

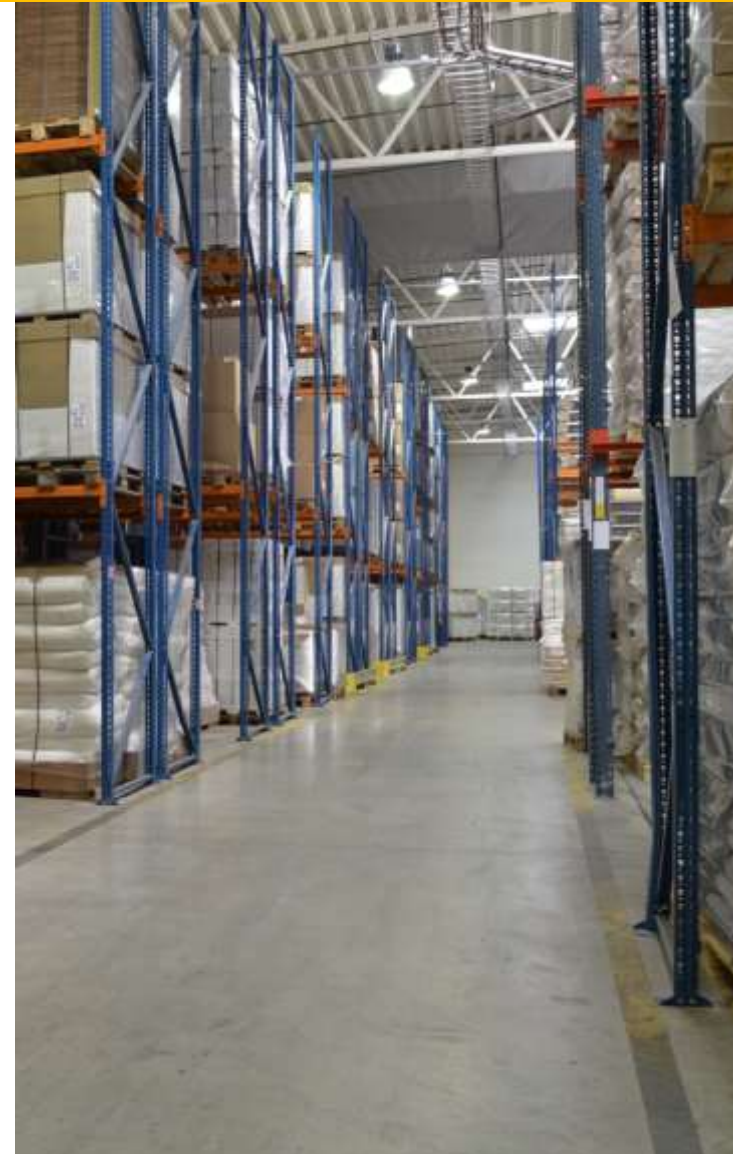
# Digital experience for better productivity

2018.05.17 Vilnius

artilux

# Artilux NMF

- Swedish – Lithuanian Company
- Established in 2002
- 4 production units
- 650 employees
- Turnover 2017 – 57 M EUR (incl. Frilux)
- Part of NMF group (Siauliai)
- Group turnover 2017 – 195 mio EUR
- 145 000 sq.m of industrial area
- 2900 employees

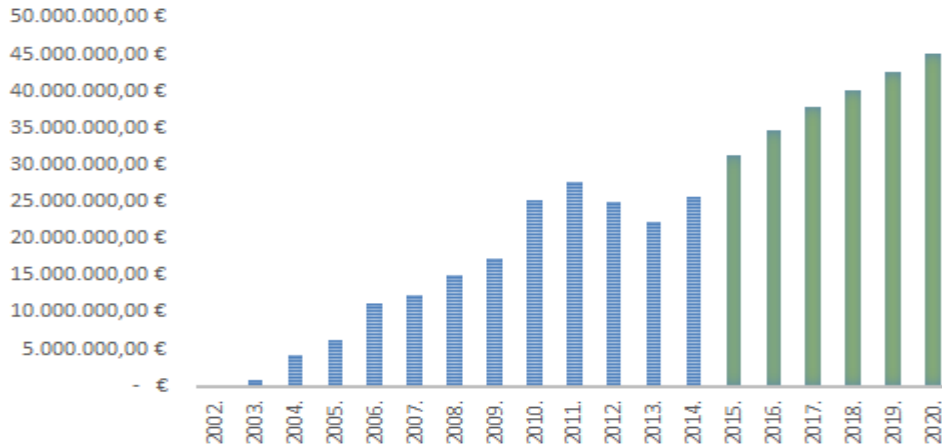


# Production Units



- **Artilux OEM** – electrical products, LED lighting
- **NMF Decor** – extrusion and framed articles for home
- **Artilux Metal** – sheet metal articles
- **Frilux** — electrical and industrial components

