# Dashboards for data based decisions


## Jenő Csanaki

**Opel Szentgotthard Ltd.**

**Unit manager, Machining**


# Content

- About OPEL Szentgotthard
- Planning - Tool set - Execution
  - Business environment
  - Data – Measure - KPI
  - Data processing, forums
  - Reports
- Results

Rüsselsheim


# Layout & capacity

***1. Family1 engine plant***
22,500 m²
630,000 unit per year

***2. Flex engine plant***
65,426 m²
645,000 unit per year

***3. Cylinder-head plant***
15,500 m²
625,000 unit per year

***13. Transmission Remanufacturing***
1,100 m²
11,700 unit per year

4-5. Offices
6. Outbound Transportation Hall
7. Warehouse
8. Energy centre
9. Truck gate
10. Personal Entrance 2
11. Social Building
12. Main Entrance / Offices
13. Reman
14. Knowledge Center

# Cars with Family1engines


Chevrolet Aveo/Sonic

Chevrolet Cruze

Opel Corsa

Opel Astra NB

Chevrolet Trax

Opel Zafira

Opel Insignia

Opel Mokka X

# Cars with Flex engines


Opel Mokka X

Opel Insignia

Opel Zafira

Opel Astra

Chevrolet Equinox

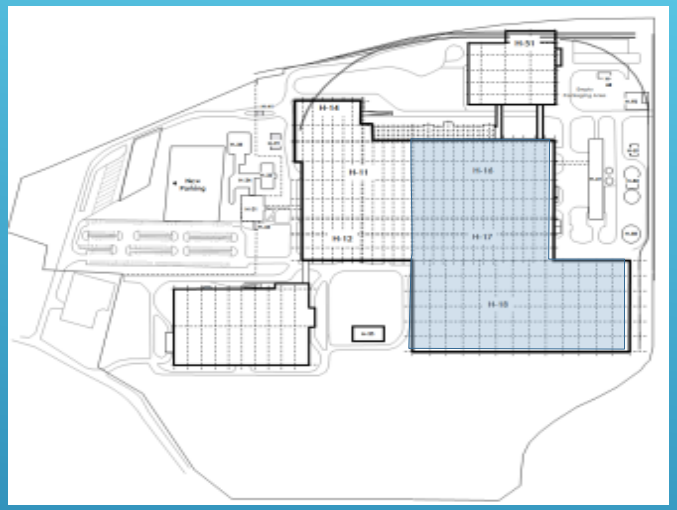
Chevrolet Cruze

Chevrolet Malibu

Opel Adam

Opel Cascada

# Flex machining lines & capacity



**CRK1**
MDE
275 K/Y

**CRK2**
SGE
MGE
275 K/Y

Indirect store

**CBL1**
MGE
(Cast
Iron)
100 K/Y

**CBL2**
SGE
MDE
(Alu)
180 K/Y

Coolant Block

**CBL3**
MDE/SG
E (Alu)
280 K/Y

Hot Test

Existing
Plant

Coolant crank

**CHM1**
SGE /
MDE
180 K/Y

**Assy1**
MGE/SGE
285 K/Y (+ 85 K/Y)

Coolant head

**CHM2**
SGE /
MDE
280 K/Y

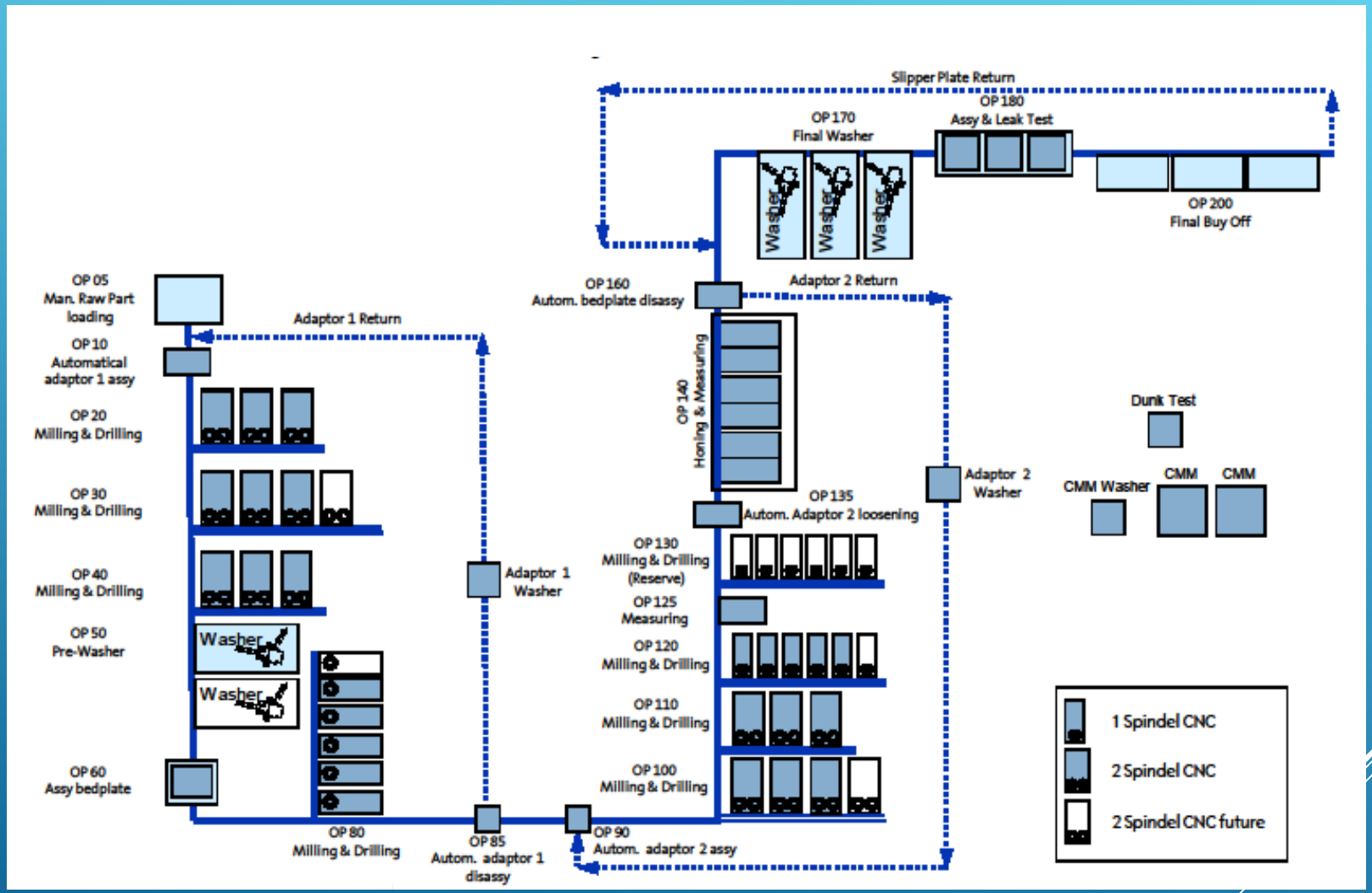
**Assy2**
MDE
275 K/Y (+95 K/Y)

Logistic

**CH2** Fam1
MGE
100 K/Y

New Plant/
Extension

# Example: Cylinder block machining line 3



# Throughput- Planning

## As a function…

$$Throughput = f(a,b,c,d,...,t)$$

Simulation required

a: # of characteristics,
b: # of machines,
c: # of spin
d:
e:
f:
g:
h: …nned, unplanned tool change),
i: $f_i$(interventions by operators),
j: $f_j$(breakdown),
k: $f_k$(impact of other machines, gantries, conveyors, adapters,…),
l: $f_l$(types, type changes),
…

