



# Data Validation Module Supporting Real-time Decision-Making Process

Processes America Advisor

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# Agenda

- **About CEMEX**
- **OSIsoft History at CEMEX**
- **Cement Production Model**
- **Problems and Challenges to overcome**
- **Production Data Validation (DVM)**
- **Conclusions**

# About CEMEX

**CEMEX** is a growing global building-solutions company that produces, distributes, and markets **Cement, Ready-Mix Concrete, Aggregates**, and related building materials throughout the Americas, Europe, Africa, the Middle East, and Asia, in more than 50 countries, and maintains trade relationships in approximately 102 nations.



## A global industry leader

- Annual sales of US\$14.98 billion
- One of the leading cement manufacturers in the world
- World's leading supplier of ready-mix concrete, and one of the world's largest suppliers of aggregates
- One of the world's top traders of cement and clinker
- Close to 44,000 employees worldwide

# OSIsoft History at CEMEX

1995



**First  
PI System  
Installed**

1995-2004



**Expanding  
PI System  
Installs**

2005 - 2006



**Enterprise  
Agreement**

2007 - 2008



**Worldwide  
PIMS Project**

2009 - 2010



**PI Infrastructure  
as Enterprise  
Platform**

2011 - 2013

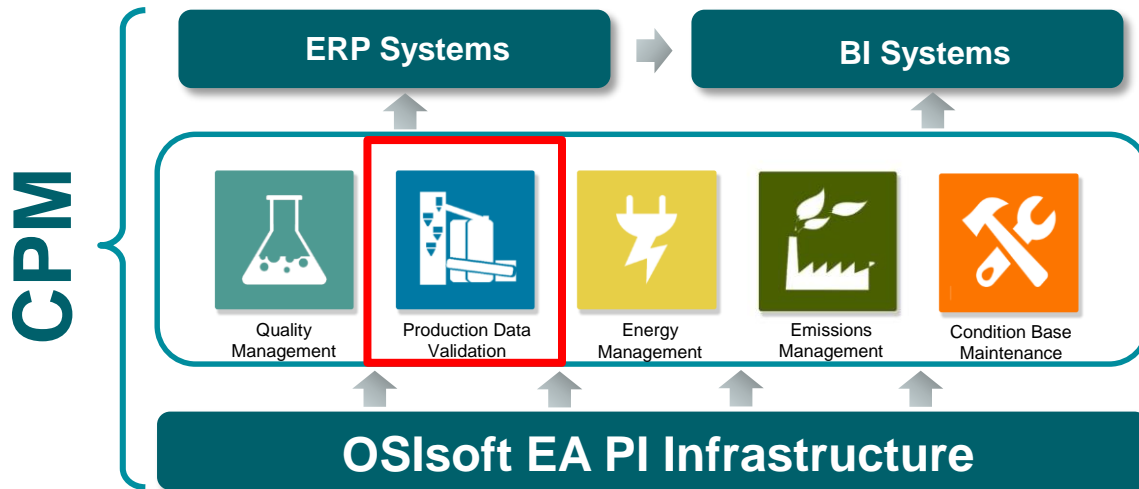


**Cement  
Production  
Management**

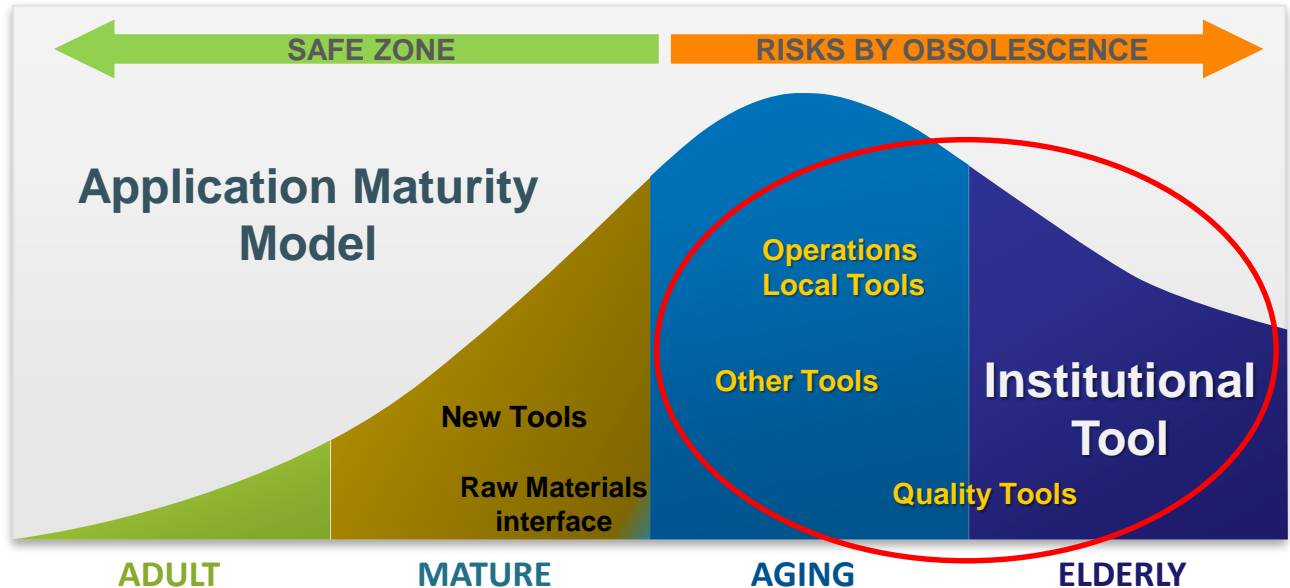


Agreement – Access to Industry Principals, Center of Excellence, Software, etc.

# Cement Production Model



# The problem to overcome

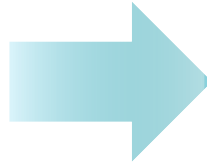


# The Challenge

## @ Cement Business



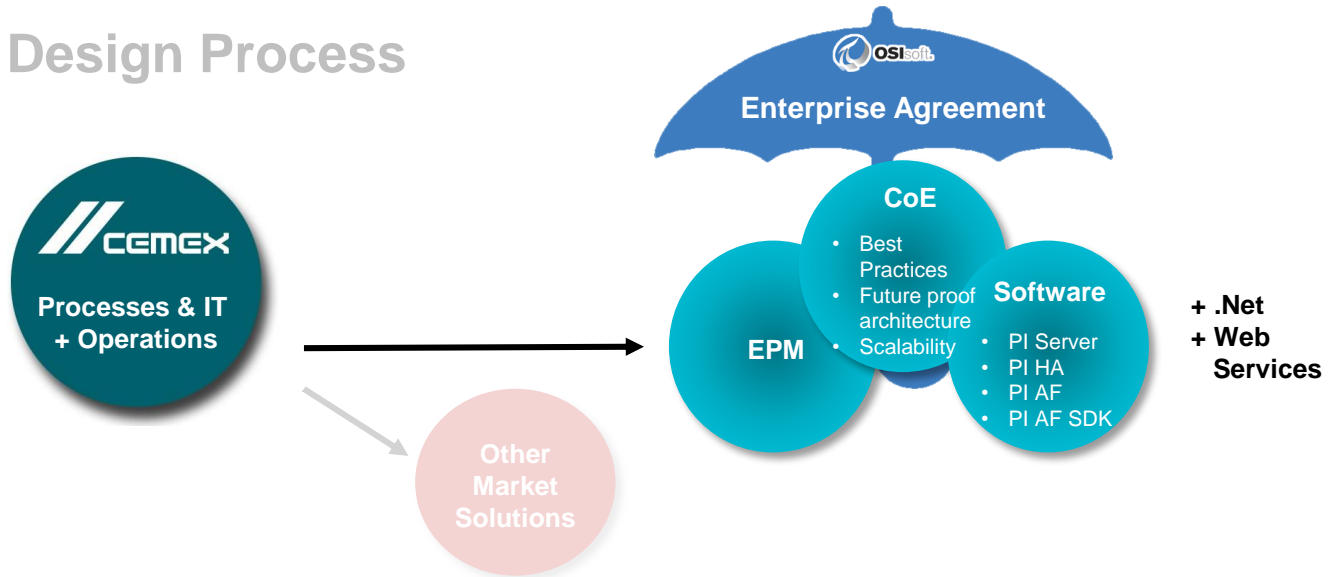
- 20 year old platform
- Manual data
- Non standard validation process