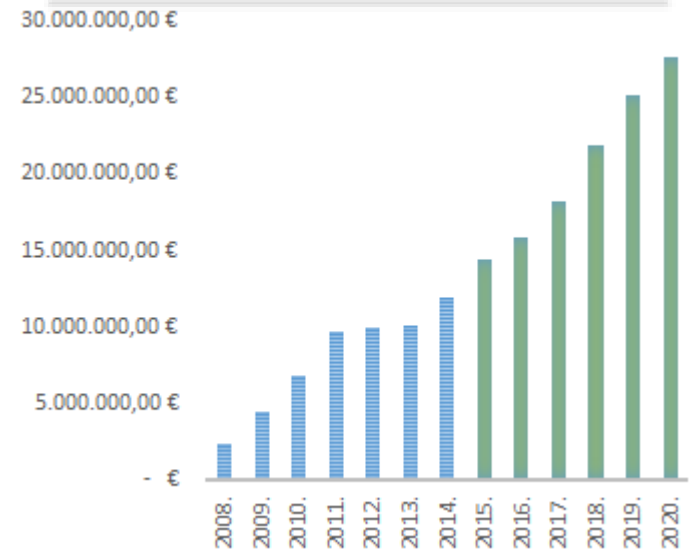
# Artilux NMF turnover



- ❑ 8 mio. Luminaries
- ❑ 2 mio. Electrical devices
- ❑ 120 mio plastic components
- ❑ 100 000 metal articles
- ❑ 3400 km extruded profile
- ❑ 500 000 framed décor articles

57 mln. EUR -2017

# Frilux turnover



# Product examples

Fish sonar. Store deliveries  
➔ Zero tolerance. In-house plastics and SMT



Street, industrial & downlight LED lamps  
➔ 100% QC. In-house SMT, metal and final assembly.

Mid voltage switches  
➔ Zero tolerance. In-house plastics, sealing, assembly



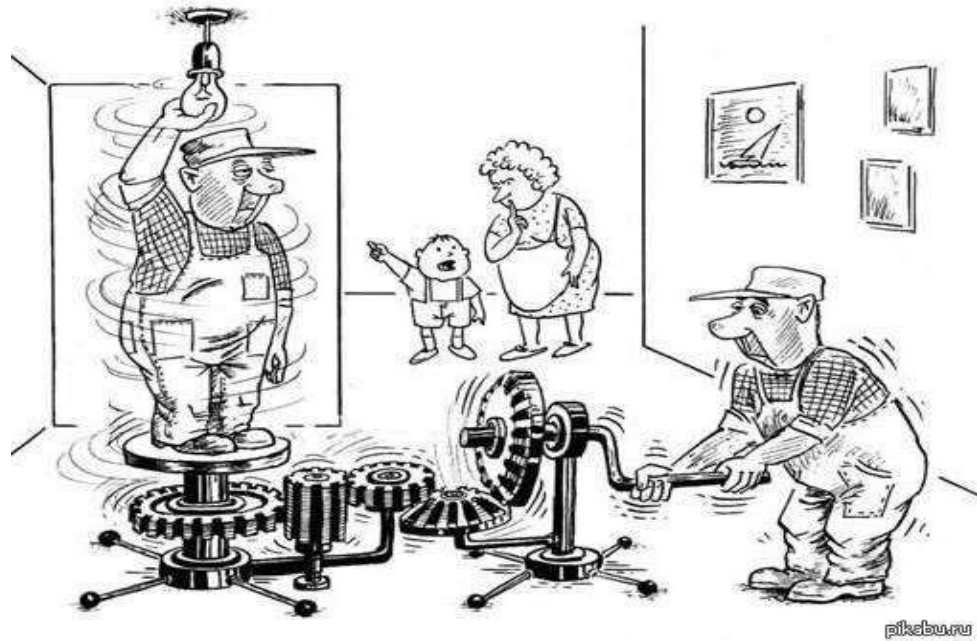
Mid voltage breaker systems  
➔ Zero tolerance. In-house plastics, post processing, assembly



Smart garden  
➔ In-house plastics, sealing, SMT, assembly

# What is needed for productivity?

- Right people
- Right processes
- Right systems to control these processes





# Business Case 1 - Frilux

- Plastic injection factory
- 47 injection molding machines with robots
- Average 140 mould changes per month
- High machinery workload every second counts!