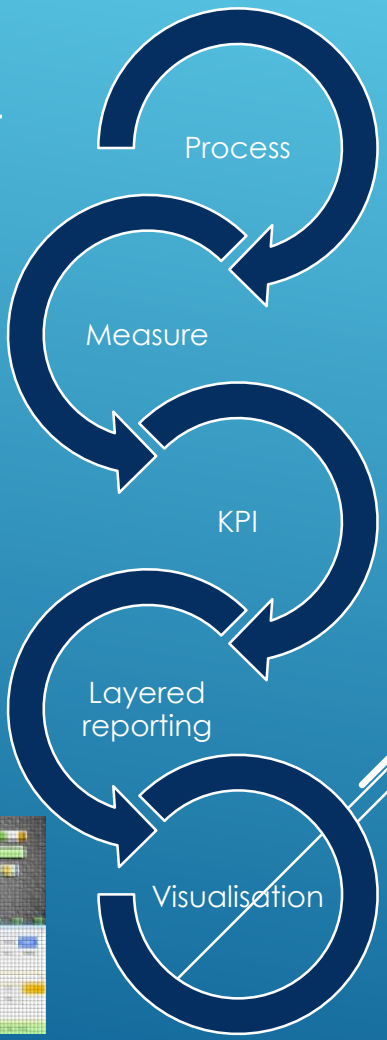
…erations),

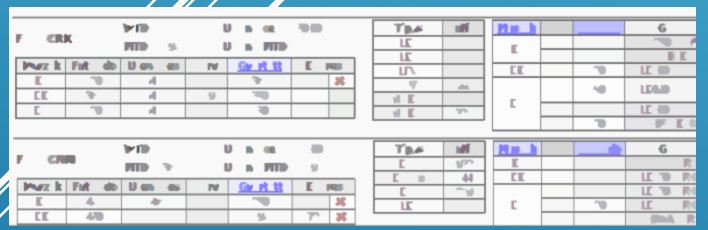
# Data ➡ Information
# Manufacturing process ➡ visualisation

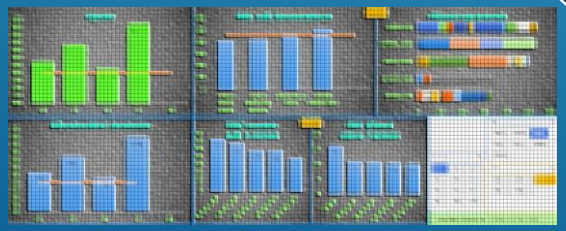
Component production

Uptime

Produced parts



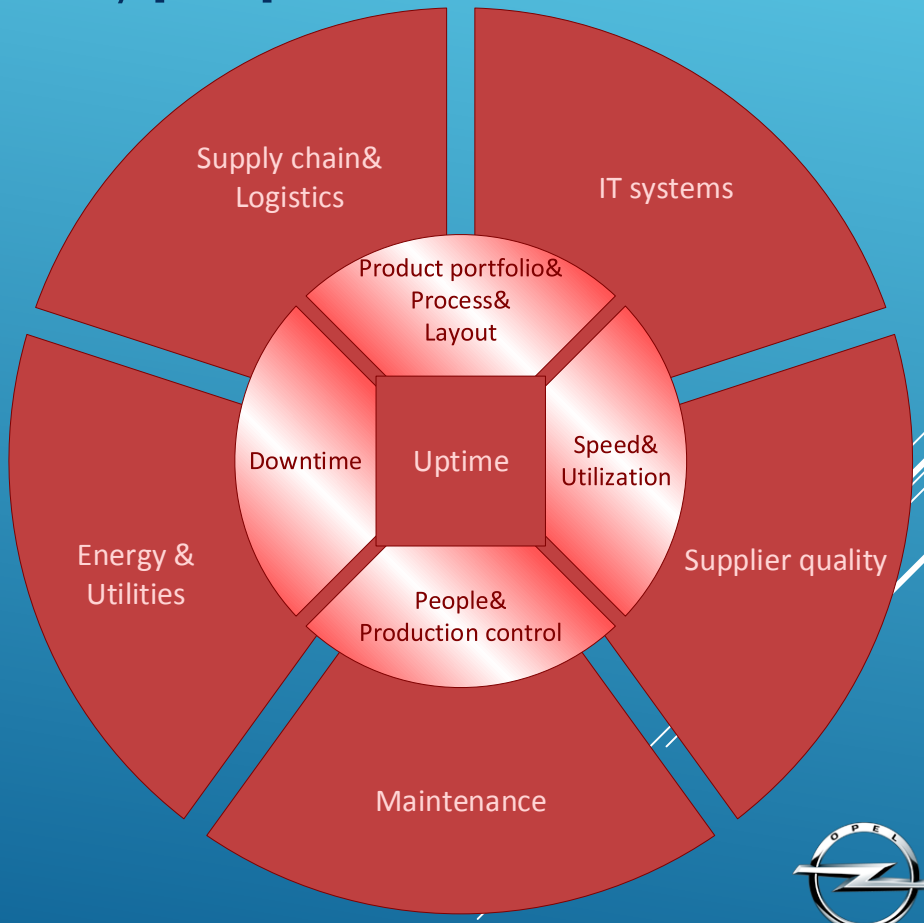


# Processes ➡ KPIs

Uptime=NetOutput/(ScheduledHours/CycleTime$_{purch}$) [%]

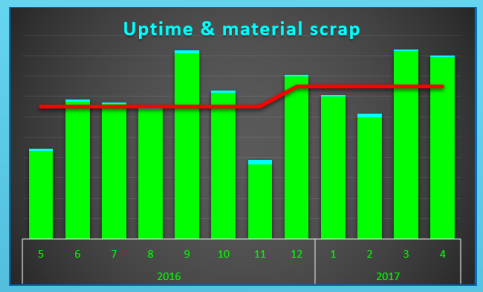
$$\text{Uptime}=\sum_{i=1}^{n}\frac{O_i \cdot T_i}{t_L}$$

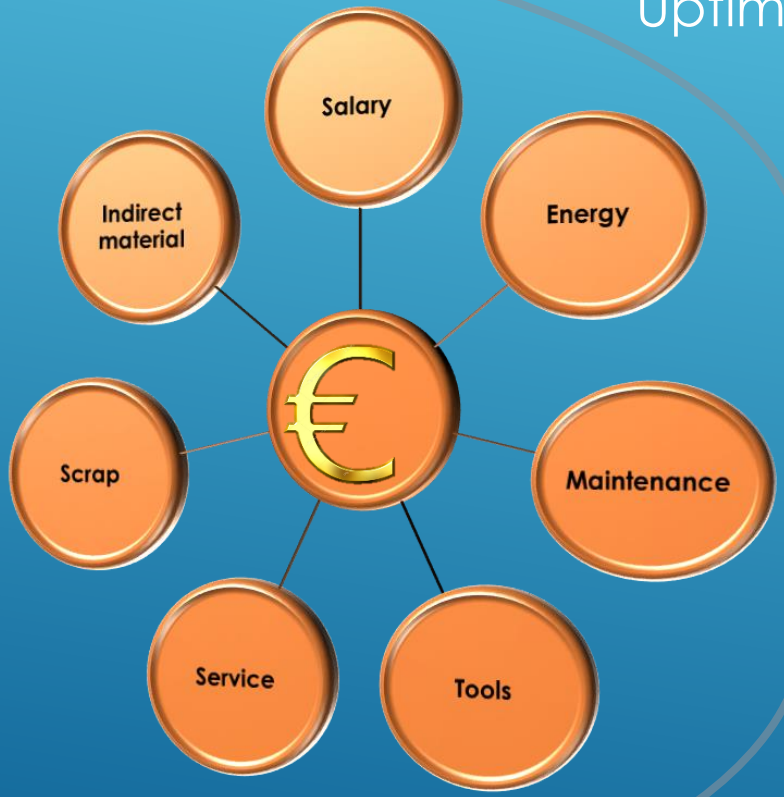
SAT=Output/(RunningTime+Downtime) [JPH]




SAT: Standalone Throughput

# Uptime ➡ Cost




## Uptime

| | |
|---|---|
| Bottleneck | Regular auto-identification |
| | Quantity losses |
| | Downtime, duration & frequency |
| Cycle time | By operation |
| | By type |
| | During type change |
| Scrap | Material |
| | Production |
| Touch | Rework |
| | Suspect |

