcher weight)	recipe download / upload	Recipe	Real time	Range	Alarm on HMI	Variable
Crutcher	Wet scrap SP (% of crutcher weight)	recipe download / upload	Recipe	Real time	Range	Alarm on HMI	Variable
Crutcher	Crutcher amps consumption	-	indication on HMI	Real time	Range	Alarm on HMI	Fixed

Crutcher	CMM (%) - refer to centerline document for exact values	-	measure sample	every other batch	Range	QW	Fixed
Crutcher	Slurry temperature (°C)	-	indication on HMI	Real time	Range	Alarm on HMI	Fixed
Drop tank	Drop Tank Temperature ('C)	-	indication on HMI	Real time	Range	Alarm on HMI	Fixed
LPP	Temperature after Rietz	-	indication on HMI	Real time	Range	Alarm on HMI	Fixed
LPP	low pressure line pressure (bar)	-	indication on HMI	Real time	Range	Alarm on HMI	Fixed
LPP	HPP Speed	-	indication on HMI	Real time	Range	Alarm on HMI	Fixed
HPP	HPP pressure (bar)	-	indication on HMI	Real time	Range	Alarm on HMI	Fixed
HPP	Slurry flowrate (kg/hr)	-	NA	NA	NA	NA	NA
Spray Drying	AI- compressed air Pressure	-	indication on HMI	Real time	Range	Interlock	Fixed
Spray Drying	AI - compressed air flowrate	-	indication on HMI	Real time	Range	Alarm on HMI	Variable
Spray Drying	Tower inlet temperature (°C)	-	indication on HMI	Real time	Range	Alarm on HMI	Variable
Spray Drying	MTIT	interlock if > HH	indication on HMI	Real time	Range	Interlock	Fixed
Spray Drying	Tower exhaust temperature (°C)	-	indication on HMI	Real time	Range	Alarm on HMI	Variable
Spray Drying	tower belt temperature (°C)	-	indication on HMI	Real time	Range	Alarm on HMI	Variable
Spray Drying	Pressure at nozzles (bar)	-	indication on HMI	Real time	Range	Alarm on HMI	Variable
Spray Drying	Number of nozzles	-	indication on HMI	Real time	Range	Visuals on HMI	Variable
Spray Drying	*Nozzles Length	-	NA	NA	NA	NA	Fixed
Spray Drying	*Nozzles Size	-	NA	NA	NA	NA	Fixed
Spray Drying	Tower balance*	-	indication on HMI	Real time	Range	Alarm on HMI	Fixed
Spray Drying	Balance at Tower exit*	-	indication on HMI	Real time	Range	Alarm on HMI	Fixed
Spray Drying	dilution fan %	-	indication on HMI	Real time	Range	Alarm on HMI	Fixed
Spray Drying	BP Density (g/l) - model	-	measure sample	every 15 mins	Range	QW	Fixed
Spray Drying	BP Moisture (%) - refer to matbal for exact values	-	measure sample	every 15 mins	Range	QW	Fixed
Spray Drying	Base Powder MPS (um)	-	measure sample	every 2 hours	Range	QW	Fixed
Spray Drying	BP CatSO3 (%) - refer to matbal for exact values	-	measure sample	every 2 hours	Range	QW	Fixed
Spray Drying	Tower Rate Ton/hr	-	NA	NA	NA	NA	NA
Mix Drum	Base Powder %	recipe download	indication on HMI	Real time	Range	Visuals on HMI	NA
Mix Drum	RVSO - Non Ionic %	recipe download	indication on HMI	Real time	Range	Visuals on HMI	NA
Mix Drum	FP Mixing Rate (ton/hr)	recipe download	indication on HMI	Real time	Range	Visuals on HMI	Fixed
Mix Drum	Perfume Spray-on Pressure (bar)	software controlled	indication on HMI	Real time	Range	Alarm on HMI	Fixed
Mix Drum	NI Spray-on Pressure (bar)	software controlled	indication on HMI	Real time	Range	Alarm on HMI	Fixed
Mix Drum	RVSO - Number of RVSO Nozzles	recipe download	indication on HMI	Real time	Range	Alarm on HMI	Fixed
Mix Drum	Mix Drum RPM	recipe download	indication on HMI	Real time	Range	Alarm on HMI	Fixed
Mix Drum	RVSO - Emulsion flow per nozzle (kg/hr)	software controlled	indication on HMI	Real time	Range	Alarm on HMI	Fixed
Mix Drum	RVSO - Emulsion pressure at manifold (bar)	-	indication on HMI	Real time	Range	Alarm on HMI	Fixed
Mix Drum	RVSO - atomization air pressure (bar)	interlock if < LL	indication on HMI	Real time	Range	interlock	Fixed

