



2003
OSISOFT USERS CONFERENCE

Sigmafine 4.0

The Next Generation

Ales Soudek

May 2003

Introduction

- *What is Sigmafine ?*
 - *Analysis Principles*
 - *Benefits*
- *Sigmafine 4.0 – The Next Generation*
 - *Configuration*
 - *Presentation Layer*
- *Leveraging AF*



What is Sigmafine ?

- *Tool for Production Accounting and Engineering Applications*
- *Data Unification and Validation Tool*
 - *ERP and other Applications*
- *Measurement Audit Tool*



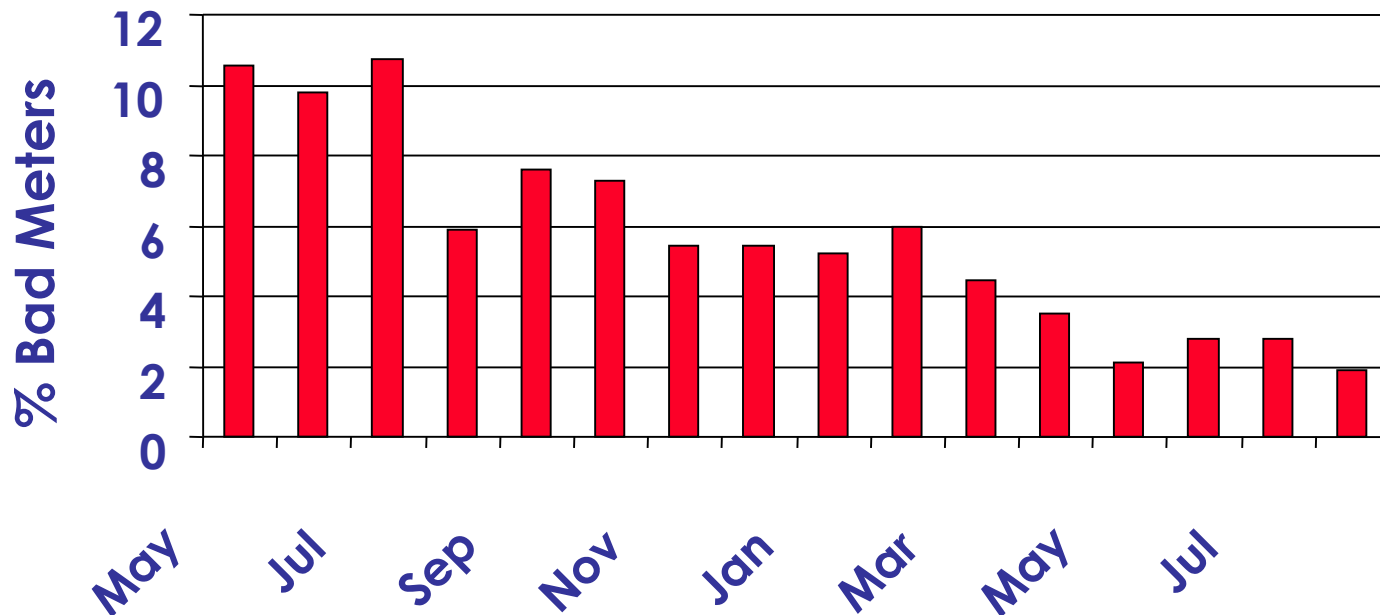
Sigmafine Analysis Principles

- *Balance*
- *Gross Error Detection*
- *Weighted Least Squares Data Reconciliation*
 - *Redundant measurements*
 - *Measurement accuracy*
 - *Calculates “soft sensors” accurately*
 - *Minimization of total error*