## Problems to solve

- Too long changer over time
- Deviation from cycle time
- Not clear reasons for machines stops
- Too many lost hours, slow reaction
- Not accurate data, no clear priorities





## How can we measure The Six Big Losses?

- **Availability losses:**
  - Unscheduled down time
  - Breakdowns/failures
  - Setups/changeovers
- **Performance losses:**
  - Minor stoppages
  - Reduced speed
- **Quality losses:**
  - Defects/rework
  - Start up/yield loss/scrap

Breakdowns



Setups and adjustments



Idling and minor stoppages



Reduced speed



Defects and rework



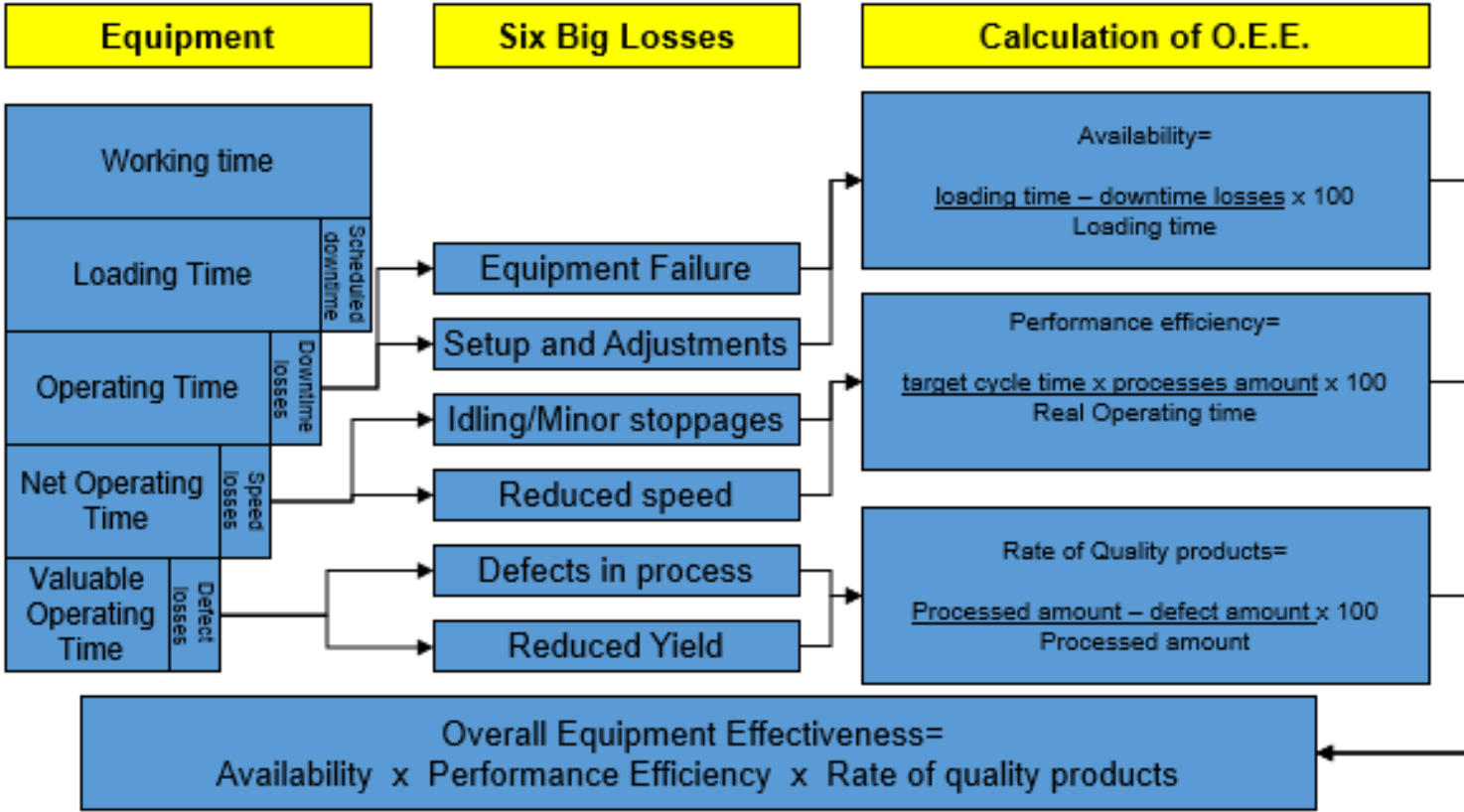
Startup and yield loss



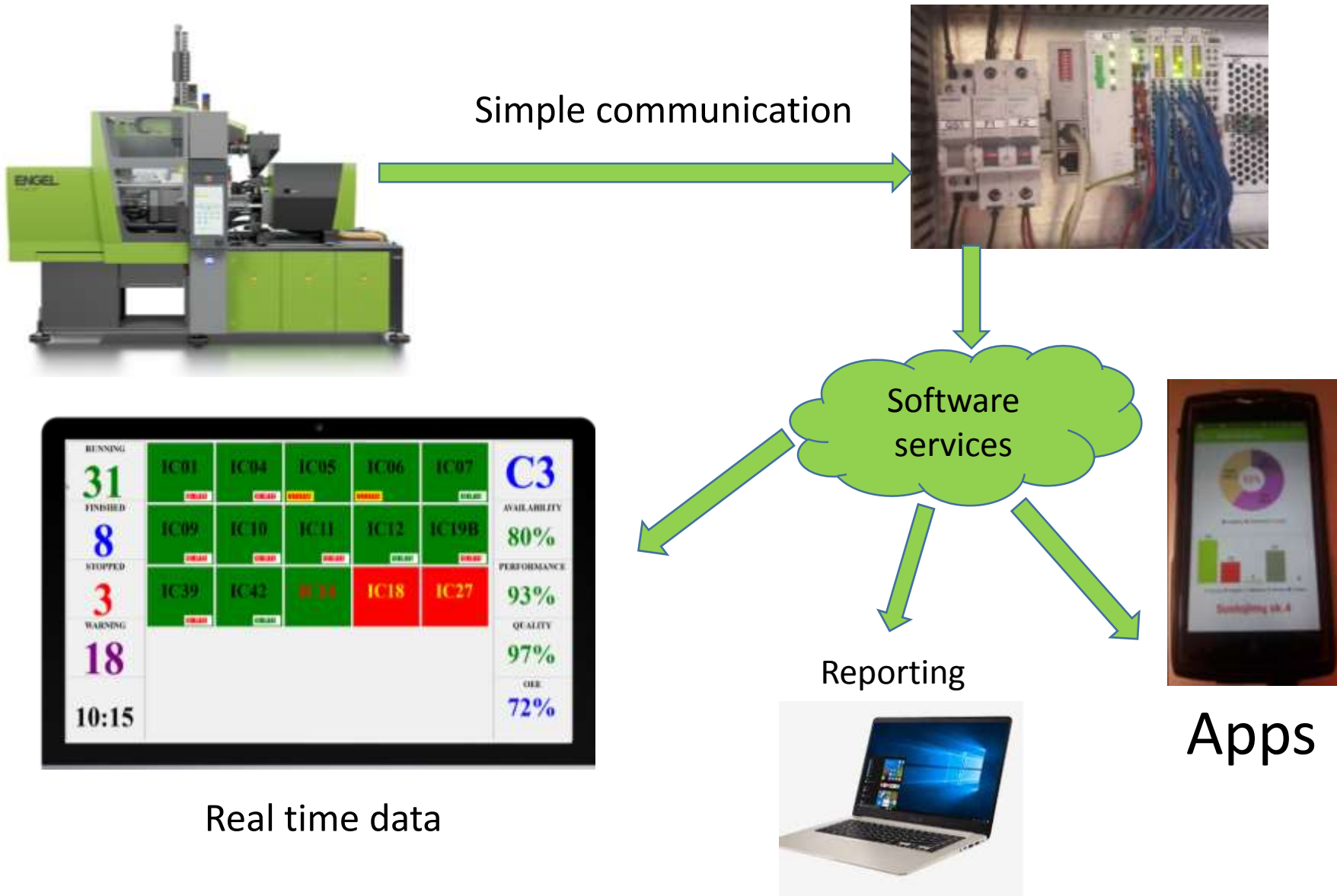
We define Overall Equipment Effectiveness (OEE)



# Overall Equipment Effectiveness (O.E.E)

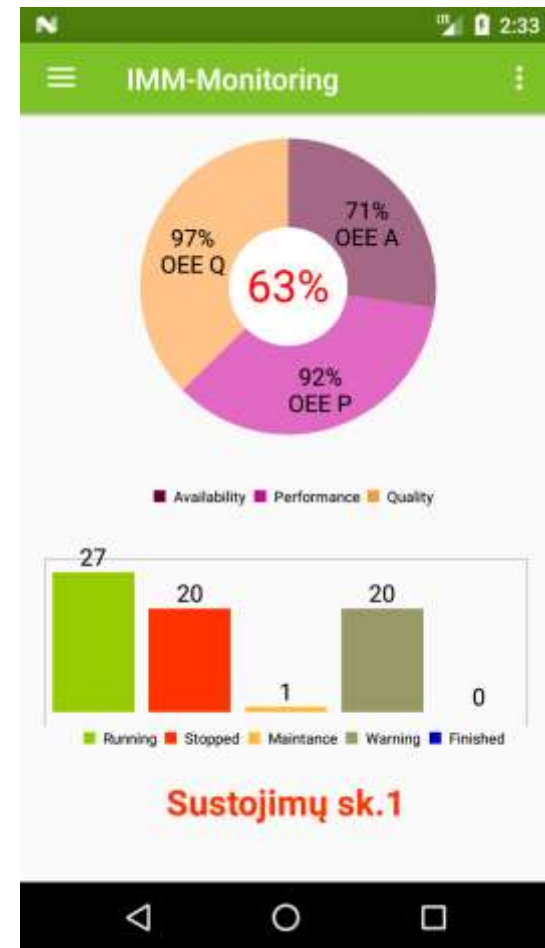


# Injection molding machines OEE



# Digital solution for industry

- Accurate data from machines
- User friendly Android apps for any phone
- Unlimited number of machines to connect
- Low investment costs
- Clear visualization in workshop
- Deviation alarms
- Report for analysis
- Integration with existing ERP system
- Alarm notification in all levels



