# OEE Management System

## User Manual

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**Document Version:** 1.0
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**Applicability:** Mechanical Workshop, Three-Shift Production

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## Table of Contents



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# 1. Introduction

## 1.1 What is OEE?

**OEE (Overall Equipment Effectiveness)** is a key performance indicator used in manufacturing to measure how effectively equipment is utilised compared to its full potential.

OEE answers the important question: “What proportion of planned production time does the equipment work effectively and produce quality products?”

**OEE = 100%** represents ideal production:
- Equipment operates without downtime
- Produces at maximum speed
- Outputs only quality products

## 1.2 What Does OEE Comprise?

OEE is calculated as the product of three components:

```
OEE = Availability × Performance × Quality
```

### Availability

**What it measures:** The proportion of time when equipment was ready for operation.

**Formula:**

```
Availability = Actual Operating Time / Planned Operating Time
```

**What reduces Availability:**
- Equipment breakdowns (B. Down)
- Changeovers and adjustments (Setting)
- Waiting for materials, tooling, or tasks

**Example:** If during an 8-hour shift the machine only operated for 6 hours due to breakdown and changeover, Availability = 6/8 = 75%

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### Performance

**What it measures:** How fast the equipment operates compared to the standard speed.

**Formula:**

```
Performance = (Number of Parts × Standard Cycle Time) / Actual Operating Time
```

**What reduces Performance:**
- Operating at reduced speed
- Micro-stoppages
- Sub-optimal processing modes

**Example:** If according to the standard, 120 parts should have been made in 6 hours (at 3 min/piece), but only 100 were made, Performance = 100×3/(6×60) = 83%

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### Quality

**What it measures:** The proportion of good parts from the total number produced.

**Formula:**

```
Quality = Number of Good Parts / Total Number of Parts
```

**What reduces Quality:**
- Scrap
- Rework
- Parts requiring reprocessing

**Example:** Of 100 manufactured parts, 95 passed quality control. Quality = 95/100 = 95%

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### Overall OEE

**Calculation example:**

```
OEE = 75% × 83% × 95% = 59.1%
```

**World-class OEE Standards:**

| Level | OEE | Description |
|---|---|---|
| World Class | ≥85% | World-class effectiveness |
| Good | 70-84% | Room for improvement |
| Average | 50-69% | Significant losses |
| Low | <50% | Urgent action required |

## 1.3 Why is OEE Important for Mechanical Workshops?

Mechanical workshops have specific characteristics that make OEE a particularly valuable tool:

**High Equipment Cost**
- CNC machines are expensive assets
- Every hour of downtime = financial loss
- OEE shows actual return on investment

**Diversity of Parts and Operations**
- Frequent changeovers between batches
- Different standards for different parts
- OEE helps identify bottlenecks

**Three-Shift Operation**
- Need for comparing shift effectiveness
- Handover between shifts
- OEE provides a unified assessment standard

## 1.4 What Problems Does OEE Identify?

### Availability Problems:

- Frequent breakdowns of specific machines
- Excessively long changeovers
- Downtime waiting for materials
- Ineffective planning

### Performance Problems:

- Tool wear (speed reduction)
- Sub-optimal cutting modes
- Issues with CNC programmes
- Insufficient operator qualification

### Quality Problems:

- Fixture wear
- Material issues
- Process errors
- Insufficient control

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# 2. Who Fills in OEE and How

## 2.1 Machine Operator

### Role in the OEE System

The operator is the **primary data source** for the OEE system. The operator sees what happens with the machine in real time and is the only one who can accurately record:

- When the machine operated
- When and why it was idle
- How many parts were manufactured
- How much scrap was produced

### What the Operator Fills In

**Time slots (every 15 minutes):**
- **Running** — machine operating, processing in progress
- **Setting** — changeover, adjustment, tool change
- **Waiting Int** — internal waiting (crane, setter, programme)
- **Waiting Ext** — external waiting (material, task, drawing)
- **T. Failure** — tool failure
- **B. Down** — machine breakdown