# Data management, BI

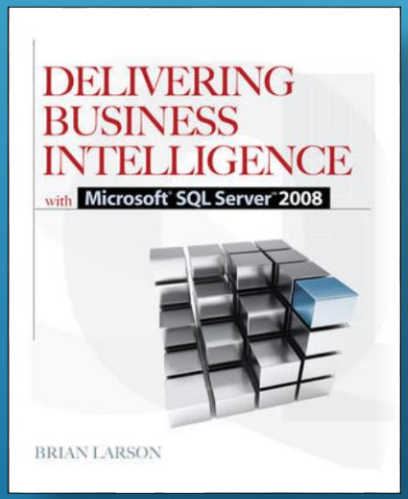
## DATA - DATA PROCESSING – REPORTS

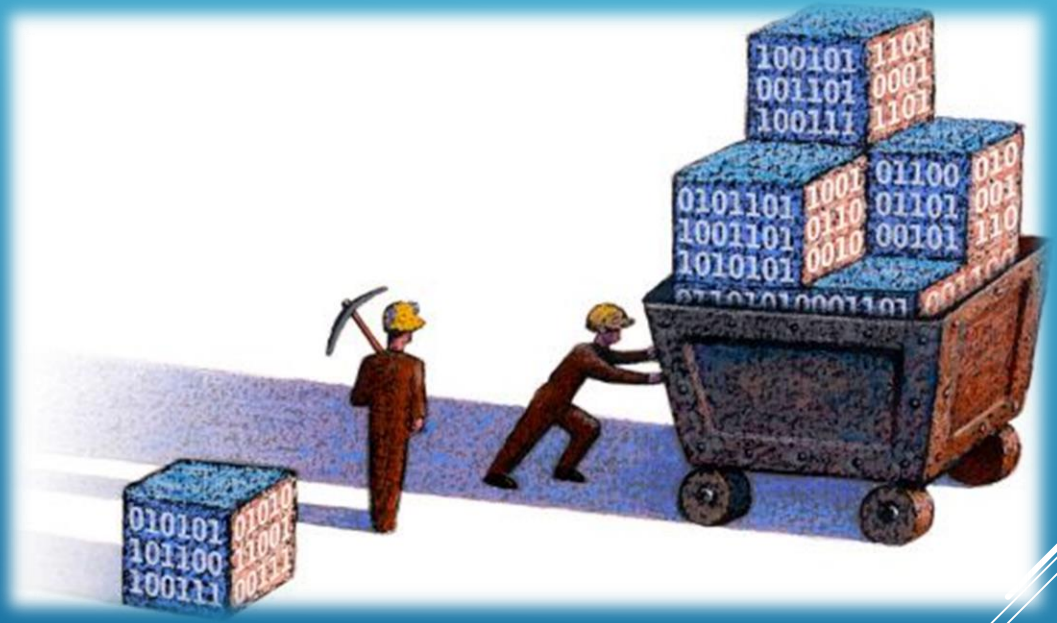
Requirements

- Proper data quality in time
- One data once entered
- Tracking changes in time (target changes)
- Be capable to
  - aggregate
  - identically defined measures
- Fast response
- Layered reports
- Shared BI
- Sharing

# Business intelligence and OLAP

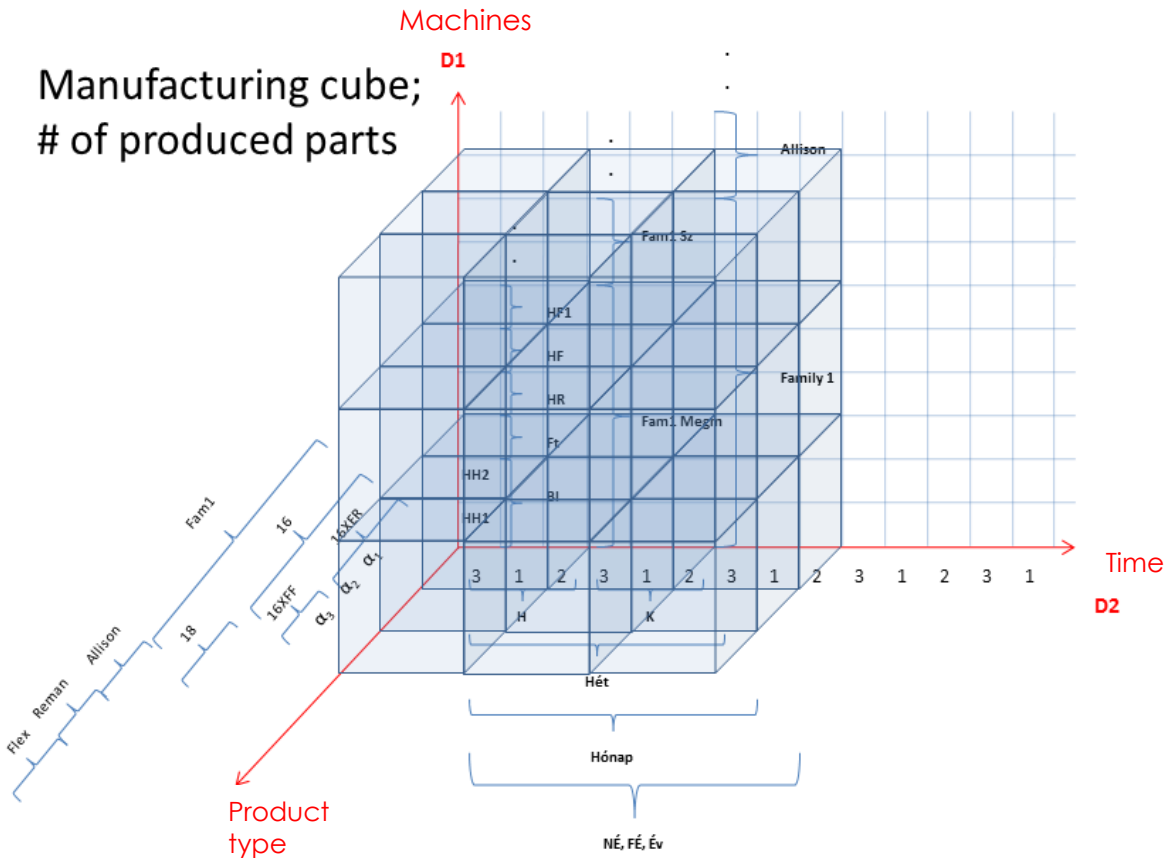
*„**Business Intelligence** is a set of methodologies, processes, architectures, and technologies that **transform raw data into meaningful and useful information** used to **enable** more effective strategic, tactical, and operational **insights and decision-making**."*
Evelson, Boris (21/11/2008)