Benefits of Sigmafine

- *Monitor and Reduce Meter Maintenance*

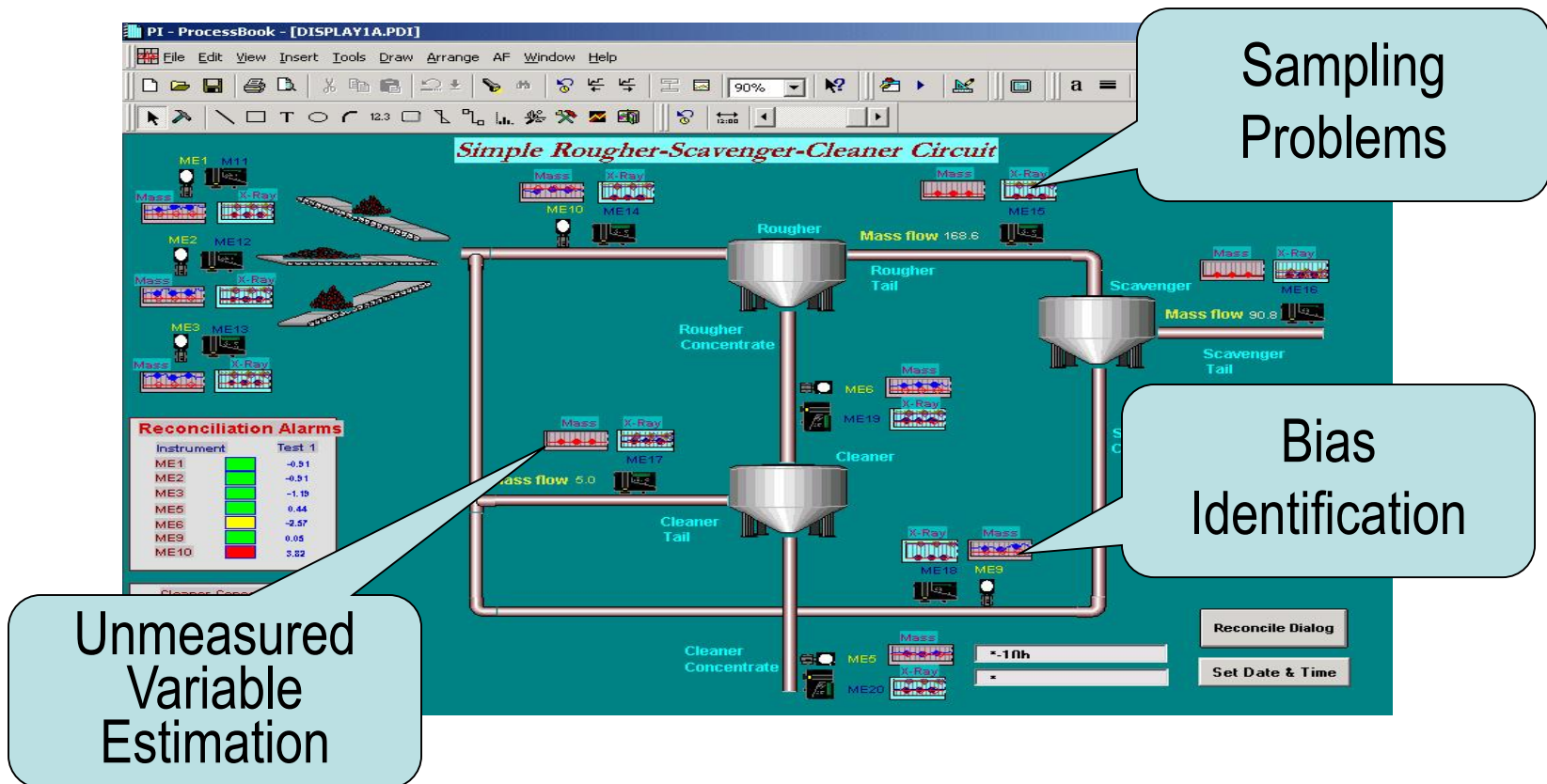


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Benefits of Sigmafine