# Functionality

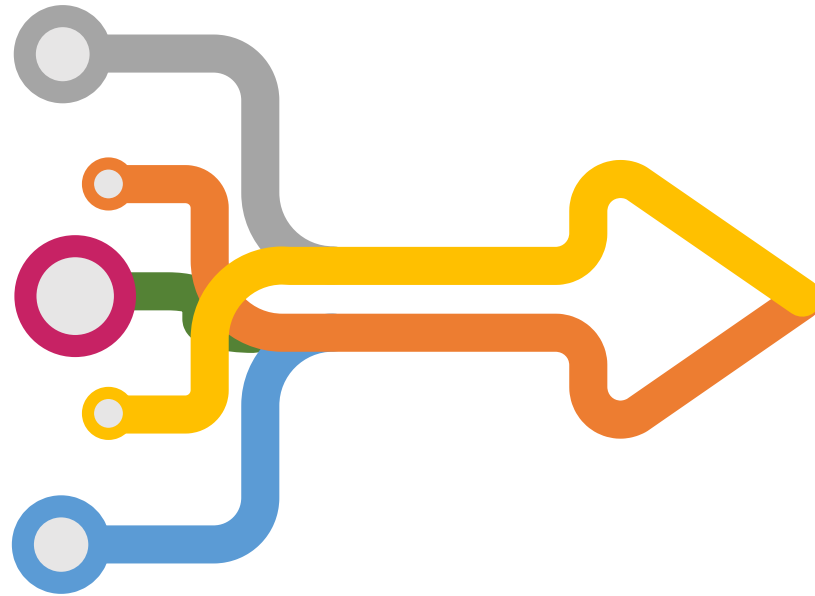
To register manufacturing machinery work.

To specify the reasons of interruption in machinery work.

To be aware of OEE indicators.

To monitor the work of the staff and operators.

To analyse collected data and to eliminate the main problems.



# Android App

It has never been easier: manage the data in Your mobile phone!

Follow the work of the  
manufacturing machinery

Android

Current OEE indicators

State of machine

Toolbox

Currently produced item

Amount of spoilage

Ideal cycle

Actual cycle

Causes of machinery

interruption

Stopping alarm



Carry out operations

Android

Indicate the cause of  
interruption

Change the cause of  
interruption

Change the tool position

Enter spoilage

Register failure

Registration at the  
workplace

Switch operating mode

Change task status

# Workshop dashboard TV

Information is always available at the real-time and in the most convenient way.