Mix Drum	RVSO - atomization air temperature	interlock if < LL	indication on HMI	Real time	Range	interlock	Fixed
Mix Drum	RVSO - atomization air flow per nozzle	-	indication on HMI	Real time	Range	Alarm on HMI	Fixed
Mix Drum	RVSO - atomization air/slurry flow ratio	interlock if < LL	indication on HMI	Real time	Range	Alarm on HMI	Fixed
Mix Drum	RVSO - IKA motor speed %	recipe download	indication on HMI	Real time	Range	Alarm on HMI	Fixed
BFS - Filling	FP Temperature ('C)	-	measure sample	every 3rd buggy	45	Manual / QW	Fixed
BFS - Filling	FP Fresh Density (g/l)	-	measure sample	every buggy	Range	Manual / QW	Fixed
BFS - Filling	FP Fresh Overs > 2360 (g/l)	-	measure sample	every buggy for DNS	Range	Manual / QW	Fixed
All	Metering systems accuracy	L 5% +20sec - LL 20% + 5sec	indication on HMI	Real time	Range	Interlock	Fixed
All	Metering systems R-Factor (PV/CV)	-	indication on HMI	Real time	Range	Alarm on HMI	Fixed
All	Starting materials activity	-	CoA compliance	every receipt	Range	MQS	Fixed
All	Starting materials dumping	-	correct RMS	every container	Range	Visuals	Fixed
All	Starting materials storage	-	conditions ≡ RMPI	Real time	Range	NA	Fixed
All	Reblend Management	adhere to reblend matrix	indication on HMI	Real time	Range	Alarm on HMI	Fixed
All	Analytical methods	-	control samples	Daily	Range	QW	Fixed

- The process should be running at Centerline at all times. The visual alarm on QW are as stated below;

LIMITS	
MAX	25
USL	F 8.500
UCL	B
UWL	B
TGT	B
LWL	B
LCL	B
LSL	B
MIN	-1

Running at Warning Limit, act immediately to prevent to process from drifting out of control and return to target

Running at Target

Process is out of control, intervene immediately. See steps below

Running at Out of Limit, Production should not continue until issue is resolved. See steps below

- If process parameter is on Warning or Control Limits

1. Revert to centerline.

2. Check BP quality.

3. If it is not possible to run at target centerlines to achieve BP quality, operator should fill in deviation report/ temporary centerline and have it approved with the Process Engineer and increase BP sampling to assure confidence that there is no OOS. The approved temporary centerlines, should also be documented in QW via the QW excel input file.

*Note: For Blown powder quality, if results are obtained for BP Density, Moisture or $CatSO_3$ below is the reaction to visual alarm on Quality window

- **Green:** At Target, no action required.

- **Yellow**: Notify the Control Room, ensure action(s) is/are taken to return to target.

- **Red**: The process is out of control. Action should be taking immediately to return the process to centerline. All powder from this run should be moved to streamlining bin if this continues for next 30 minutes.

- **White**: The BP is Out of Spec. and should be diverted to streamlining bin immediately. The production should be stopped and issue resolved before commencing production. There should be a clear action plan documented to fix the Out of Spec. Department QA Leader must be notified of the Out Of Spec that occurs during normal ongoing production.

Level 1

PROCESS CONDITION

- Daily Report and review of Process Centerline and Blown Powder compliance as captured in Process Compliance Report.
- Daily review of Blown Powder $CatSO_3$ on QW using statistical means e.g. Cr & Tz, PC & Acc., C_{pm}.
- Calibration of Satellite laboratory scales and Moisture analyzer.
- Define corrective actions to fix any gaps.