- Identify location of data errors

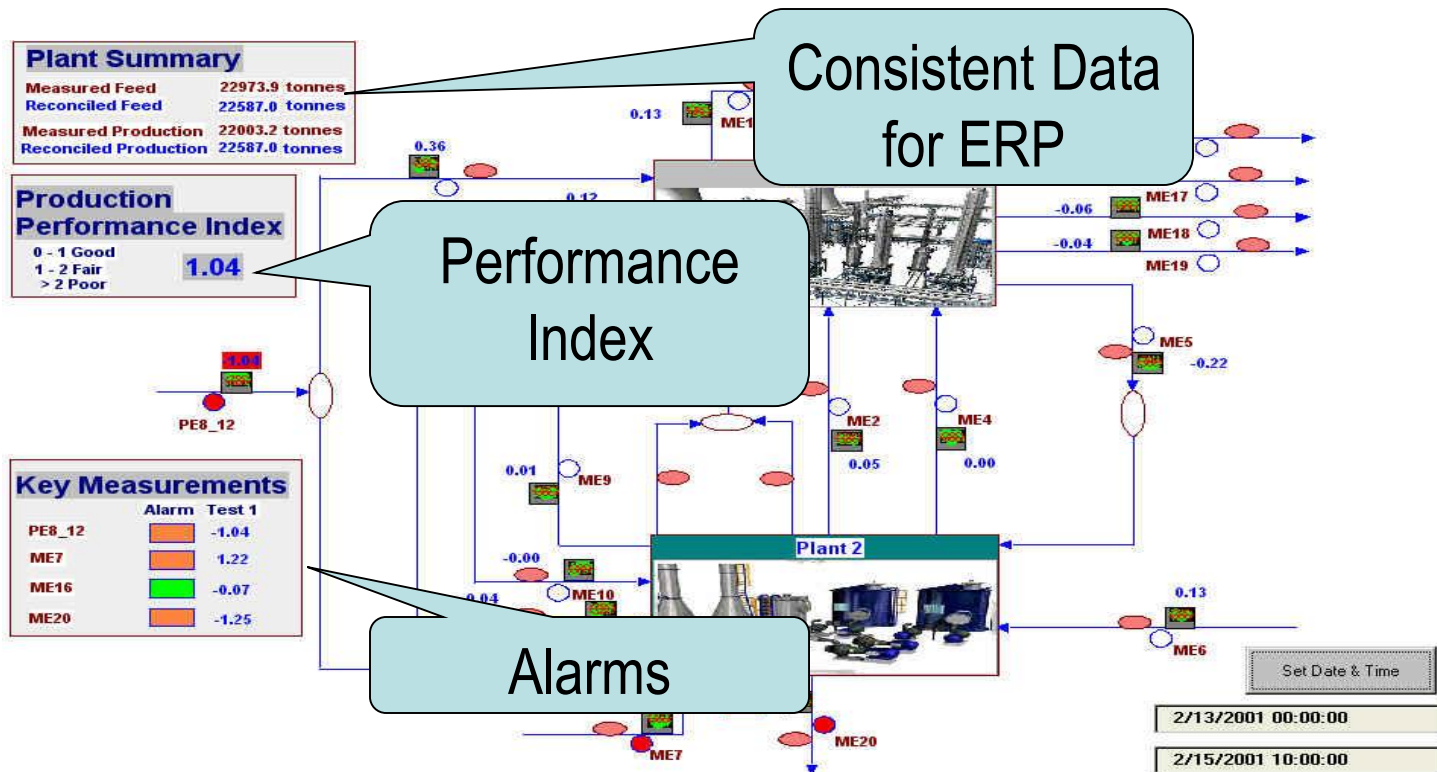


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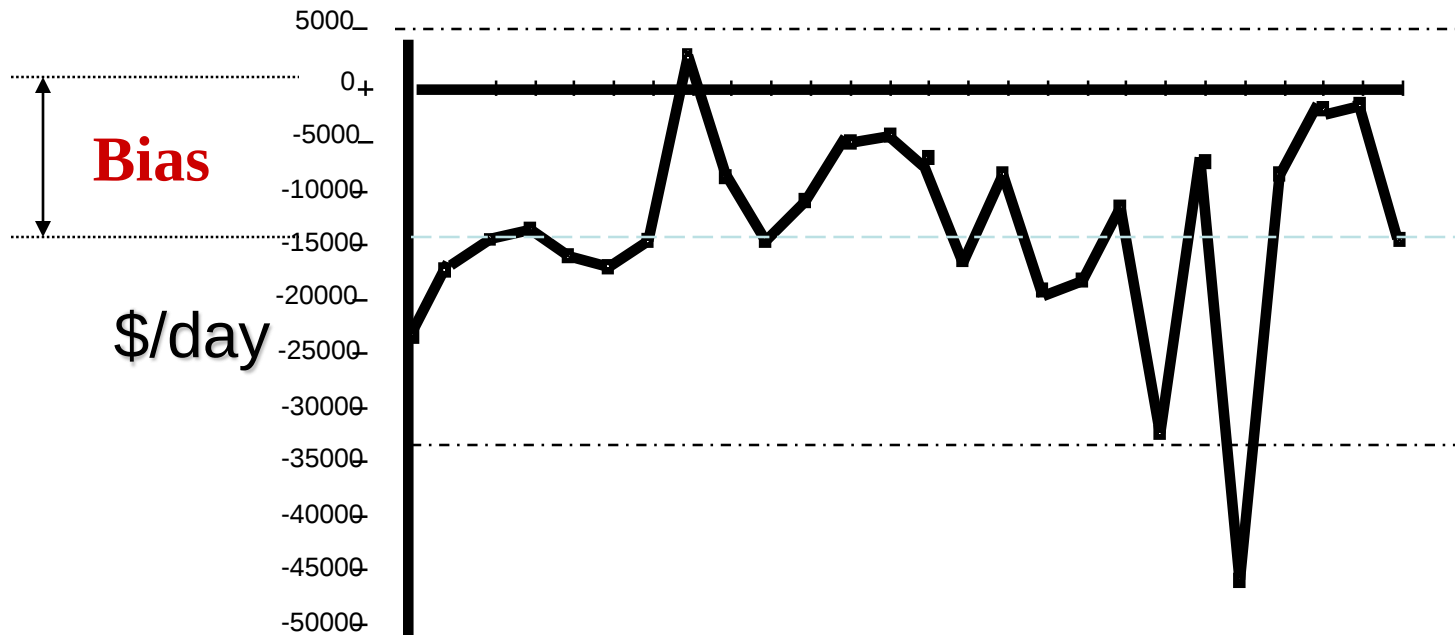
Benefits of Sigmafine