- New reliable platform
- Automatic Data in Real time
- Faster validation and reconciliation

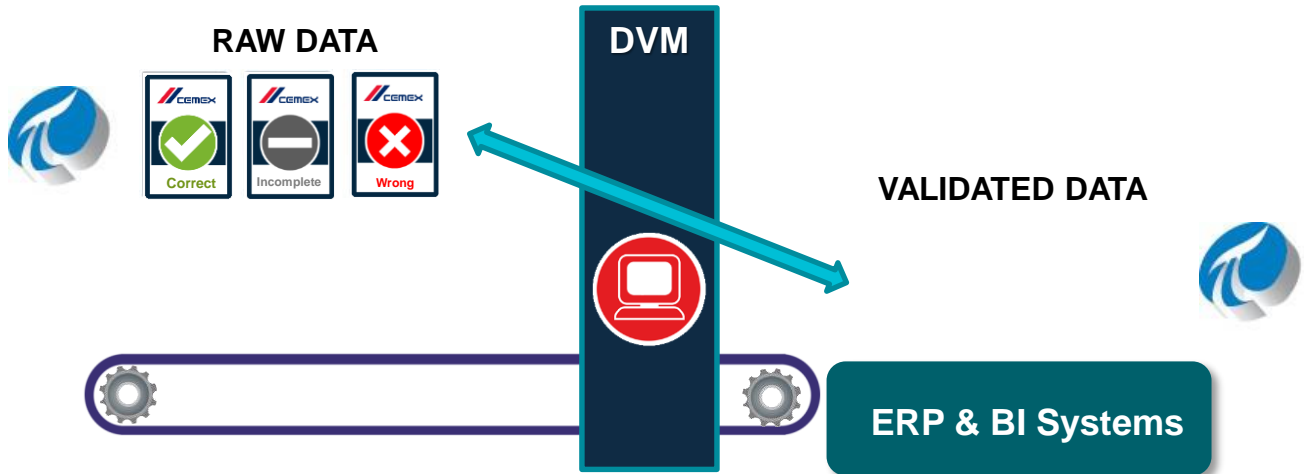
# Production Data Validation (DVM)