# Multidimensional data structure

## OLAP cube

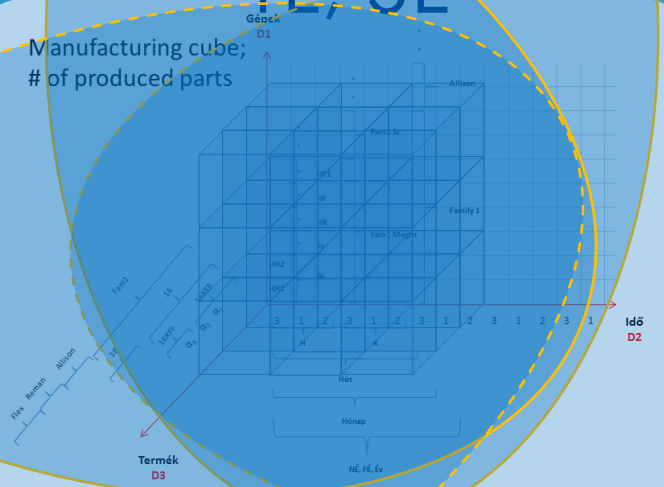


# Data sources, systems

PMC

TL, SL

Manufacturing cube;
# of produced parts




CMM report

Flexnet

Qs-Stat

OLAP
Tabular

# System structure

Data

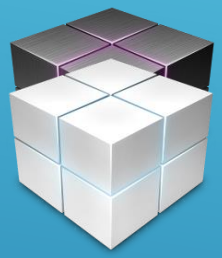
Measures, KPIs, BI

Reports

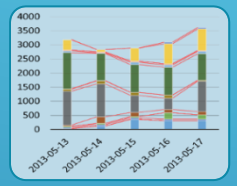
Browser

OLTP Database

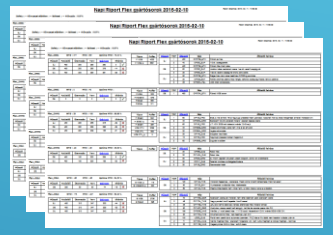
Data Warehouse



OLAP Cubes

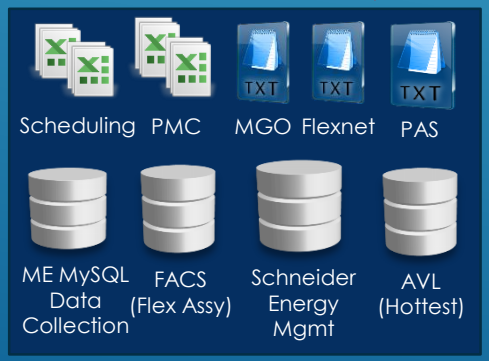



Special reports



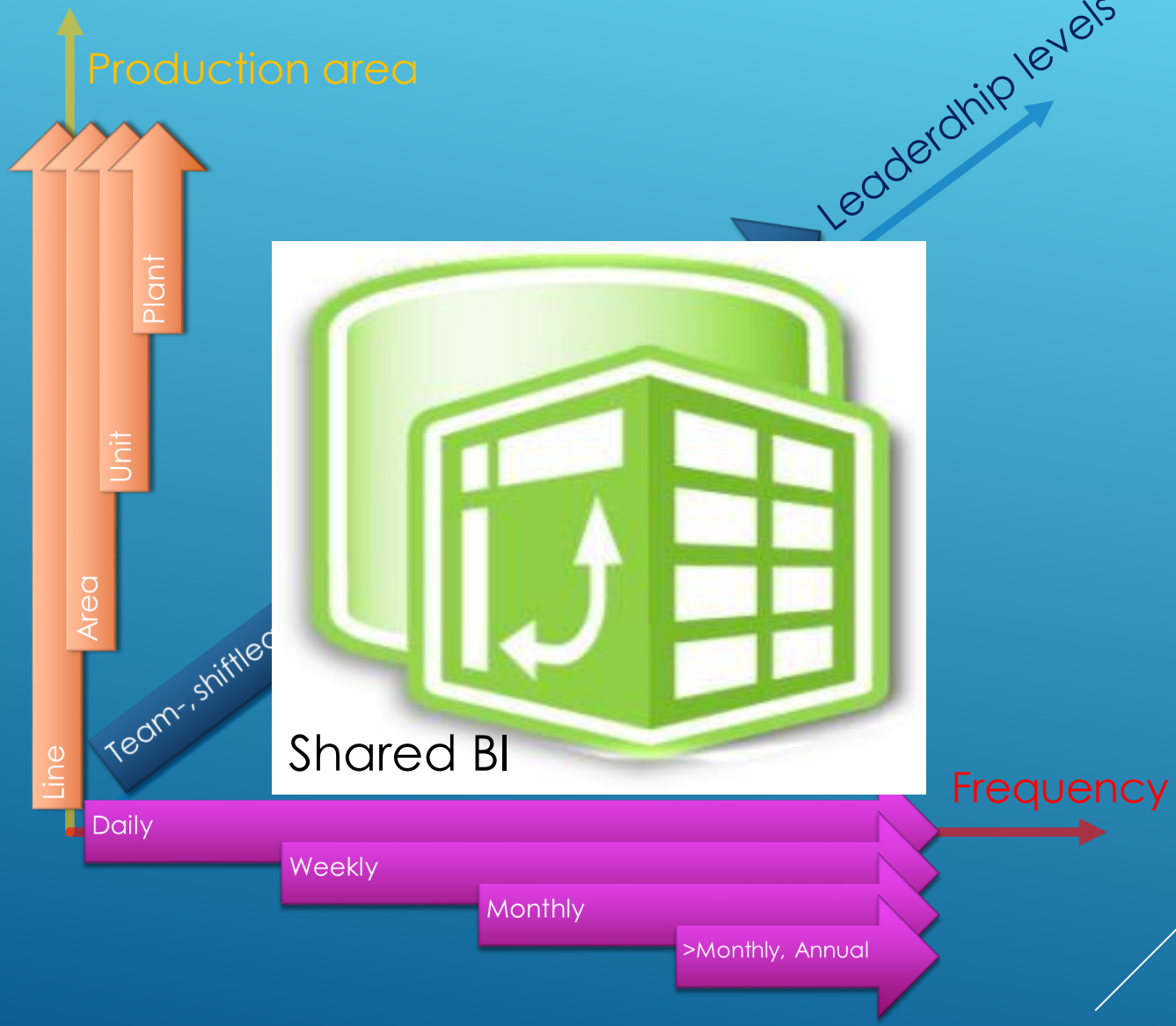
Shiftreports


Dashboards

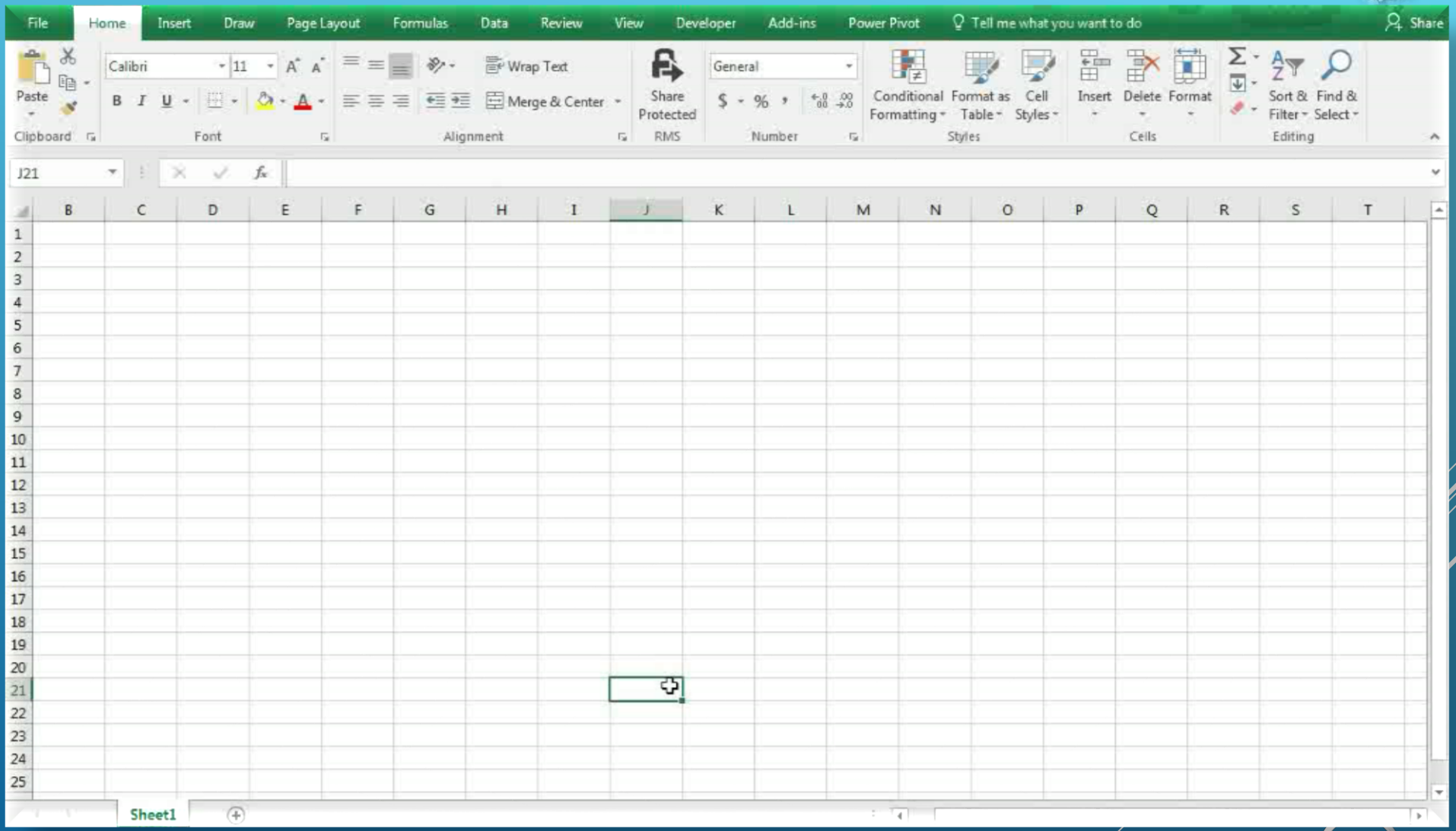



Shared BI

# Report structure



# Record By - example sort



# Systematic forums & reports

PMC

BN (SAT) ranking

Daily

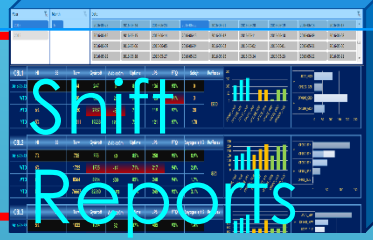
Daily production meeting

TIP

Weekly

Weekly production meeting

TIP





Uptime action plan update

Monthly

Weekly production meeting

TIP

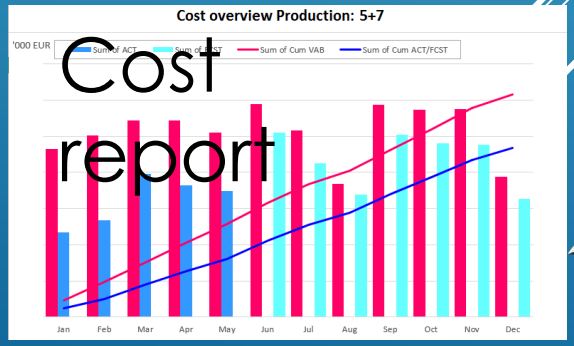
Cost management review

BPD review


>Monthly, Annual

LRP, CIP plan

Manuf Staff Mtg, PPRM




TIP: Throughput Improvement Process
BN: Bottleneck
SAT: Standalone Throughput=Output / (RunningTime+Downtime)
LRP: Loss Reduction Project

# WEB interface
# shiftly, manual supported by PM&C on-line

**A KIVÁLASZTOTT SOR: BLOKK3, MDE/SGE**

Admin felület ►

◄ Vissza a sorokhoz

| Hét | Dátum | ÉJ (terv/gyártott) | DE (terv/gyártott) | DU (terv/gyártott) | Napi | ▲▼ |
|---|---|---|---|---|---|---|
| ► 23 | 2017-05-30 | 417 / 428 | 417 / 0 | 417 / 0 | 1251 / 428 | |
| 23 | 2017-05-29 | 365 / 370 | 417 / 406 | 330 / 330 | 1112 / 1106 | |
| 22 | 2017-05-28 | - | - | - | 0 | |
| 22 | 2017-05-27 | 0 / 0 | - | - | 0 / 0 | |
| 22 | 2017-05-26 | 365 / 372 | 417 / 398 | 352 / 357 | 1134 / 1127 | |
| 22 | 2017-05-25 | 417 | | | | |
| 22 | 2017-05-24 | 417 | | | | |

Számlaigazoló lapok - All ... | OnlineTraining | FlexNet Start | GM web | Google | Home | Maximo | PMC online report | MaTE | Best Practice | VTSoft | Dolgozói adatbázis

**HENGERFEJ2 MDE/SGE ► 2017.05.30. ► DU** (NZRBCG)

◄ Dátumválasztás
Admin felület ►

Kijelentkezés most
Automatikus kijelentkezés: 4:59

Mentés | Jóváhagyás | Sorjegyzet

Műszak adatok | Termelés | Állásidők | Készletnyilvántartás | Személyügy és biztonság | Veszteség | Logisztika