- *Monitor Plant Performance*



Benefits of Sigmafine

- *Verify Custody Transfer*



Daily “profit/loss” in \$ over one month
Day of the Month

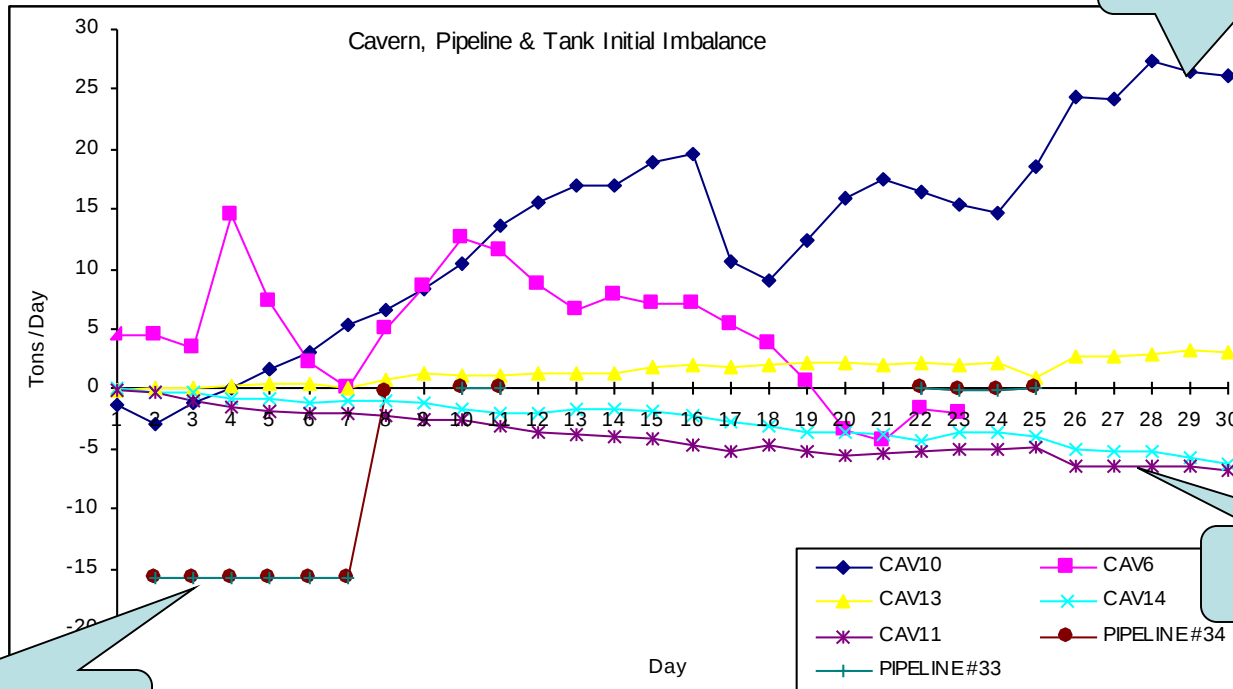


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Benefits of Sigmafine

- Instrument and Loss*



Leak

Drift

Meter Error



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Sigmafine 4.0 - The Next Generation



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Sigmafine 4.0

- *Fully integrated with PI System*
- *First Application Built on the Analysis Framework (AF)*
- *Modular and Reusable Structure*
- *.NET based*

Sigmafine
PI UDS PI AF

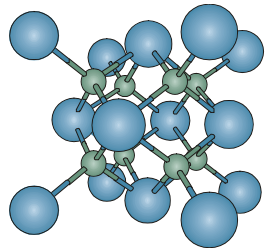


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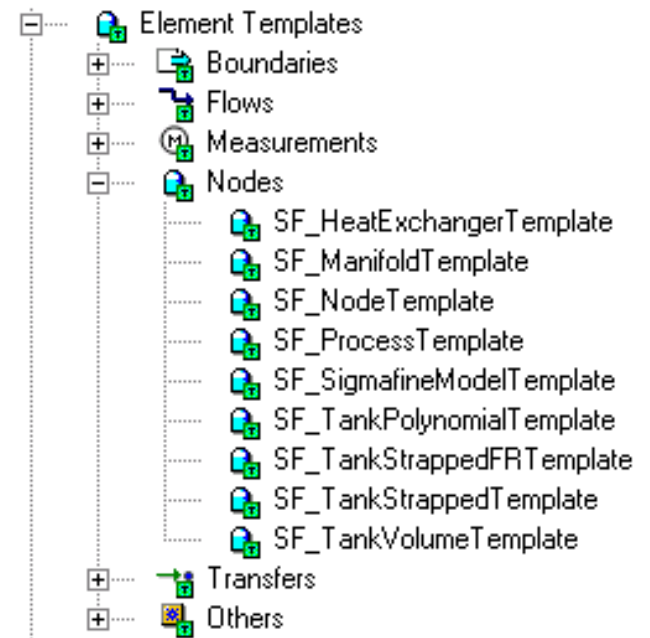
Sigmafine 4.0 - Configuration