Level 2

PROCESS CONDITION

- Monthly review of Process and BP Characteristics Compliance as captured in Process Compliance report
- Monthly review of PPM level for FP Density.
- Review calibration records for laboratory instruments.
  Gap Analysis with corrective and systemic actions plan to address outages

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> ADMIX & SPRAY-ON

LIW Feeders

Level 0

- Cutoff limits for feeders:

  - 5% deviation +20 sec. timer (Brabender controlled).
  - 20% deviation +5 sec. timer (PLC controlled).

- Monitor relation for all feeders on SCADA, if relation is OOL for one of critical feeders (affecting one of the 10 rated CCQPs in QEC), sound an alarm and take immediate action to confirm correct addition. If correct addition is confirmed continue working and feed back to CIL/Equipment owner.

- Monitor Perfume pressure every change over.

- Fix Brabender alarm configurations to cutoff.

- Analyze process. Check sample at Start Up at a minimum for FP CatSO3, AvOx, and where applicable or recommended by MPD, BH Base, Protease and perfume identity. Samples can be picked from the buggy station or on the packing line, but preferably from the packing line.

- Check fresh FP density and particle size on Buggy filling station every new buggy discharge.

Level 1

- Review daily R-Factor Compliance for all feeders (# of Alarms) and feedback to CIL/Equipment owner.

- Monitor related quality alerts.

- Monitor PC and accuracy for all feeders on a daily basis.

Level 2

- Static and Dynamic calibration check of LIW every month (as per schedule).

- Review monthly PC and Accuracy report for all feeders.

- Review MUV results for all raw materials added via feeders.

- Review monthly PPM data for all variables.

- Gap Analysis with corrective and systemic actions plan to address outages

The tale below summarizes the various PCS strategy for the LIW feeders

	Design	Level Zero	Level One	Level Two	Action (Level Zero)
• Addition Accuracy and PC	• Automatic recipe download and verification every changeover.	• 5% deviation + 20 second timer. (Brabender controlled) • 20% deviation + 5 second timer. (PLC controlled).	• Monitor PC and accuracy for all feeders daily. (Random sampling).	• Monthly Report PC / accuracy for all feeders and flow meters. • Monthly calibration of all feeders and flow meters. • Monthly MU report for all raw materials added via feeders. • Monthly PQM report for all variables.	• Recipe verification every changeover

• Relation for all feeders	• Auto-pull of PV/CV on QW for all feeders. • Real time alarm for all feeders	• Monitor relation in real time for all feeders. Visual display on relation alarm on Production tab of Admix Page	• Review daily relation for all feeders (# of alarms) and feedback to CIL/Equipment owner.	• Monthly report (Number of alarms for all feeders).	• Troubleshoot • Immediate confirmation of correct addition accuracy.
• Process check sample	• Periodic Sampling for analysis.	• Analyze process check sample at Start Up / Change Over for $CatSO_3$, AvO_2		• Monthly PPM report for all variables.	• Process and Quality Troubleshooting.
• FP Density	• Periodic Sampling for analysis.	• Check fresh FP density from buggy filling station every new buggy discharge.		• Monthly PPM Report for density.	• Process and Quality Troubleshooting.

Weigh Belt Feeders

Level 0

- Cutoff limits for feeders:
    - 5% deviation + 20 sec. timer (Brabender controlled).
    - 20% deviation + 5 sec. timer (PLC controlled).
- Static and dynamic calibration check for BP WB feeders.
- Fix Brabender alarm configurations to cutoff.
- Check process check sample results every change over, in case OOL STOP and calibrate BP feeder.

Level 1

- Monitor PC and Accuracy on daily basis.
- Calibration check for Weigh Belt feeders as per schedule
- CIL for Weigh Belt feeders as per schedule.

Level 2

- Review Calibration records for BP feeder.
- Review monthly MU report for Tower Materials
- Review monthly $CatSO_3$ PPM data in FP.
- Gap Analysis with corrective and systemic actions plan to address outages.