**GÉPÁLLÁS**

| | Gépnév | Állásidő | Hibakategória | Hiba leírása | | |
|---|---|---|---|---|---|---|
| 1 | LD010_GRO | 80 | Mechanikus | N S1 P.:77,2% MDE Z11 megfogó szorítási hibák/hibaker | ▲ ▼ | Törlés |
| 2 | OP150_FRO | 45 | Mechanikus | N S2 P.:69,1% D16 fagydugó adagolási hibák (megszoru | ▲ ▼ | Törlés |
| 3 | OP110_FRO | | | N S3 P.:77,5% 4B/köztes csapágyfedél megszorul az ad | ▲ ▼ | Törlés |
| | | | Egyéb | | ▲ ▼ | Törlés |
| 5 | - | | Egyéb | | ▲ ▼ | Törlés |
| 6 | - | | Egyéb | | ▲ ▼ | Törlés |
| 7 | - | | Egyéb | | ▲ ▼ | Törlés |
| 8 | - | | Egyéb | | ▲ ▼ | Törlés |
| 9 | - | | Egyéb | | ▲ ▼ | Törlés |
| 10 | - | | Egyéb | | ▲ | Törlés |

**SORÁLLÁS**

| | Kezdete | Vége | Állás oka | Tervezett | | |
|---|---|---|---|---|---|---|
| 1 | | | Egyéb | ☐ | ▲ ▼ | Törlés |
| 2 | | | Egyéb | ☐ | ▲ ▼ | Törlés |
| 3 | | | Egyéb | ☐ | ▲ ▼ | Törlés |
| 4 | | | Egyéb | ☐ | ▲ ▼ | Törlés |
| 5 | | | Egyéb | ☐ | ▲ ▼ | Törlés |

PM&C bottleneck (SAT) ranking

# Weboldal példák
Web page examples

http://huszedv0sql01/ProductionDailyReport/Lir

Production Daily Reporting ...

File Edit View Favorites Tools Help

Bejelentkezett felhasználó: (EUR\HZJHC4)
A mai dátum. 2017.5.31

Wir leben Autos.

## FAM1

| Motorgyár | Hengerfej gyár |
|---|---|
| Blokk | Hengerfej1 |
| Csapágyfedél | Hengerfej2 |
| Hajtórúd | Vezérműtengely |
| Főtengely | Hengerfej szerelés |
| Motor szerelés | |

## FLEX

| Megmunkáló sor | Szerelősor |
|---|---|
| Blokk1, MGE | HF szerelés, MGE/SGE |
| Blokk2, MDE/SGE | Szerelés, MGE/SGE |
| Blokk3, MDE/SGE | HF szerelés, MDE |
| Főtengely1, MDE | Szerelés, MDE |
| Főtengely2, MGE | Meleg teszt |
| Hengerfej MDE | |
| Hengerfej2 MDE/SGE | |

# Shared BI, database connections

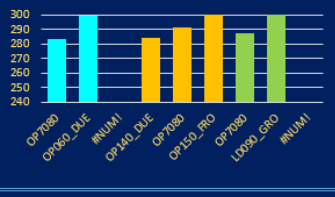
```
=CUBEVALUE("ProductionCube","[Measures].["&$H$3&"]","[Dim Lines].[Short Line Name].[All].["&B37&"]",Slicer_Time_Hierarchy,Slicer_Date_Of_Shift_Start)
```

=CUBEVALUE("ProductionCube","[Measures].["&$H$3&"]","[Dim Lines].[Short Line Name].[All].["&B37&"]",Slicer_Time_Hierarchy,Slicer_Date_Of_Shift_Start)

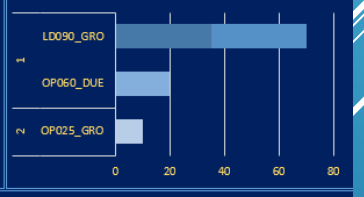
| Year | Month | Date of shift start |
|---|---|---|
| 2017 | 5 | 2017-05-17 · 2017-05-18 · 2017-05-19 · 2017-05-20 · 2017-05-21 · 2017-05-22 · 2017-05-23 · 2017-05-24 · **2017-05-25** · 2017-05-26 · 2017-05-27 · 2017-05-28 · 2017-05-29 |