- *Structure*
 - ***Element Templates***
 - *Elements*
 - *Plug-Ins*
 - *Data References*
 - *Analysis Rules*
 - *Time Rules*
 - *Models*
 - *Unit of Measure Classes*
 - *Tables*



Element Templates

- *Element Templates*
 - *Boundaries*
 - *Flows*
 - *Measurements*
 - *Nodes*
 - *Transfers*
 - *Others*
 - *User Definable*



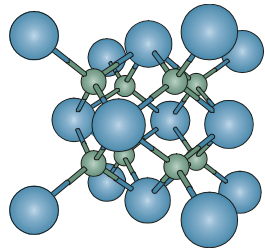
Element Templates

- *Attribute Configuration*
 - *Type*
 - *Units of Measure*
 - *Data Reference*
 - *Settings*
 - *Default Value*



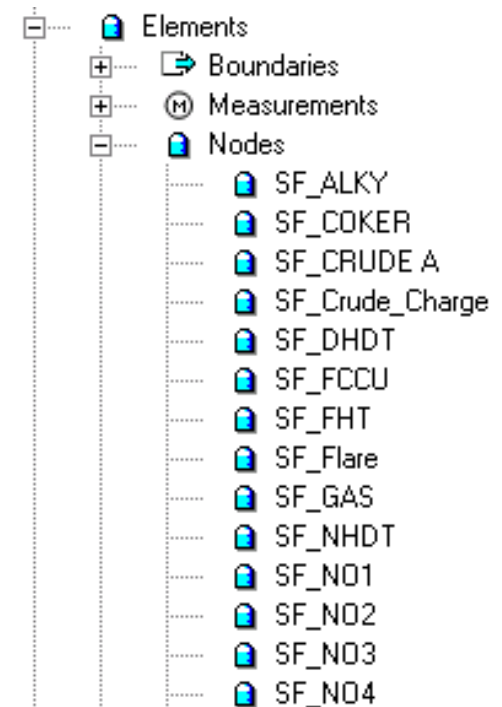
Sigmafine 4.0 - Configuration

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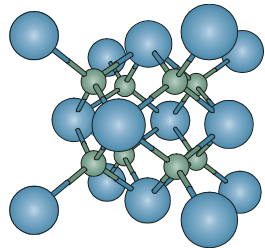
Elements

- *Element*
 - *Created from Element Template*
 - *Inherit configuration from Template*
 - *Override Configuration*
 - *Global or Local to Model*



Sigmafine 4.0 - Configuration

- *Structure*
 - *Element Templates*
 - *Elements*
 - ***Plug-Ins***
 - *Data References*
 - *Analysis Rules*
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Plug-Ins

- *Data References*
 - *How Attributes get/put Data*
- *Analysis Rules*
 - *Collection of Elements (Model Context)*
- *Time Rules*
 - *Cases*



Plug-Ins

- *Data References*
 - *Formula*
 - *PI Point*
 - *PI Point Array*
 - *Sigmafine*
 - *Table Lookup*
 - *Tank Volume from Gauge*
 - *Units Of Measure*
 - *User Defined*



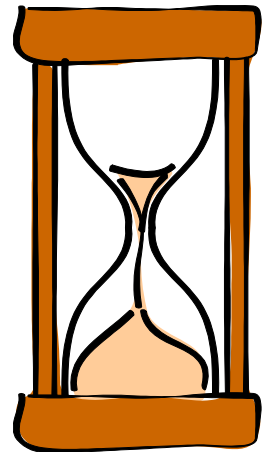
Plug-Ins

- *Analysis Rules*
 - *Gross Error Detection*
 - *Mass Balance*
 - *Volume Balance*
 - *Component Balance*
 - *Energy Balance*
 - *Stoichiometric Balance*
 - *Constraint Mass Balance*
 - *Composition Tracking*
 - *User Definable*