**Part data:**
- Part number (Part No)
- Batch size
- Routed and actual setup time
- Routed and actual cycle time
- Production time
- Number of good parts (Good Parts)
- Number of scrap (Bad Parts)

**Comments:**
- Downtime reasons
- Problem descriptions
- Important information for the next shift

### When to Fill In

**Recommended:** Fill in data **in real time** — every 15-30 minutes during natural pauses:
- During automatic processing
- When changing parts
- During breaks

**Minimum:** Complete before the end of shift, whilst events are fresh in memory.

### Which Devices Can Be Used

| Device | Advantages | When to Use |
|---|---|---|
| **PC** | Large screen, convenient for detailed work | Start/end of shift, for detailed entry |
| **Tablet** | Mobility + readability | At the machine, operational entry |
| **Smartphone** | Always to hand | Quick downtime marking, adding comments |

## 2.2 Supervisor

### Role in the OEE System

The supervisor **controls data quality** and uses it for **operational management**.

### Main Tasks

**Checking data correctness:**
- Are all time slots filled?
- Does the data correspond to reality?
- Are there comments for downtime?

**Operational analysis:**
- Why did downtime occur?
- Could it have been prevented?
- What actions to take?

**Shift comparison:**
- Effectiveness of shifts on the same machine
- Identifying best practices
- Transferring experience between shifts

### Which Reports Are Used

- **Downtime Analysis** — analysis of downtime causes
- **Shift Efficiency** — comparison of shift effectiveness
- **Plan vs Actual** — standard compliance

## 2.3 Manager / Engineer

### Role in the OEE System

Management uses OEE data for **strategic decisions** and **systematic improvements**.

### Main Tasks

**Workshop effectiveness analysis:**
- Overall OEE by workshop/section
- Trends over time
- Comparison with targets

**Improvement planning:**
- Determining priorities

- Calculating ROI from measures
- Tracking results

**Process assessment:**
- Routing Accuracy — standard precision
- Setup Efficiency — changeover effectiveness
- Cycle Time Efficiency — cycle time compliance

### Which Reports Are Used

- **OEE Dashboard** — overall picture
- **Advanced Efficiency Reports** — in-depth analysis
- **Department Efficiency** — by departments
- **Routing Accuracy** — route precision

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# 3. System Purpose and Benefits

## 3.1 Installation Options

### Local Installation (On-Premise)

The system can be installed:
- On a local enterprise server
- In the corporate network
- On a dedicated PC in the workshop

**Advantages:**
- Full data control
- Works without internet
- Integration with internal systems

### Cloud Deployment

The system can operate in the cloud with internet access.

**Advantages:**
- Access from anywhere
- Automatic updates
- No IT infrastructure required

## 3.2 System Access

### Via Browser

The system works in any modern browser:
- Google Chrome (recommended)
- Mozilla Firefox
- Microsoft Edge
- Safari

**Not required:**
- Programme installation
- Special plugins
- Administrator rights

### From Any Device

| Device | Support | Features |
|---|---|---|
| Desktop PC | ✅ Full | All functions, large screen |
| Laptop | ✅ Full | Mobility + functionality |
| Tablet | ✅ Full | Touch interface, at the machine |
| Smartphone | ✅ Adaptive | Basic functions, emergency access |

## 3.3 Benefits Over Paper Reports

### Resource Savings

| Resource | Paper Report | Electronic System |
|---|---|---|
| Paper | 3-5 sheets/shift | 0 sheets |
| Toner | Regular replacement | Not required |
| Storage | Document archive | Electronic database |
| Electricity | Printer, copier | Minimum |

**Annual savings (for 10-machine workshop):**
- ~15,000 sheets of paper
- ~10 toner cartridges
- Hundreds of processing hours