## Design Process



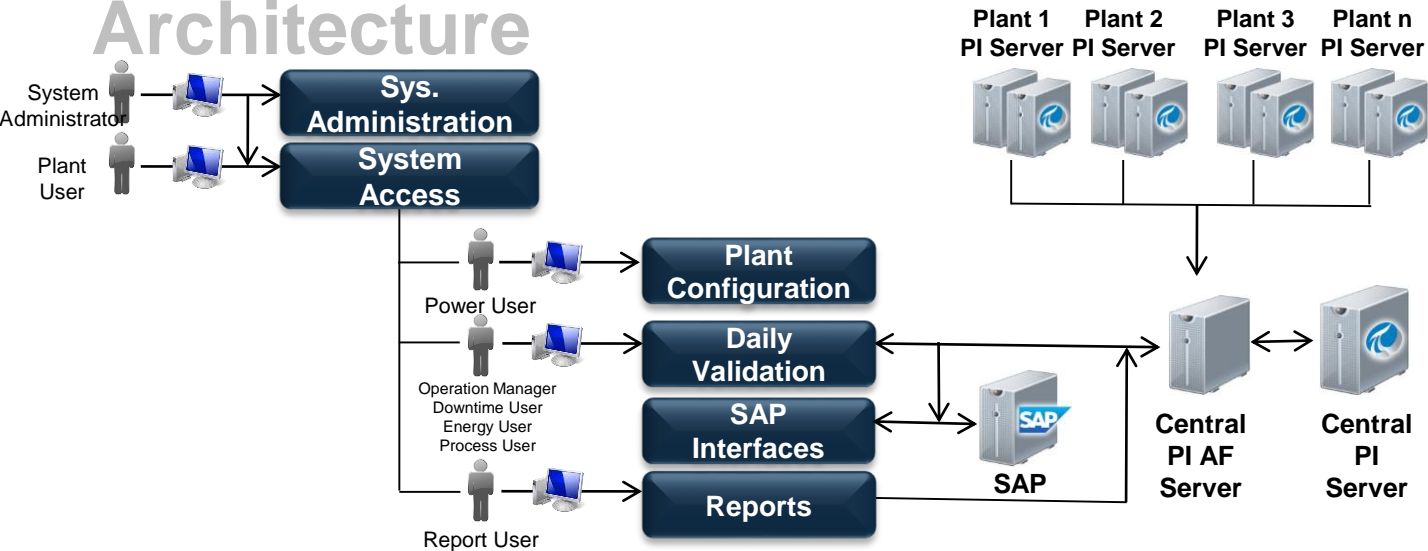
# Production Data Validation (DVM)

## Functionality



# Production Data Validation (DVM)

## Architecture



# Production Data Validation (DVM)

Sys.  
Administrator

Plant  
Configuration

Daily  
Validation

SAP  
Interfaces

Reports

- PIMS-DVM enables to manage central catalogs
- This assures consistency
- The main catalogs in PIMS-DVM are:

• Users	• Equipments
• Country	• Material Family
• Plants	• Materials
• Equipment Family	

## Equipments

In this page you will be able to create and update equipments.

Equipments			
Equipment Family	Code	Equipment	SAP Equipment Id
Equipment Family: 100 - Plant (1 Item)			
100 - Plant	10001	Plant	PL01
Equipment Family: 150 - External Mining (1 Item)			
150 - External Mining	15001	Mining 01	MI01
Equipment Family: 200 - Quarry (3 Items)			
200 - Quarry	20001	Quarry 01	QR01
200 - Quarry	20002	Quarry 02	QR02
200 - Quarry	20003	Quarry 03	QR03
Equipment Family: 300 - Crusher (6 Items)			
300 - Crusher	30001	Crusher 01	CR01
300 - Crusher	30002	Crusher 02	CR02
300 - Crusher	30003	Crusher 03	CR03
300 - Crusher	30004	Crusher 04	CR04

# Production Data Validation (DVM)

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Interfaces

Reports

- The Power User configures the plant site
- Selects equipment, materials and products used within the cement production line
- This process is based on the homologated catalogs
- The main plant administration processes are:

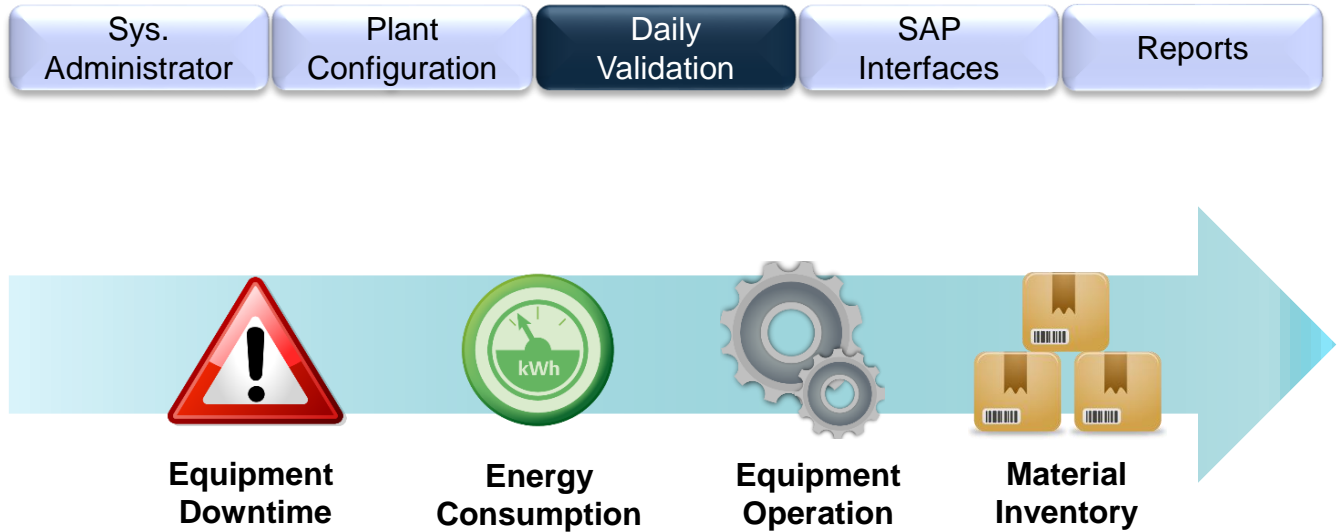
- Equipments

- Materials

- Operation - Correlate Equipment with materials and products

- *PIMS-DVM has drag and drop capabilities*
- *The AF structure is generated automatically through AF SDK*

# Production Data Validation (DVM)



# Production Data Validation (DVM)

Sys.  
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Interfaces

Reports

## Equipment Downtime

- Real time downtime events are shown
- Users classify each event and time
- The result will provide the basis of uptime to calculate:
  - Performance KPIs
  - Energy Consumptions
  - Fuel Consumptions
  - Maintenance
- It is possible to schedule future downtime events

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Equipment	Downtimes	Total	Day
<b>Equipment: Crusher 01 (3 Items)</b>			
Crusher 01	Downtime 30001_19450	07:00:00	07
Crusher 01	Downtime 30001_19451	00:00:00	01
Crusher 01	Downtime 30001_19452	00:00:00	06
<b>Equipment: Crusher 02 (2 Items)</b>			
Crusher 02	Downtime 30002_19453	00:00:00	05
Crusher 02	Downtime 30002_19454	00:00:00	05
<b>Equipment: Dryer 02 (1 Item)</b>			
Dryer 02	Downtime 30002_19449	23:00:00	23
<b>Equipment: Finish Mill 05 (1 Item)</b>			
Finish Mill 05	Downtime 60005_19455	23:00:00	23

You are viewing events to this date: 18-11-2012

Events	Downtime
Inactive Event	30001_19450
Active Event	30001_19450

# Production Data Validation (DVM)

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## Energy Consumption

- Real time energy consumptions are displayed
- Users validate the daily information and provide insight on:
  - Month to Date consumptions
  - End of Month consumptions


Date: 17/11/2012 Equipment Family: Equipment Family Equipment: Equipment Close Energy V

Downtime Validation ✓ Energy Validation ✓ Operation Validation ✓ Inventory Validation ✓