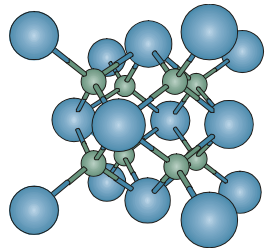
Plug-Ins

- *Time Rules*
 - *Hourly*
 - *Daily*
 - *Monthly*
 - *User Definable*



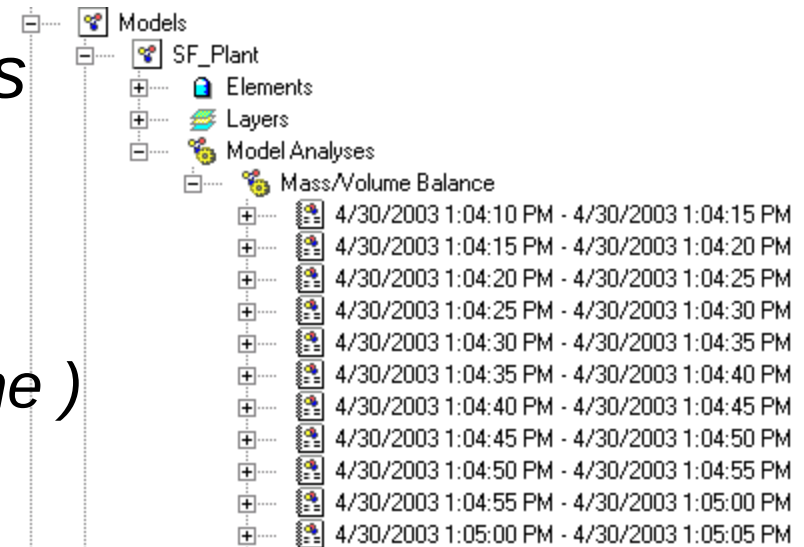
Sigmafine 4.0 - Configuration

- **Structure**
 - *Element Templates*
 - *Elements*
 - *Plug-Ins*
 - *Data References*
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 - **Models**
 - *Unit of Measure Classes*
 - *Tables*



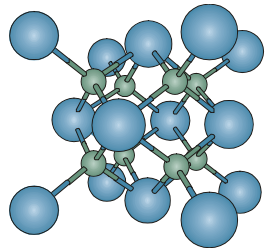
Models

- *Collection of*
 - *Connected Elements*
 - *Layers*
 - *Model Analyses*
 - *Cases (period of time)*



Sigmafine 4.0 - Configuration

- *Structure*
 - *Element Templates*
 - *Elements*
 - *Plug-Ins*
 - *Data References*
 - *Analysis Rules*
 - *Time Rules*
 - *Models*
 - ***Unit of Measure Classes***
 - ***Tables***



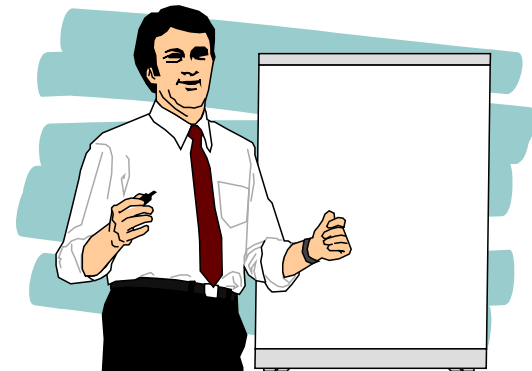
Units of Measure

- *Units of Measure*
 - *Class to Class*
- *Tables*
 - *Component Table*
 - *Material Table*
 - *Strapping Tables*
 - *User Definable*