**Last refreshed: 29-May-2017 07:39** — **Uptime MTD Machining: 84.6%**

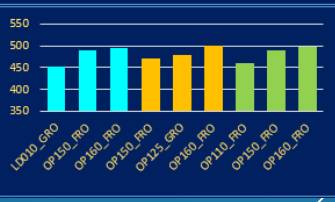
**Bottleneck SAT** daily - weekly - monthly

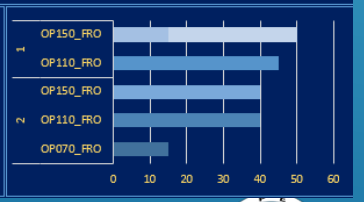



**Downtime**




| CHM1 | Absenteeism Rate | Safety incident | Planned/ scheduled | EOL produced | Δ EOL produced | Uptime | JPS | FTQ | Material scrap % | EOL buffer |
|---|---|---|---|---|---|---|---|---|---|---|
| 2017-05-25 | 0% | | 708 | 710 | 2 | 89% | 270 | 97% | 0.0% | 2950 |
| WTD | 0% | | 2645 | 3046 | 401 | 88.8% | 269 | 98% | 0.0% | |
| MTD | 1% | | 12094 | 12650 | 556 | 88.0% | 267 | 98% | 0.1% | |
| YTD | 2% | | 74453 | 73706 | 189 | 86% | 261 | 98% | 0.1% | |




| CHM2 | Absenteeism Rate | Safety incident | Planned/ scheduled | EOL produced | Δ EOL produced | Uptime | JPS | FTQ | Material scrap % | EOL buffer |
|---|---|---|---|---|---|---|---|---|---|---|
| 2017-05-25 | 0% | | 1147 | 1143 | -4 | 89% | 416 | 97% | 1.0% | 1192 |
| WTD | 0% | | 4626 | 4370 | -256 | 86.3% | 404 | 97% | 0.8% | |
| MTD | 0% | | 18472 | 18077 | -395 | 87.2% | 409 | 98% | 0.5% | |
| YTD | 2% | | 115245 | 114397 | 744 | 84% | 393 | 98% | 0.5% | |

# Daily reports

Year: 2017 | Month: 5 | Date of shift start: 2017-05-17 | 2017-05-18 | 2017-05-19 | 2017-05-20 | 2017-05-21 | 2017-05-22 | 2017-05-23 | 2017-05-24 | 2017-05-25 | 2017-05-26 | 2017-05-27 | 2017-05-28 | 2017-05-29

Last refreshed: 29-May-2017 07:39 — Uptime MTD Machining: 84.6%

**Bottleneck SAT** daily - weekly - monthly

**Downtime**

| CHM1 | Absenteeism Rate | Safety incident | Planned/ scheduled | EOL produced | Δ EOL produced | Uptime | JPS | FTQ | Material scrap % | EOL buffer |
|---|---|---|---|---|---|---|---|---|---|---|
| 2017-05-25 | 0% | | 708 | 710 | 2 | 89% | 270 | 97% | 0.0% | |
| WTD | 0% | | 2645 | 3046 | 401 | 88.8% | 269 | 98% | 0.0% | |
| MTD | 1% | | | | | | | | | |
| YTD | 2% | | | | | | | | | |

| CHM2 | Absenteeism Rate | Sc inc |
|---|---|---|
| 2017-05-25 | 0% | |
| WTD | 0% | |
| MTD | 0% | |
| YTD | 2% | |

| 2017-05-29 | Prod Δ | Prod Δ MTD | EOL Buffer | Problem description |
|---|---|---|---|---|
| ASSY1 (Gasoline) | | | | |
| ASSY2 (Diesel) | | | | |
| HOT-TEST | | | | |
| CRK1 | | | | |
| CRK2 | | | | |
| CHM1 | | | | |
| CHM2 | | | | |
| CBL1 | | | | |
| CBL2 | | | | |
| CBL3 | | | | |

Date: 2017-05-30 | 2017-05-29 | 2017-05-28 | 2017-05-27

Absenteeism | Weekend | CMS

| Uptime | Uptime MTD | Raw material scrap | Raw material scrap MTD |
|---|---|---|---|
| | | | |

# Reporting dashboard example

File Home Insert Draw Page Layout Formulas Data Review View Developer Add-ins Power Pivot Tell me what you want to do Share

L32 =CUBEVALUE("ProductionCube","[Measures].["&$L$3&"]","[Dim Lines].[Short Line Name].[All].["&B31&"]",Slicer_Date_Of_Shift_Start)

Year: 2017 | Month: 5 | Date of shift start: 2017-05-17 … 2017-06-01 (2017-05-24 selected)

Last refreshed: 01-Jun-2017 15:43 | Uptime MTD Machining: 84.9% | Bottleneck SAT daily - weekly - monthly | Downtime

| CHM1 | Abs | Inc | Planned | EOL | Δ EOL | Uptime | JPS | FTQ | MatScrap | Buffer |
|---|---|---|---|---|---|---|---|---|---|---|
| 2017-05-24 | 0% | | 810 | 798 | -12 | 88% | 266 | 98% | 0.1% | |
| WTD | 0% | | 2193 | 2302 | 109 | 88.7% | 269 | 97% | 0.0% | |
| MTD | 1% | | 11642 | 11906 | 264 | 88.0% | 267 | 97% | 0.1% | |
| YTD | 2% | | 73065 | 72962 | -103 | 86% | 261 | 98% | 0.1% | 928 |

| CHM2 | Abs | Inc | Planned | EOL | Δ EOL | Uptime | JPS | FTQ | MatScrap | Buffer |
|---|---|---|---|---|---|---|---|---|---|---|
| 2017-05-24 | 0% | | 1251 | 1175 | -76 | 84% | 392 | 98% | 0.5% | |
| WTD | 0% | | 3582 | 3201 | -381 | 86.1% | 403 | 98% | 0.8% | |
| MTD | 0% | | 17428 | 16908 | -520 | 87.3% | 409 | 98% | 0.4% | |
| YTD | 2% | | 112609 | 113228 | 619 | 84% | 392 | 98% | 0.5% | 1114 |

| CBL1 | Abs | Inc | Planned | EOL | Δ EOL | Uptime | JPS | FTQ | ProdScrap | Buffer |
|---|---|---|---|---|---|---|---|---|---|---|
| 2017-05-24 | 7% | | 235 | 237 | 2 | 91% | 152 | 99% | 2 | |
| WTD | 8% | | 829 | 958 | 129 | 86.0% | 144 | 99% | 4 | |
| MTD | 3% | | 1819 | 2148 | 329 | 85.5% | 143 | 99% | 12 | |
| YTD | 2% | | 16433 | 16049 | -384 | 82% | 138 | 98% | 126 | 3043 |

| CBL2 | Abs | Inc | Planned | EOL | Δ EOL | Uptime | JPS | FTQ | MatScrap | Buffer |
|---|---|---|---|---|---|---|---|---|---|---|
| 2017-05-24 | 0% | | 776 | 788 | 12 | 90% | 274 | 95% | 0.0% | |