Validated on: 2012/11/22 15:51:19 By: Carlos Adrian Chapa Padilla

Excel Save Cancel Validate all

Plant	Equipment Family	Equipment	MTD KWH	Raw KWH	Validated KWH	Month Projected KWH	Raw KWH/Ton
Monterrey	300 - Crusher		10,780,400.000	710,780.400	710,780.400	10,780,400.000	
	30001 - Crusher 01	✓	288,410.000	2,188,100.000	2,188,100.000	288,410.000	1.710
	30002 - Crusher 02	✓	100,000.000	5,710,000.000	5,710,000.000	100,000.000	1.000
	30003 - Crusher 03	✓	30,000.000	5,710,000.000	5,710,000.000	30,000.000	1.000
	30005 - Crusher 05	✓	1,000.000	1,000.000	1,000.000	1,000.000	1.000
	30090 - Crusher 90	✓	1,000.000	1,000.000	1,000.000	1,000.000	1.000
	306 - Dryer		27,000.000	2,000.000	2,000.000	27,000.000	
	30601 - Dryer 01	✓	27,000.000	2,000.000	2,000.000	27,000.000	1.000
	30602 - Dryer 02	✓	1,000.000	1,000.000	1,000.000	1,000.000	1.000
	885 - Petcoke/Coal ...		480,000.000	10,710.000	10,710.000	480,000.000	
	88501 - Petcoke/Coal ...	✓	480,000.000	10,710.000	10,710.000	480,000.000	1.000
	88502 - Petcoke/Coal ...	✓	1,000.000	1,000.000	1,000.000	1,000.000	1.000
	400 - Raw Mill		11,700,000.000	100,000.000	100,000.000	11,700,000.000	
	40005 - Raw Mill 05	✓	100,000.000	1,000.000	1,000.000	100,000.000	1.000
	40006 - Raw Mill 06	✓	1,000.000	1,000.000	1,000.000	1,000.000	1.000



# Production Data Validation (DVM)

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## Equipment Operation

Real time operation data and calculations are shown

- Material Consumption
- Working Hours by product
- Energy consumption by product
- Fuel consumption by product
- Produced Material
- KPIs


Date: 17/11/2012 Equipment Family: Equipment Family Equipment: Equipment Close Energy V

Downtime Validation ☒ Energy Validation ☒ Operation Validation ☒ Inventory Validation ☒

Validated on: 2012/11/22 15:51:19 By: Carlos Adrian Chapa Padilla

Excel Save Cancel Validate all

Plant	Equipment Family	Equipment	MTD KWH	Raw KWH	Validated KWH	Month Projected KWH	Raw KWH/Ton
Monterrey	300 - Crusher		15,785,424.00	15,785,424.00	15,785,424.00	15,785,424.00	
		30001 - Crusher 01	15,785,424.00	15,785,424.00	15,785,424.00	15,785,424.00	1.170
		30002 - Crusher 02	15,785,424.00	15,785,424.00	15,785,424.00	15,785,424.00	1.170
		30003 - Crusher 03	15,785,424.00	15,785,424.00	15,785,424.00	15,785,424.00	1.170
		30005 - Crusher 05	15,785,424.00	15,785,424.00	15,785,424.00	15,785,424.00	1.170
		30060 - Crusher 60	15,785,424.00	15,785,424.00	15,785,424.00	15,785,424.00	1.170
	306 - Dryer		15,785,424.00	15,785,424.00	15,785,424.00	15,785,424.00	
		30601 - Dryer 01	15,785,424.00	15,785,424.00	15,785,424.00	15,785,424.00	1.170
		30602 - Dryer 02	15,785,424.00	15,785,424.00	15,785,424.00	15,785,424.00	1.170
	885 - Petcoke/Coal ...		15,785,424.00	15,785,424.00	15,785,424.00	15,785,424.00	
		88501 - Petcoke/Coal ...	15,785,424.00	15,785,424.00	15,785,424.00	15,785,424.00	1.170
		88502 - Petcoke/Coal ...	15,785,424.00	15,785,424.00	15,785,424.00	15,785,424.00	1.170
	400 - Raw Mill		15,785,424.00	15,785,424.00	15,785,424.00	15,785,424.00	
		40005 - Raw Mill 05	15,785,424.00	15,785,424.00	15,785,424.00	15,785,424.00	1.170