The tale below summarizes the various PCS strategy for the Weigh belt feeder

	Design	Level Zero	Level One	Level Two	Action (Level Zero)
• Blown Powder Addition Accuracy and variability	• Automatic recipe download and verification every changeover. • Weekly calibration check of weigh belts feeder • CIL for Weigh belts feeder.	• 5% deviation + 20 seconds timer (Brabender Controlled). • 20% deviation + 5 seconds timer (PLC controlled). • Cutoff process check samples result and weekly static and dynamic calibration.	• Daily PC reporting and accuracy of BP feeders.	• Monthly PC reporting/accuracy for WB feeders and • Monthly CatSO3 PPM data. • Monthly calibration report • Monthly MU report	• Report quality alert if CIL or calibration is not being complied to.
• Fresh FP density.	• Monitor density every batch	• Monitor density every batch	• Monitor related quality alerts	• Monitor and analyze PPM report with respect to FP density.	• Check BP density and BP feeder calibration.
• Process check sample	Periodic Sampling for analysis.	• Analyze process check sample at Start Up / Change-over for $CatSO_3$, AvO_2		• Monthly PPM report for all variables.	• Process and Quality Troubleshooting.
• FP Density	Periodic stratified Sampling for analysis.	• Check fresh FP density from buggy filling station every new buggy discharge.	• Daily Aged FP density results	• Monthly PPM Report for density.	• Process and Quality Troubleshooting.

Perfume Spray-On

Level 0
- Cutoff limits for addition:
    - 20% deviation + 5 sec. timer (PLC controlled).
- Fixed spray-on pressure limit of 2-4 bar for monitored on a continuous basis.

Level 1
- Monitor PC and Accuracy on a daily basis
- Daily review of spray-on related quality alerts.
- CIL for perfume pump as per schedule.

Level 2
- Review calibration records for flow-meters as per schedule
- Monthly review of spray-on pressure PC and Accuracy.
- Review MU report for spray-on RM.

- Develop long term action plan.

The tale below summarizes the various PCS strategy for the perfume Spray On.

	Design	Level Zero	Level One	Level Two	Action (Level Zero)
• Perfume spray-on pressure.	• Fix spray-on perfume pressure to 2-4 bar. • Automatic addition of perfume with respect to HMI set point through perfume spray nozzles controlled by automatic metering feedback.	• 20% deviation + 5sec. timer (PLC controlled) • Monitor pressure once every changeover.	• Monitor PC and accuracy of perfume pressure on a daily basis.	• Monthly MU report	• Process troubleshooting using the right tool.

Reblend System

Level 0

- Feeder cutoff deviation limit (5%, +20 Second) Brabender controlled.
- Reblend matrix compliance tracking using the controlled release check list and QW Data
- Reblend generation and consumption tracking per shift

Level 1

- Review Reblend related quality alerts.
- Net Zero Reblend
-

Level 2

- Total Reblend on Site for the period
- Net Zero Reblend which is difference between Reblend generated and Consumed for a given period
- Monthly report for Reblend generation stratification.
- Gap Analysis with corrective and systemic actions plan to address outages

The table below summarizes the various PCS strategy for the Reblend feeders

	Design	Level Zero	Level One	Level Two	Action (Level Zero)
• Blown Powder Addition Accuracy and variability	• Fixed Reblend percent in as per MI. • Controlled with a fixed feeder speed with 0% tolerance on HMI. • Lock maximum reblend SP as per MI. • Follow reblend matrix in MI.	• Used Reblend feeder according to reblend matrix. • Ensure reblend cards attached in release every brand	• Daily review of reblend related quality alerts	• Monthly stratification on for reblend sources.	• Process troubleshooting using the right tools.
• BP2 reblend	• Lock maximum reblend SP as per MI.	• Use one reblend type at a time. • Follow BP reblend matrix.	• Daily review of related quality alerts	• NA	• Process troubleshooting using the right tools
• Dry/Wet scrap addition	• Automatic dry and wet scrap addition as per MI • Continuous moisture compensation to maintain CMM.	• Automatic scrap addition with manual moisture compensation.	• Daily review of related quality alerts	• NA	• Check CMM, tower CL and PWS CIL.

Attached to this SOP is a list of all interlocks identified and implemented in the department.

REASON FOR UPDATE

Version 0: New Issuance

End Of Procedure

SOP RELATED ATTACHMENTS
Attachment 1: Training & Qualification Attachment 2: Model Answers Attachment 3: List of Interlocks Attachment 4: Step Up Cards Attachment 5: List of Process Equipment