### Time Savings

| Operation | Paper Process | Electronic System |
|---|---|---|
| Report filling | 15-20 min | 5-10 min |
| Data search | 20-30 min (archive) | 10 sec (filter) |
| Summary preparation | 2-3 hours | 1 minute (Generate Report) |
| Data transfer | Physical, with delay | Instant, online |

### Error Elimination

**Typical paper process errors:**
- Illegible handwriting
- Document loss
- Errors when copying to Excel

- Arithmetic errors
- Inconsistent data

**Electronic system eliminates:**
- Automatic OEE calculation
- Input data validation
- Unified storage format
- Impossibility of data loss

### Single Data Source

**All levels work with the same data:**

```
Operator → Supervisor → Manager
    ↓          ↓          ↓
  Input     Control    Analysis
    ↓          ↓          ↓
        UNIFIED DATABASE
```

**This ensures:**
- Information consistency
- Process transparency
- Decision-making speed
- Trust in data

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# 4. System Overview

## 4.1 Application Structure

The OEE Management System consists of four main sections:

```
┌──────────────────────────────────────────────────────────┐
│                    OEE Management                        │
├──────────────┬──────────────┬──────────────┬─────────────┤
│ Daily Sheets │   Add OEE    │  Machines    │   Reports   │
│   (Main)     │   (Add)      │ (Equipment)  │  (Reports)  │
└──────────────┴──────────────┴──────────────┴─────────────┘
```

## 4.2 Navigation

At the top of the screen is the menu:

| Section | Purpose | Who Uses |
|---|---|---|
| **Daily Sheets** | Viewing and editing OEE | Everyone |
| **Add OEE** | Creating new OEE sheet | Operators |
| **Machines** | Managing machine list | Administrator |
| **Reports** | Analytics and reports | Supervisors, Managers |

# 5. Main Page (Daily OEE Sheets)

## 5.1 Purpose

The main page displays a **list of all completed OEE sheets** and allows:
- Quick finding of the required sheet
- Viewing key information
- Opening a sheet for editing
- Deleting erroneously created sheets

## 5.2 Displayed Data

The table contains the following columns:

| Column | Description |
|---|---|
| **Date** | Date for which OEE was completed |
| **Machine** | Machine name |
| **Department** | Section/department |
| **Part No** | Part numbers (comma-separated) |
| **Shifts** | Which shifts are completed (Night, A, B) |
| **Actions** | Edit and delete buttons |

## 5.3 Data Filtering

### Date Filter

Select date range:
1. Click on the **Date From** field
2. Select the start date
3. Click on the **Date To** field
4. Select the end date

**Tip:** For quick search of yesterday’s data — set both dates to yesterday.

### Machine Filter

1. Open the **Machine** dropdown list
2. Select a specific machine or **All Machines**

### Department Filter

**Important:** The Department filter appears only when “All Machines” is selected

1. Ensure “All Machines” is selected
2. Open the **Department** dropdown list
3. Select the required section

## 5.4 Working with OEE Sheets

### Open for Viewing/Editing

1. Find the required sheet using filters
2. Click the **Edit** button (pencil icon) in the sheet row
3. The system will open the editing form

### Delete Sheet

1. Click the **Delete** button (bin icon)
2. Confirm deletion in the dialogue box

**Warning:** Deletion cannot be undone! Ensure you are deleting the correct sheet.

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# 6. Adding OEE (Add Daily OEE)

## 6.1 Step-by-Step Instructions

### Step 1: Selecting Date, Machine and Shift

**Date:**
- Today’s date is set by default
- To change, click on the date field and select the required one
- Data can be filled for past days

**Machine:**
- Select a machine from the dropdown list
- After selection, the machine’s **Department** is automatically displayed

**Shift:**
- Select shift: **Night**, **A** or **B**
- Shift selection determines the time slot time frames

| Shift | Time (Mon-Thu) | Time (Fri) | Weekends |
|---|---|---|---|
| Night | 22:00-06:00 | None | None |
| A | 06:00-14:00 | 06:00-12:00 | None |
| B | 14:00-22:00 | 12:00-16:00 | None |

### Step 2: Working with Time Slots

**Visual Time Scale**

After selecting the shift, a grid of 15-minute intervals is displayed.