# Production Data Validation (DVM)



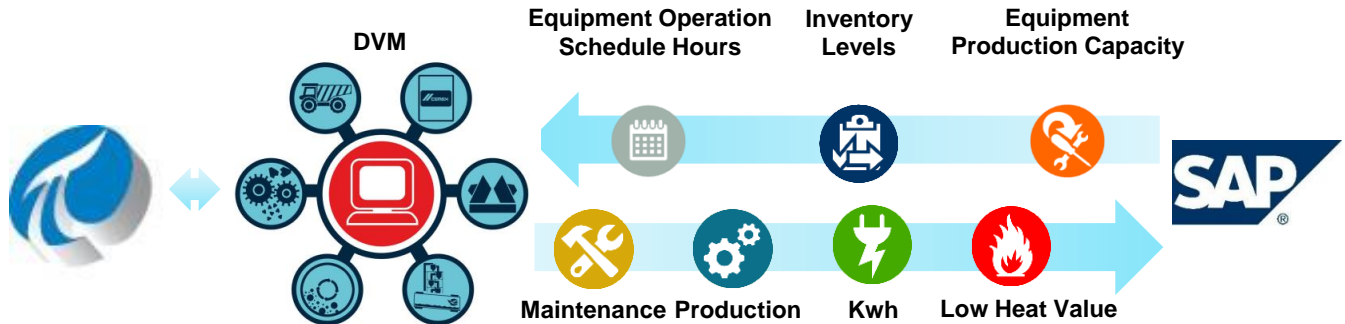
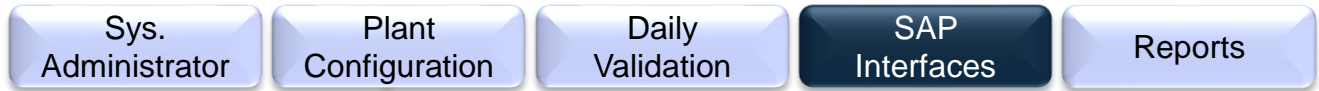
## Material Inventory

- Material balance is achieved in this step
- The previous day inventory from SAP are received as initial inventory
- The user compares physical inventory vs. the calculated inventory
- If all is OK the User closes day validation

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SAP Code	Material	Initial Inventory	Production	Consumption	Calculated Invent.	Physical Inventory	Inventory Differ.	Calculated Produ.	Production Differ.
1200000012	1200000012	100.00	0.00	0.00	100.00	0.00	+100.00	100.00	100.00
1200000037	1200000037	100.00	0.00	0.00	100.00	0.00	+100.00	100.00	100.00
1200000034	1200000034	100.00	0.00	0.00	100.00	0.00	+100.00	100.00	100.00
1200000030	1200000030	100.00	0.00	0.00	100.00	0.00	+100.00	100.00	100.00
1200000289	1200000289	100.00	0.00	0.00	100.00	0.00	+100.00	100.00	100.00
1200000290	1200000290	100.00	0.00	0.00	100.00	0.00	+100.00	100.00	100.00
1200000289	1200000289	100.00	0.00	0.00	100.00	0.00	+100.00	100.00	100.00
1200000288	1200000288	100.00	0.00	0.00	100.00	0.00	+100.00	100.00	100.00
1200000287	1200000287	100.00	0.00	0.00	100.00	0.00	+100.00	100.00	100.00
1200000425	1200000425	100.00	0.00	0.00	100.00	0.00	+100.00	100.00	100.00
1200000311	1200000311	100.00	0.00	0.00	100.00	0.00	+100.00	100.00	100.00
1200000310	1200000310	100.00	0.00	0.00	100.00	0.00	+100.00	100.00	100.00
1200000292	1200000292	100.00	0.00	0.00	100.00	0.00	+100.00	100.00	100.00