Important data is always available to everyone and always on time



Notice machinery interruptions at the real-time



Notice operation deviation from the cycle at the real-time



Notice exceeded level of scrap at the real-time





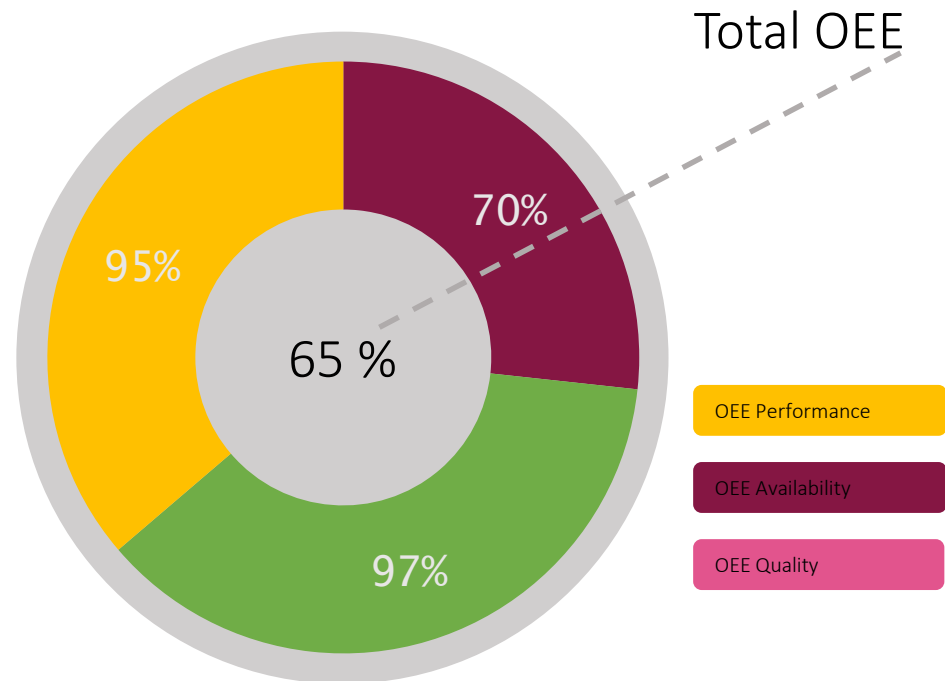
# Real time OEE monitoring

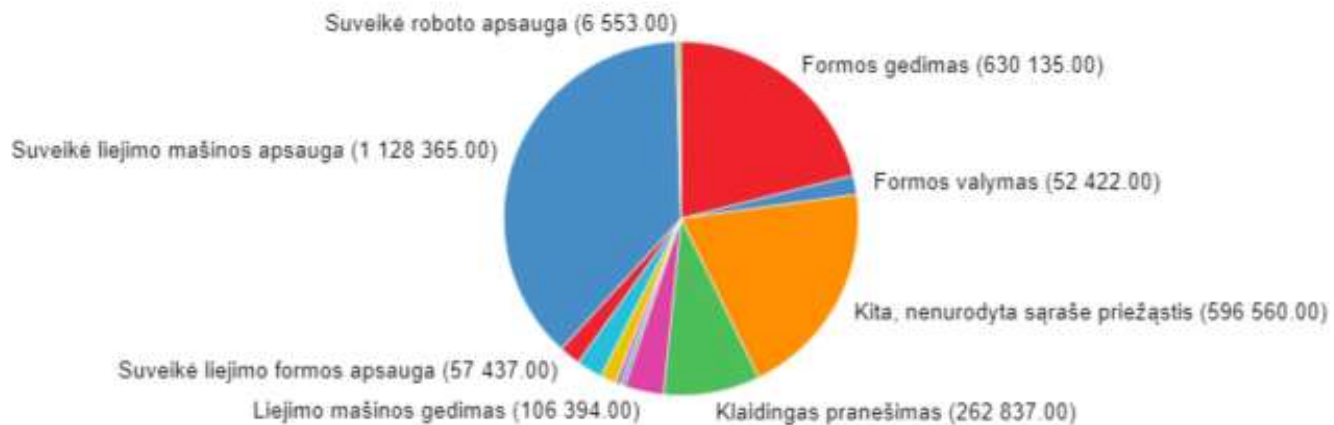
## Why is it beneficial?

OEE availability. Why and how long the machine was not working? How long changeroovers takes. Downtimes by reason.

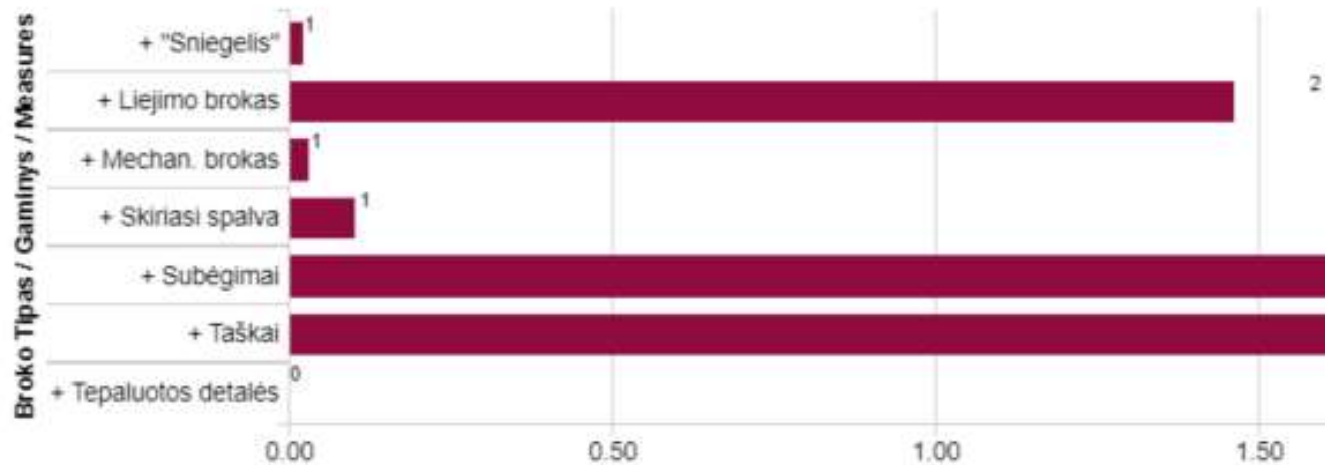
OEE performance. What is the actual cycle of the machine? What are deviation from target cycle time? Lost hours , affect to OTD

OEE quality. What is the ratio between scrap and quality items?





anešimas + Liejimo mašinos gedimas + Medžiagos trūkumas + Paleidimas-derinimas + Papildomas medžiagos džiovint