Flex dashboard | Sheet1 | ScheduledVsProduced

# Weekly reports

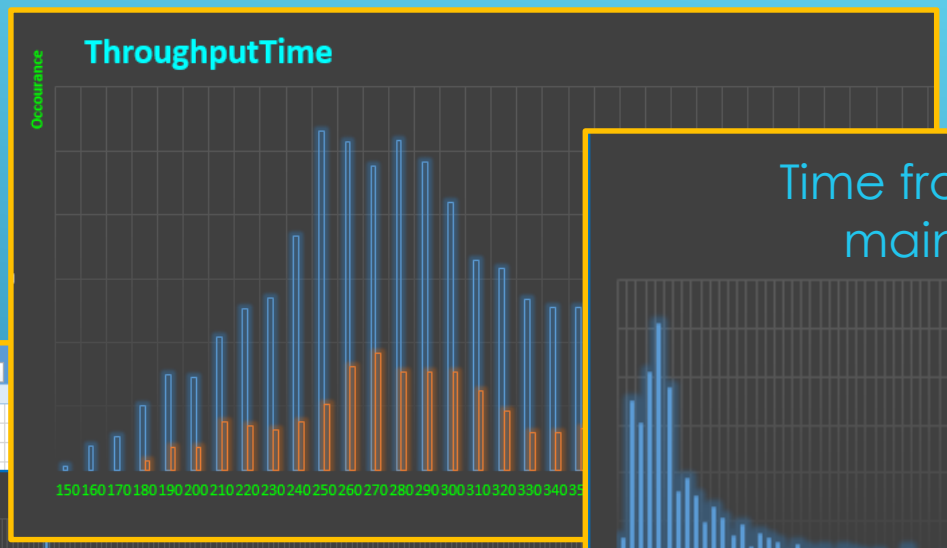
# Reporting examples

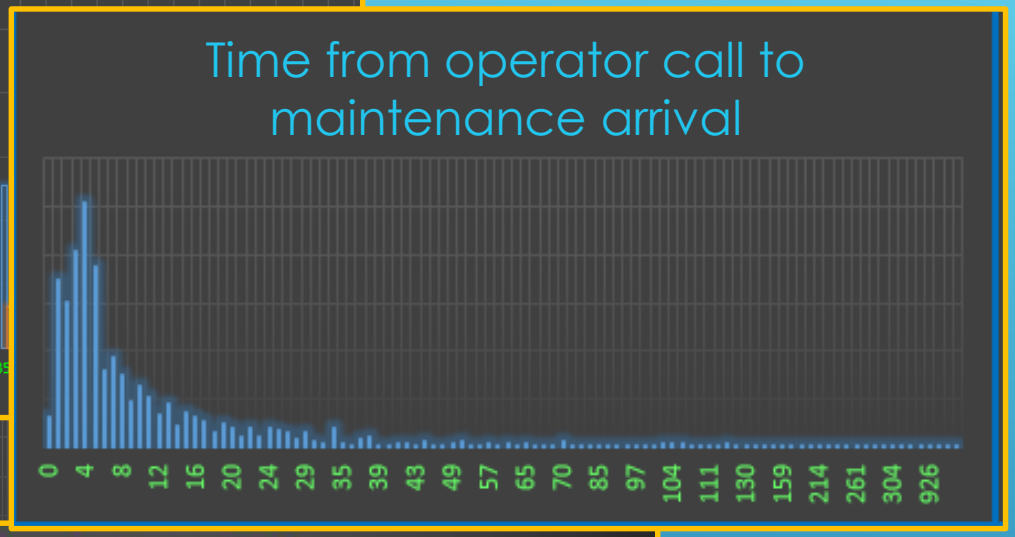
| | Daily (WTD, MTD, YTD) | Weekly | Monthly |
|---|---|---|---|
| **Safety&People** | | | |
| | **Incident** | | |
| | report: dashboard | | |
| | where: ProdMeeting | | |
| | freq: daily | | |
| | resp: SL | | |
| | deviation: reason(prevention) | | |
| | **Absenteesm total** | | |
| | report: dashboard | | |
| | where: ProdMeeting | | |
| | freq: daily | | |
| | resp: SL | | |
| | deviation: reason(prevention) | | |
| **Quality** | | | |
| | **Scrap** | **Scrap, rework** | **Scrap** |
| | report: dashboard | report: WeeklyProdRep | report: WeeklyProdRep |
| | where: ProdMeeting | where: WeeklyProdMeeting | where: WeeklyProdMeeting |
| | freq: daily | freq: weekly | freq: monthly |
| | resp: SL | resp: AM | resp: AM |
| | deviation: reason (prevention) | deviation: prevention | deviation: prevention |
| | | **FTQ** | **On-going capability** |
| | | report: WeeklyProdRep | report: ? |
| | | where: WeeklyProdMeeting | where: WeeklyQualityMeet |