# Production Data Validation (DVM)



# Production Data Validation (DVM)

Sys. Administrator

Plant Configuration

Daily Validation

SAP Interfaces

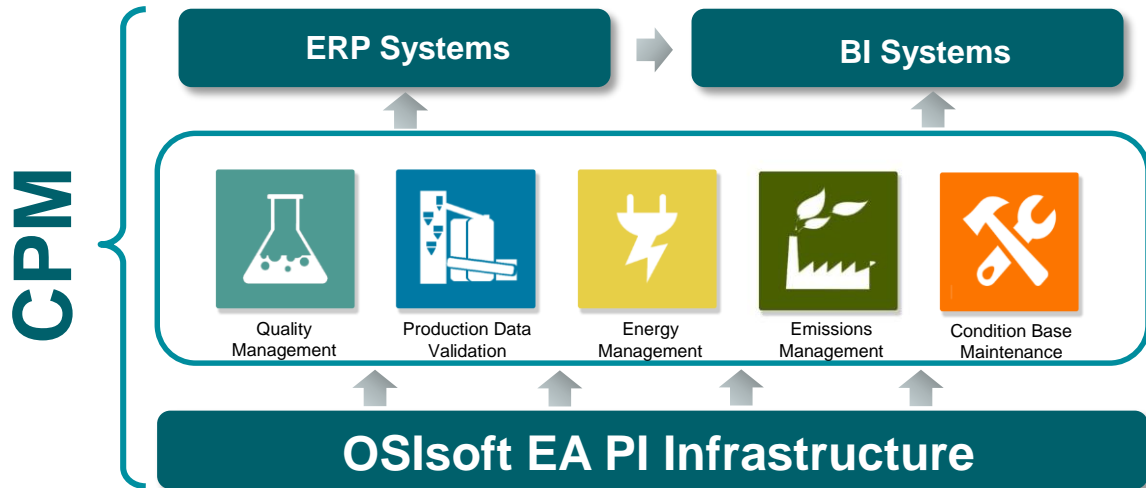
Reports

## Reports

- Equipment Operation Report
- Fuel Consumption Report
- KWH Consumption Report

Equipment	Product	SAP Code	UOM	Production Today	Production Month	KWH Today	KWH Mon
20001 - Quarry 01				0.450.000	70.000.000		
	Blender components	1000000	70	0.450.000	70.000.000		
20002 - Quarry 02				1.000.000	31.000.000		
	Rough Clay	1000001	70	1.000.000	31.000.000		
	100% Blender components			0.450.000	70.000.000	0.000	0.000
	100% Rough Clay			1.000.000	31.000.000	0.000	0.000
30001 - Crusher 01				0.010.000	100.000.000	0.000.000	000.41
	Crusher components	1000001	70	0.010.000	100.000.000	0.000.000	000.41
	Crusher 100% components	1000002	70	0.000	1.000.000	0.000	000.13
30002 - Crusher 02				1.000.000	30.000.000	0.000.000	1.000.00
	Crusher Components	1000001	70	0.000	0.000.000	0.000	1.000.00
	Crusher Clay	1000002	70	1.000.000	30.000.000	0.000.000	1.000.00
	Crusher 100% components	1000003	70	0.000	0.000	0.000	0.000
30003 - Crusher 03				0.000.000	10.000.000	0.000.000	0.000.00
	Crusher Components	1000001	70	0.000.000	10.000.000	0.000.000	0.000.00
30005 - Crusher 05				0.000.000	1.000.000	0.000.000	0.000.00

# Conclusions: Cement Production Model



# Conclusions: Business Value Outcome

- Real time data validated for decision makers
- Easier way for plants to review operational data
- Ensures data accuracy and reliability
- Standardizes validation rules and criteria between all plants
- Maintain evidence and references for future audits
- Reduces further data corrections and inventory adjustments
- TCO reductions

Now we had started to replace old and obsolete tools, meeting the operations needs and reducing the total cost of ownership



THANK  
YOU

**Alfredo Garza Ibarra**

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