# Benefits

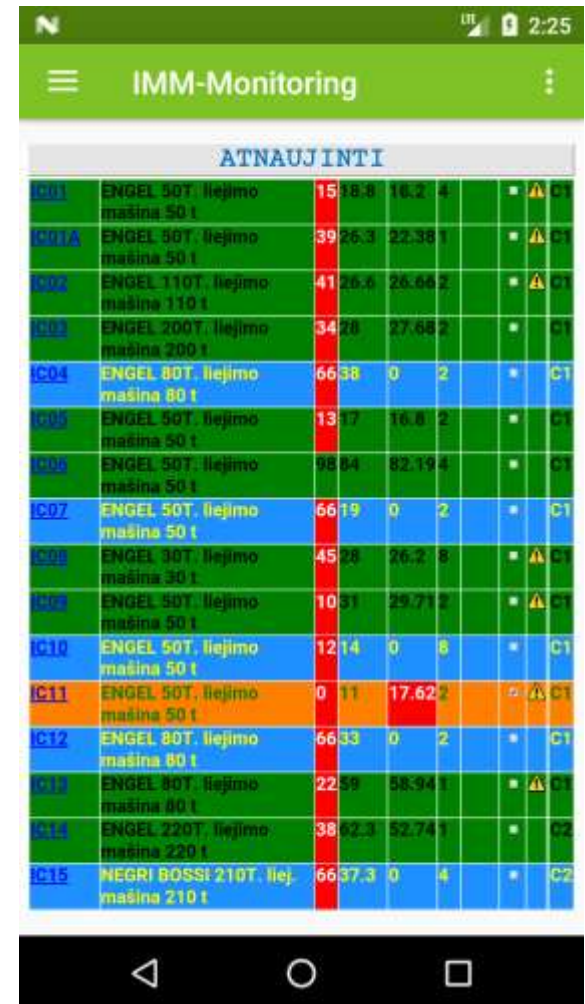
- Accurate data
- Reduced change over time
- Reaction of technician faster
- Faster start up
- Lower scrap
- Better performance
- Easy to connect new machines
- Low investment for software, very simple hardware

The screenshot shows the IMM-Monitoring application interface. At the top, there is a green header bar with a menu icon, the text 'IMM-Monitoring', and a refresh icon. Below the header, there is a button labeled 'ATNAUJINTI'. The main content is a table with 15 rows, each representing a machine. The table has columns for machine ID, machine name, and several numerical values. The rows are color-coded: green for machines 1-10, orange for machine 11, blue for machines 12-15. The table is displayed on a mobile device screen, with a status bar at the top showing signal strength, battery, and time (2:25), and a navigation bar at the bottom with back, home, and recent apps icons.

ID	Machine Name	Value 1	Value 2	Value 3	Value 4	Value 5	Value 6	Value 7
IC01	ENGEL 50T, liejimo mašina 50 t	15	18.8	16.2	4			C1
IC01A	ENGEL 50T, liejimo mašina 50 t	39	26.3	22.38	1			C1
IC02	ENGEL 110T, liejimo mašina 110 t	41	26.6	26.662				C1
IC03	ENGEL 200T, liejimo mašina 200 t	34	28	27.682				C1
IC04	ENGEL 80T, liejimo mašina 80 t	66	38	0	2			C1
IC05	ENGEL 50T, liejimo mašina 50 t	13	17	16.6	2			C1
IC06	ENGEL 50T, liejimo mašina 50 t	98	84	82.194				C1
IC07	ENGEL 50T, liejimo mašina 50 t	66	19	0	2			C1
IC08	ENGEL 30T, liejimo mašina 30 t	45	28	26.2	8			C1
IC09	ENGEL 50T, liejimo mašina 50 t	10	31	29.712				C1
IC10	ENGEL 50T, liejimo mašina 50 t	12	14	0	8			C1
IC11	ENGEL 50T, liejimo mašina 50 t	0	11	17.62				C1
IC12	ENGEL 80T, liejimo mašina 80 t	66	33	0	2			C1
IC13	ENGEL 80T, liejimo mašina 80 t	22	59	58.94				C1
IC14	ENGEL 220T, liejimo mašina 220 t	38	62.3	52.74	1			C2
IC15	NEGRI BOSSI 210T, liejimo mašina 210 t	66	37.3	0	4			C2

# Next steps

- Machine and tool maintenance tasks automation
- Hard RFID tags on tools tracking to connect TOOL+WORK-TASK+MACHINE
- Tool maintenance plan
- Early warning alarm as preventive actions on process deviation
- Camera inspection for quality checks by robot



The screenshot shows the IMM-Monitoring application interface. At the top, there is a green header bar with a menu icon, the text "IMM-Monitoring", and a refresh icon. Below the header, there is a table with the following data:

ATNAUJINTI									
IC01	ENGEL 50T, liejimo mašina 50 t	15	18.8	16.2	4				CT
IC01A	ENGEL 50T, liejimo mašina 50 t	39	26.3	22.38	1				CT
IC02	ENGEL 110T, liejimo mašina 110 t	41	26.6	26.662					CT
IC03	ENGEL 200T, liejimo mašina 200 t	34	28	27.682					CT
IC04	ENGEL 80T, liejimo mašina 80 t	66	38	0	2				CT
IC05	ENGEL 50T, liejimo mašina 50 t	13	17	16.6	2				CT
IC06	ENGEL 50T, liejimo mašina 50 t	98	84	82.194					CT
IC07	ENGEL 50T, liejimo mašina 50 t	66	19	0	2				CT
IC08	ENGEL 30T, liejimo mašina 30 t	45	28	26.2	8				CT
IC09	ENGEL 50T, liejimo mašina 50 t	10	31	29.712					CT
IC10	ENGEL 50T, liejimo mašina 50 t	12	14	0	8				CT
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IC14	ENGEL 220T, liejimo mašina 220 t	38	62.3	52.74	1				CT
IC15	NEGRI BOSSI 210T, liejimo mašina 210 t	66	37.3	0	4				CT