# Monthly reports

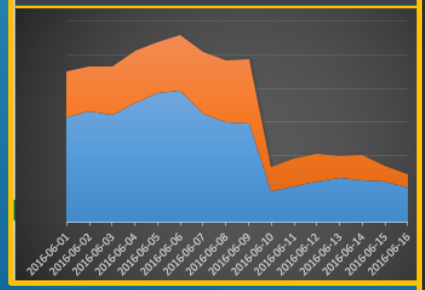

## Action plans

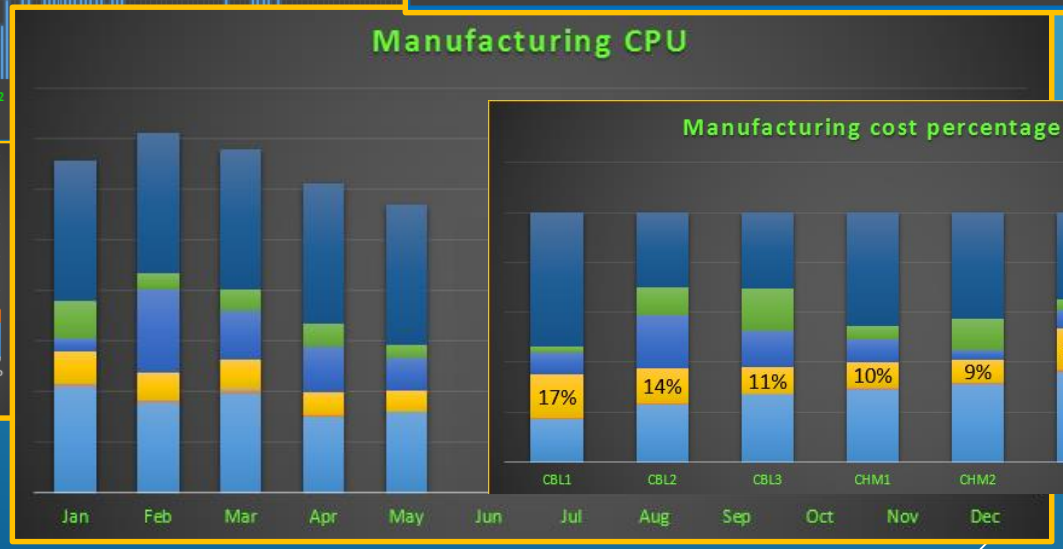
# Other reports



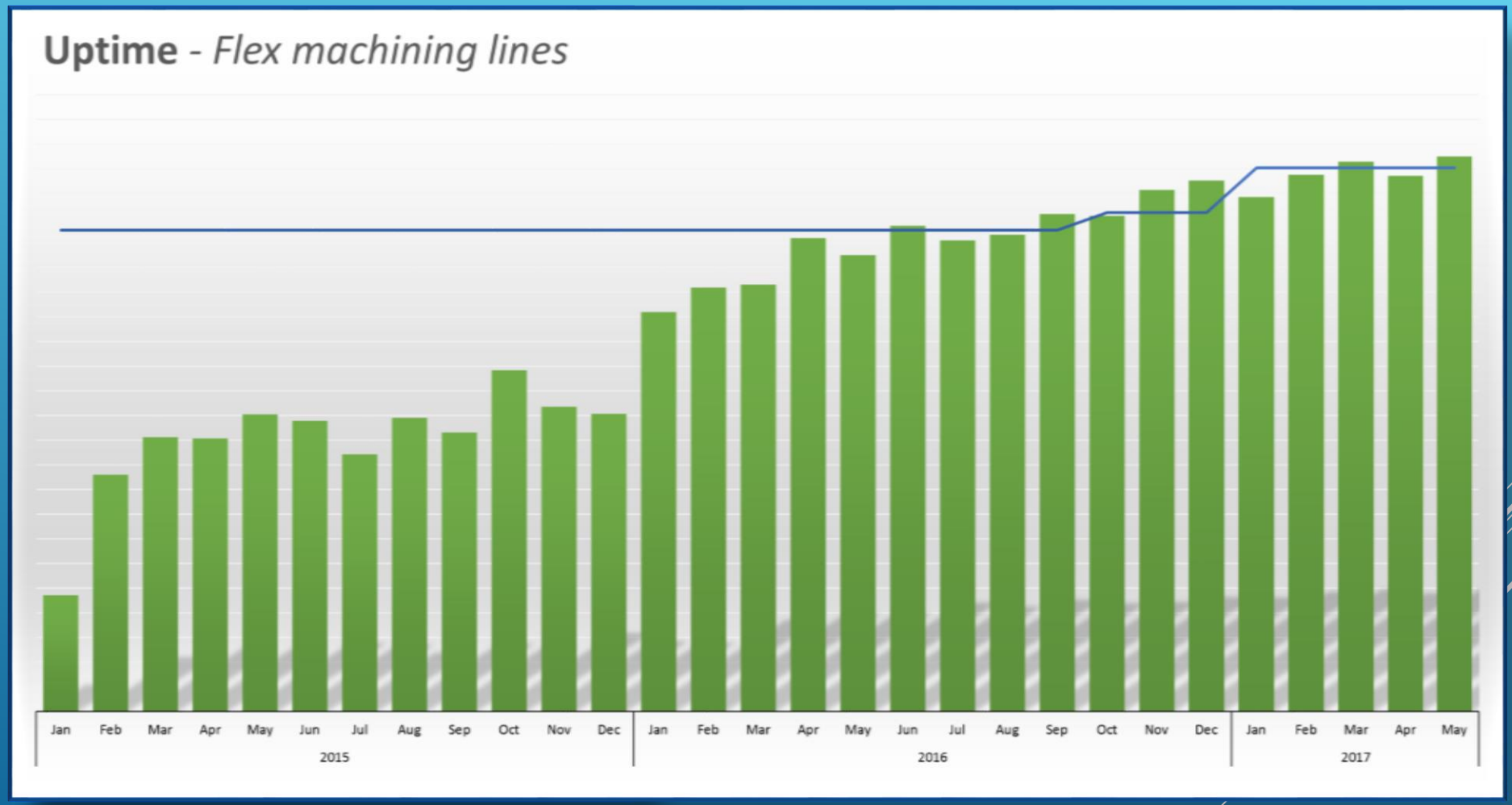





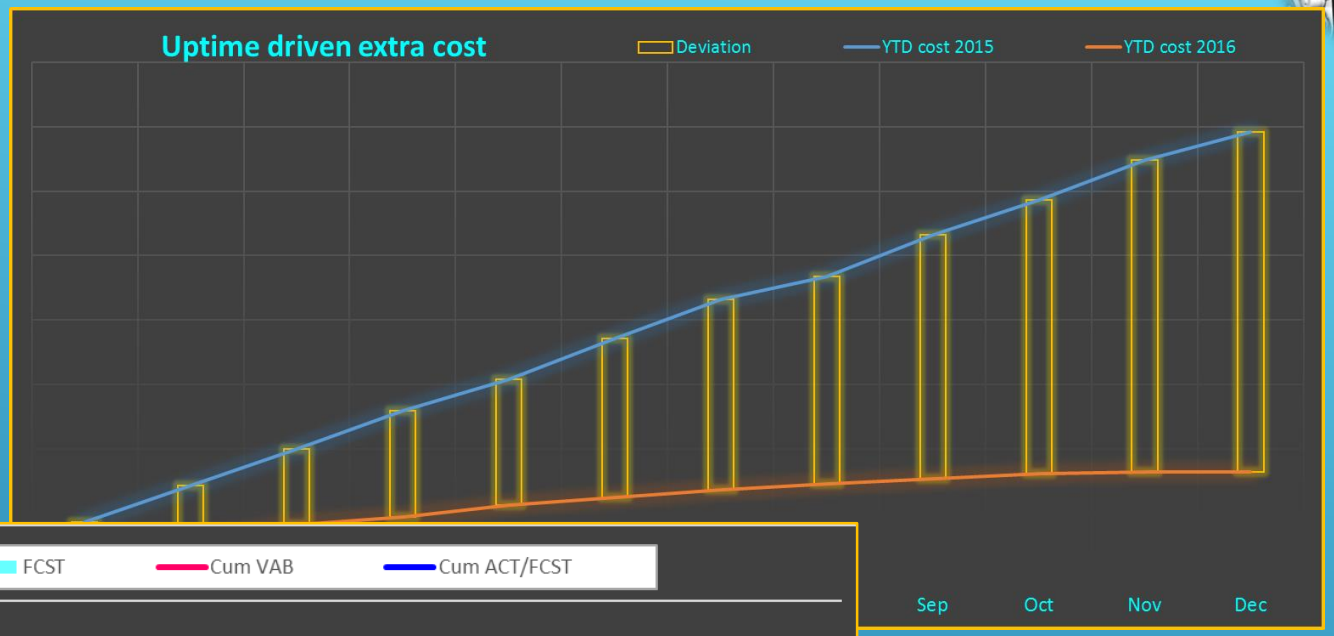


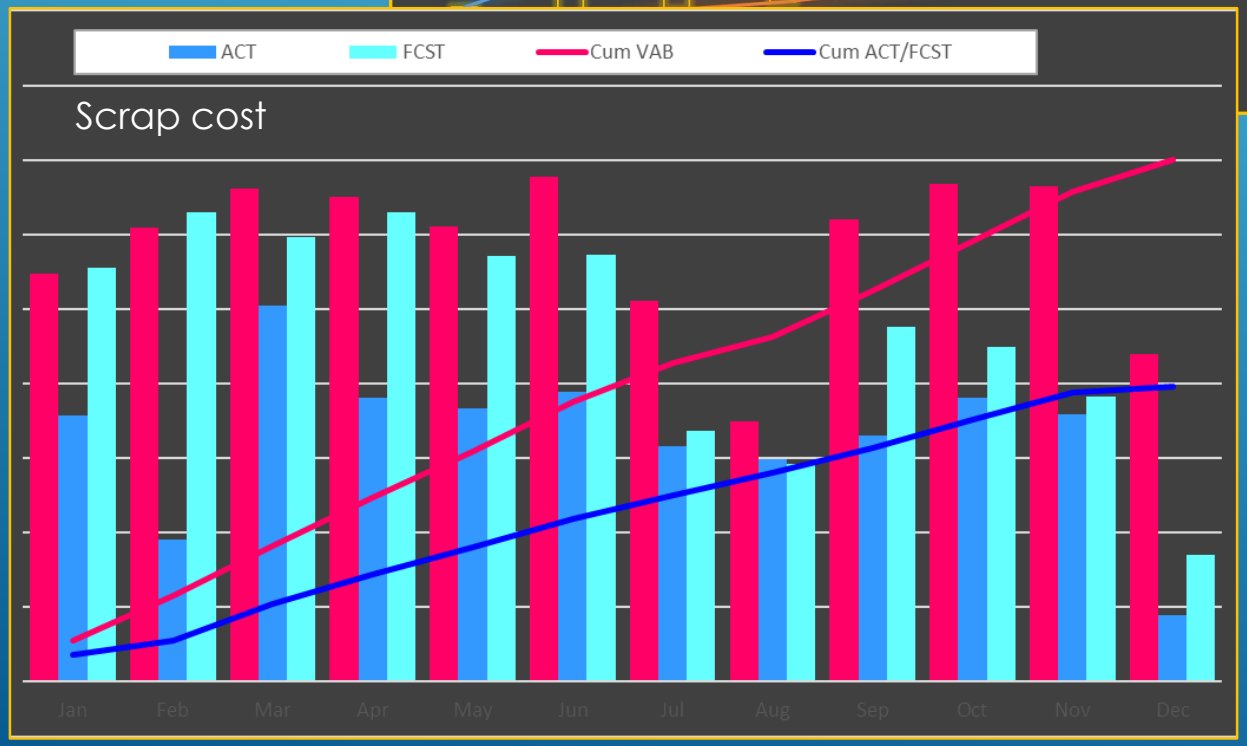


# Uptime improvement result



# Cost developement 2015 vs. 2016



# THANK YOU FOR YOUR ATTENTION!