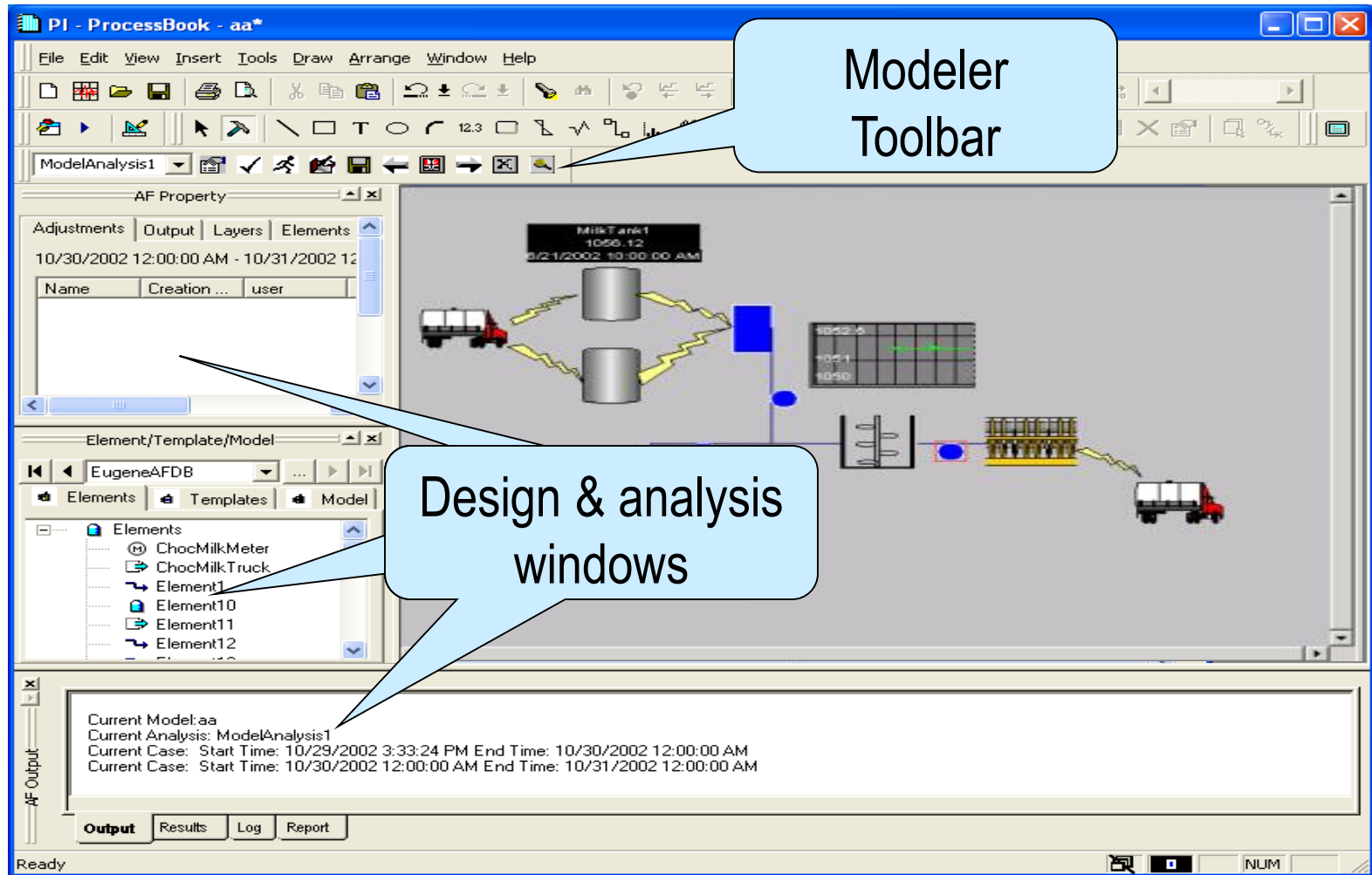


Presentation Layer

- *PI ProcessBook 3.0*
 - *Modeling Add-In*
 - *Create/Import/View Models*
- *SF Excel Add-In*
 - *Built in knowledge of the AF SDK*
 - *Report Templates*
 - *Run Analysis*
 - *Ad hoc Data Retrieval*



ProcessBook Modeling Add-In



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SF Excel Add-In

Microsoft Excel - Book1

File Edit View Insert Format Tools Data Window SF PI PI-ECU PI-SMT Help

10 B

= {=SFGetAttributes("soudeklaptop","Plant","SF_Plant","Mass/Volume Balance",\$B\$6,\$B\$7,D9,"MeasuredMass","Single","lton", 1)}

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Server	soudeklaptop												
2	Database	Plant												
3	Model	SF_Plant												
4	Analysis	Mass/Volume Balance												
5														
6	Start	4/30/2003 1:04:30 PM												
7	End	4/30/2003 1:04:35 PM												
8				Element	Mass									
9				SF_T10LSFO	5603.476									
10				SF_T1Crude	14378.67									
11				SF_T20BUT	3546.134									
12				SF_T25ALKY	1541.387									
13				SF_T2Crude	12613.94									
14				SF_T30REF	7605.944									
15				SF_T3Crude	13067.1									
16				SF_T4Crude	13518.92									
17				SF_T5LPG	3033.075									
18				SF_T6URG	4285.027									
19				SF_T7UPR	2997.399									
20				SF_T8Jet	4806.8									
21				SF_T91MTBE	4477.085									
22				SF_T9Diesel	5881.334									
23				SF_TkFccFeed	2911.667									
24				SF_TkFccHdtr	2867.367									
25														
26														
27														
28														
29														
30														
31														
32														

SF Get Attribute Values

PI System: soudeklaptop Model: SF_Plant

Database: Plant Model Analysis: Mass/Volume Balance

Start Case: \$B\$6 End Case: \$B\$7

Element: D9:D24

☒ Single Case - Multiple Attributes ☐ Multiple Cases - Single Attribute

Available Attributes and Default UOMs:

- Maximum - bbl
- MeasuredMass - lb
- Minimum - bbl
- MixingModel - N/A
- MolecularWeight - lb/lbmol
- NetVolume - bbl
- NetWeight - N/A
- ObjectStatus - N/A
- PercentBsw - %

Selected Attributes and Selected UOMs:

- MeasuredMass - lton

Output: \$E\$9 ☒ Row ☐ Column

☐ Show Times ☐ Write Header ☐ UOM

List of UOMs: lton, g, kg, klb, lb, MM lb, ston, t

OK Cancel



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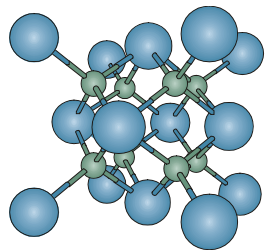
Running an Analysis