# Business Case 2 - Artilux NMF

- Artilux NMF assembly
- Pallet flow up to 80 pallets per hour from WIP > Warehouse
- Shipments – 10-15 trucks per day
- Partial loads
- 30-40 different articles per truck

## Problems to solve:

- Slow pallet flow
- Manual data input
- Errors on mixed loads
- Errors in labeling
- Incorrect inventory data
- Claims from customers





# RFID pallet tracking

- Faster article identification and tracking
- Possibility to integrate RFID with standard ERP as Navision or Axapta (Microsoft)
- Direct contact between scanner and label not needed
- Automated warehouse operations
- Automatic registration of status change in ERP





# Implementation stages

- STAGE 1 - WIP > Warehouse - pilot project in “bottle neck” – RFID gate to identify and transfer goods from production to warehouse. Tested UHF technology is reliable and ready to work.
- STAGE 2 Warehouse > Truck - double check on loading to truck. RFID gate installed at loading ramp to eliminate loading mistakes.
- STAGE 3 -Production Work Task START > END in Assembly line > Tool tracking with hard tags.



# WIP > Warehouse



ULL labels are printed only for pallets with quality control are passed and work task is closed in ERP

All other pallets are rejected with feedback for operator on the display.

# Shipments control RFID



Only pallets from the ERP shipments task are accepted. Goods are counted and controlled via RFID and comes from ERP system.

If invalid pallet is detected – liftruck driver is informed by alarm in computer screen. When loading finished documents prepared automatically

# Shipments control RFID

RFID tag



- No time losses on loading
- Mistakes are tracked by antennas and software
- When shipment loading is finished ERP get data automatically to print documents

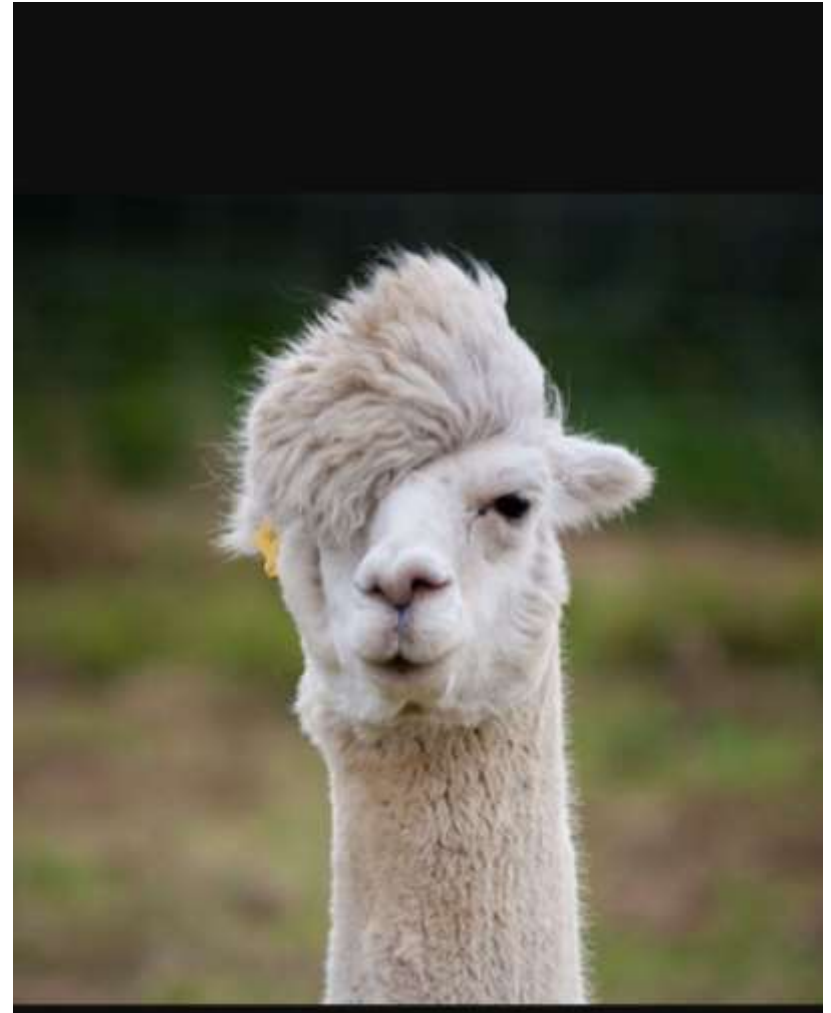


# Benefits

- Eliminated errors on mixed loads last 3 years to 0,01%
- Less manpower needed to do operations
- Faster order processing time
- Higher warehouse throughput
- Faster shipping and loading process
- Accurate loadings
- No mixed unit labels after production
- Easy to integrate with ERP system



**Labour market today**  
**Expectations vs Reality**





Thank You for Your kind attention

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