**Colour Coding:**

| Colour | Category | Description |
|---|---|---|
| 🟢 Green | Running | Machine operating, processing in progress |
| 🟣 Purple | Setting | Changeover, adjustment |
| 🟡 Yellow | Waiting Int | Internal waiting |
| ⚫ Grey | Waiting Ext | External waiting |
| 🟤 Brown | T. Failure | Tool failure |
| 🔴 Red | B. Down | Machine breakdown |

**How to Fill In:**

1. **Selecting slots:**
   - Click on a slot to select one interval
   - Or hold the mouse and drag to select multiple slots

2. **Assigning category:**
   - After selecting slots, click on the required category in the panel on the right
   - Selected slots will be coloured with the corresponding colour

3. **Completion indicator:**
   - Green border = all slots filled
   - Red border = time missing or exceeded
   - Grey border = filling in progress

**Adding Comment to Time Slot:**

1. **Double-click** on the time slot
2. Enter the comment in the appearing window
3. Click **Save**

**When to add comments:**
- During downtime — downtime reason
- During breakdown — fault description
- During quality issue — what happened
- Important information for the next shift

## Step 3: Part Data (Production Parts Details)

**Adding a Part:**

1. Click the **+ Add Part** button
2. Fill in the fields:

| Field | Description | Example |
|---|---|---|
| **Part No** | Part number per drawing | PN-12345 |
| **Batch Size** | Batch size | 500 |
| **Routed Setup (min)** | Routed setup time | 15 |
| **Actual Setup (min)** | Actual setup time | 18.5 |
| **Cycle Time Routed** | Routed cycle time (min) | 2.5 |
| **Cycle Time Actual** | Actual cycle time (sec) | 165 |
| **Production Time (min)** | Total production time | 420 |
| **Good Parts** | Number of good parts | 485 |
| **Bad Parts** | Amount of scrap | 15 |

**Adding Next Batch of Same Part (Follow-on Batch):**

1. Click **+ Next Batch**
2. The system automatically copies:
   - Part No
   - Routed Setup
   - Cycle Time Routed
3. Fill in the remaining fields for the new batch

**Deleting a Part:**

Click the bin icon to the right of the part row.

### Step 4: Saving OEE

1. Check all data is correct
2. Click the **Save Daily OEE** button
3. Wait for the successful save message

**After saving:**
- Data is recorded to the database
- Becomes available in reports
- Comments can be added to time slots
- Sheet can be edited later

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# 7. Machines — Equipment Management

## 7.1 Section Purpose

The **Machines** section allows:
- Viewing the machine list

- Adding new machines
- Editing machine information
- Deleting machines

### 7.2 Adding a New Machine

1. Click the **+ Add Machine** button
2. Fill in the required fields:

| Field | Required | Description | Example |
|---|---|---|---|
| **Machine Name** | ✅ Yes | Unique machine name | Deco 1, Turning-5 |
| **Department** | ✅ Yes | Section/department | CNC, Turning, Milling |
| **Machine Type** | ✅ Yes | Machine type | CNC Lathe, Milling Centre |
| **Number of Axes** | No | Number of axes | 3, 4, 5 |

1. Click **Save**

### 7.3 Editing a Machine

1. Find the machine in the list
2. Click the **Edit** button (pencil)
3. Change the required fields
4. Click **Save**

### 7.4 Importance of Correct Department Assignment

**Department** is used for:
- Grouping machines in reports
- Filtering on the main page
- Calculating effectiveness by sections
- Comparative analysis