- *Run From*
 - *AF Explorer*
 - *Process Book*
 - *SF Excel Add-In*



Leveraging AF

- *Structure*
 - *Element Templates (Done)*
 - *Elements (Done)*
 - *Plug-Ins*
 - *Data References (Done/New)*
 - *Analysis Rules (New)*
 - *Time Rules (Done/New)*
 - *Models (New)*
 - *Unit of Measure Classes (Done)*
 - *Tables (Done)*



Leveraging AF

- *Build new (if necessary)*
 - *Data References*
 - *Time Rules*
- *Build new Model*



Summary – Sigmafine 4.0

- *Customized by users for specific industry*
- *Flexible analysis rules*
- *Flexible time rules*
- *Data References*
 - *Data comes from anywhere*
- *User definable templates, attributes, rules, ...*



Summary – Analysis Framework

- *Infrastructure for Deploying and Sharing Business, Process and Manufacturing Rules in the PI System*
- *Framework for Building Generalized and Reusable Solutions*

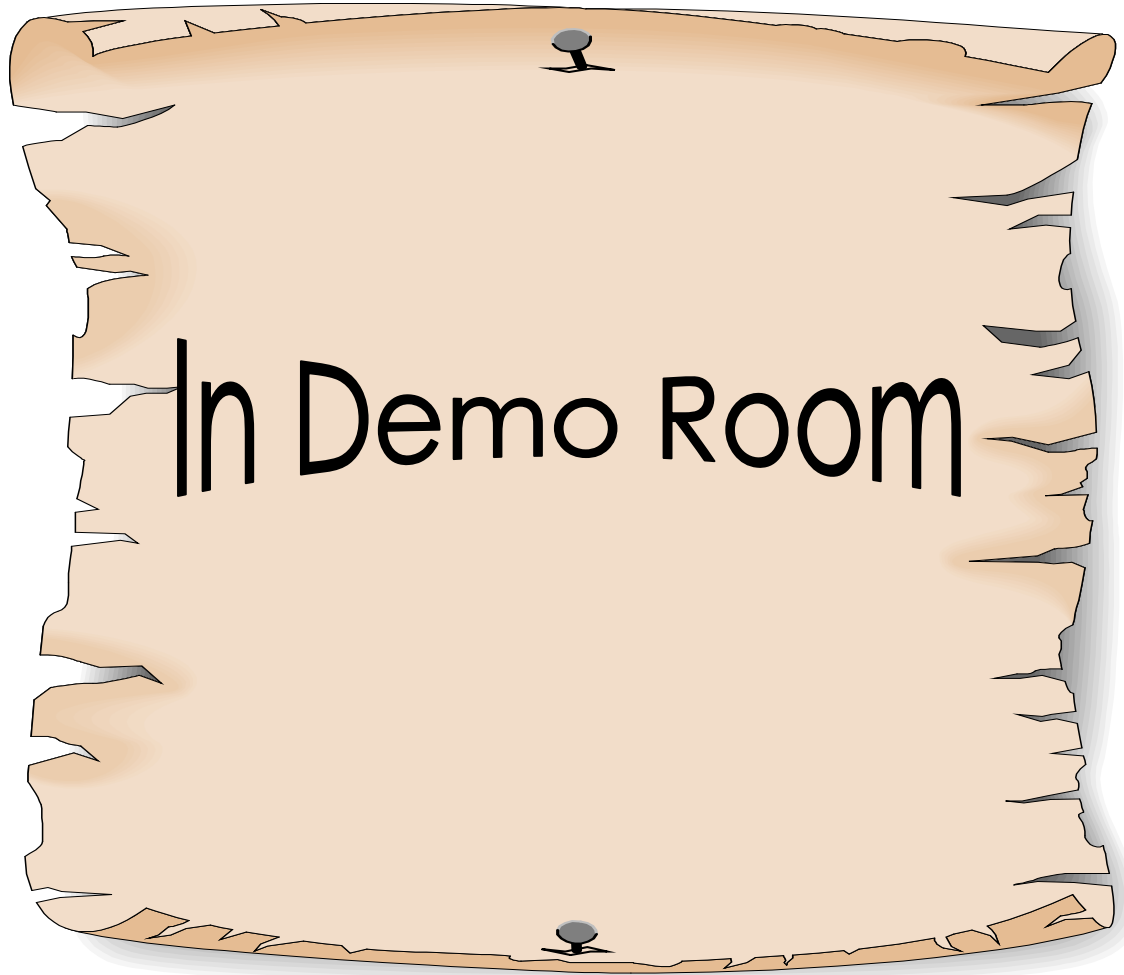


What's It All Mean?

- *One global model*
 - *Different views of global model*
 - *Maintenance in one location*
- *Presentation*
 - *Excel*
 - *Process Book*
- *Applications insulated from data infrastructure*



More Details?



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Yearly Puzzle

**Remove 6 sacks to leave even number
in each row and column**



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