**Recommendations:**
- Use uniform names (CNC vs CNC — choose one)
- Group by functional attribute
- Align names with enterprise organisational structure

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## 8. Reports — Reporting Guide

### 8.1 How to Generate a Report

#### Step 1: Set Filters

**Date From / Date To:**
- Select the period for analysis
- To compare periods, generate reports separately

**Department:**
- Select **All Departments** for general analysis
- Or a specific section for detailed analysis

**Machines:**
- After selecting Department, available machines are displayed
- Use **Select All** / **Clear All** for quick selection
- Or select specific machines

### Step 2: Generation

1. Click **Generate Report**
2. Wait for data loading
3. The report will appear on the page

## 8.2 Report Descriptions

### OEE Dashboard (Indicators Panel)

**What it shows:**
- Availability, Performance, Quality, OEE — large cards
- OEE by Machine — bar chart
- OEE Trends over period — line graph

**Who finds it useful:**
- Managers — quick workshop status assessment
- Supervisors — machine comparison
- During briefings — current status visualisation

**How to interpret:**
- Availability < 85% — downtime issues
- Performance < 95% — not operating at full capacity
- Quality < 99% — scrap issues

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### Plan vs Actual Comparison

**What it shows:**

| Metric | Description |
|---|---|
| Routed Setup | Routed setup time |
| Actual Setup | Actual setup time |
| Δ Setup | Difference (+ overrun, - saving) |
| Cycle Time Routed | Standard cycle time |
| Cycle Time Actual | Actual cycle time |
| Production Time | Total production time |

**Efficiency Metrics:**

| Metric | What It Shows | Target Value |
|---|---|---|
| Setup Efficiency | Setup time vs standard | ≥100% |
| Cycle Time Efficiency | Cycle time compliance | ≥100% |
| Production Efficiency | Time utilisation effectiveness | ≥85% |
| Overall Efficiency | Combined indicator | ≥90% |

**Δ Setup Colour Coding:**
- 🔴 Red (+ values) — setup time overrun
- 🟢 Green (- values) — time saving
- ⚫ Neutral (0) — exact compliance

**Who finds it useful:**
- Engineers — analysing standard accuracy
- Technologists — route correction
- Planners — realistic planning

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## Downtime Analysis

**What it shows:**
- Breakdown (minutes) — breakdown time
- Setting (minutes) — changeover time
- Tool Failure (minutes) — tool failures
- Waiting Ext (minutes) — external waiting
- Waiting Int (minutes) — internal waiting
- Pie Chart — downtime distribution

**Extended metrics:**

| Metric | Description | Formula |
|---|---|---|
| **MTBF** | Mean Time Between Failures | Operating time / Number of breakdowns |
| **MTTR** | Mean Time To Repair | Total repair time / Number of repairs |

**Who finds it useful:**
- Maintenance department — prioritising work
- Supervisors — operational resolution
- Managers — assessing equipment reliability

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## Scrap & Quality Reports

**What it shows:**

| Metric | Description |
|---|---|
| **Scrap by Shift** | Scrap quantity by shifts |
| **Scrap Trend** | Scrap dynamics over period |
| **Good vs Bad Parts** | Ratio of good to scrap |
| **Scrap Rate** | Scrap percentage |
| **Yield** | Good parts output |

**Who finds it useful:**
- Quality department — scrap cause analysis
- Operators — self-control
- Managers — loss assessment

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### Advanced Efficiency Reports

**Shift Efficiency:**
- Shift effectiveness comparison
- Identifying best practices
- Deviation analysis

**Department Efficiency:**
- Effectiveness by sections
- Comparative analysis
- Finding bottlenecks

**Routing Accuracy:**
- Route standard accuracy
- % plan/actual variance
- Recommendations for correction

**Total Earned Hours vs Total Clocked Hours:**
- Earned hours (per standard)
- Actual hours worked
- Working time utilisation effectiveness

## 8.3 Report Export

### Export to PDF

1. Generate the report
2. Click the **Export to PDF** button
3. Wait for generation (may take 10-15 seconds)
4. PDF downloads automatically

**PDF Contents:**
- Page 1: Plan vs Actual Table + Summary Statistics + Efficiency Metrics
- Page 2: Charts & Analytics (shift charts)
- Page 3: Good vs Bad Parts + Downtime Analysis + OEE Metrics

**PDF Features:**
- Optimised for A4 printing
- All data matches web version
- Charts with annotations (actual values)
- Large, readable KPI indicators

### Export to Excel

1. Generate the report
2. Click the **Export to Excel** button
3. .xlsx file downloads automatically

**Excel Contents:**
- Sheet 1: OEE Metrics — all indicators by machines
- Sheet 2: Plan vs Actual — detailed by operations

**What to use for:**
- Additional analysis in Excel
- Building custom charts
- Integration with other systems
- Data archiving

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# 9. Best Practices

## 9.1 How to Properly Maintain OEE During a Shift

### Start of Shift (first 15 minutes)

1. **Log into the system** from a device at the machine
2. **Open Add OEE** or find the existing sheet
3. **Check previous shift data** (if any)
4. **Read comments** — there may be important information

### During the Shift

**Every 30-60 minutes:**
- Mark time slots from the last update
- This takes less than a minute
- Do during automatic processing

**During each downtime:**
- Immediately mark the downtime category
- Add a comment with the reason

**When changing part/batch:**
- Fill in Good Parts / Bad Parts
- Add new part/batch

### End of Shift (last 15 minutes)

1. **Check all time slots** — all should be filled
2. **Check part data** — all fields filled
3. **Add comments** for the next shift
4. **Save OEE**

5. **Confirm** successful save

## 9.2 Why Real-Time Filling is Important

### Advantages of Immediate Filling:

| Aspect | End of Shift Filling | Real-Time Filling |
|---|---|---|
| Accuracy | ~70-80% | ~95-99% |
| Filling time | 15-20 min | 5-10 min (total) |
| Stress | High (must remember everything) | Minimal |
| Comment detail | General | Detailed |
| Forgotten downtime | Frequent | Rare |

### What is Forgotten by End of Shift:

- Exact duration of short downtime
- Micro-stoppage causes
- Event sequence
- Problem details

## 9.3 How Comments Help Analysis

### Good Comments:

✅ **"Coolant pump breakdown, waited 45 min for repair, seal replaced"**
- What happened
- How long waited
- What was done

✅ **"Waiting for material PN-12345 from warehouse, delay due to stocktaking"**
- What was waited for
- Why the delay

✅ **"Increased scrap due to tool wear, replaced after 50 pcs"**
- Problem
- Action
- Quantitative assessment

### Poor Comments:

❌ **"Downtime"** — unclear why

❌ **"Breakdown"** — which one? what was done?

❌ **"Waited"** — for what? how long?

## 9.4 Typical Errors and How to Avoid Them

### Error 1: Not All Time Slots Filled

**Problem:** Missing slots make OEE data incorrect.

**Solution:** Before saving, ensure the indicator shows 100% completion (green border).

### Error 2: Wrong Downtime Category

**Problem:** Confusion between Setting and Waiting Int, between T. Failure and B. Down.

**Solution:**
- **Setting** = operator actively working (changing tools, adjusting)
- **Waiting** = operator waiting (material, task, crane)
- **T. Failure** = tool failure (broken cutter)
- **B. Down** = machine breakdown (component failure, CNC error)

### Error 3: Good + Bad Parts ≠ Batch Size

**Problem:** Sum of good and scrap doesn’t equal batch size.

**Solution:** Check: Good Parts + Bad Parts ≤ Batch Size

### Error 4: Forgot to Save

**Problem:** Data lost, need to fill again.

**Solution:**
- Always click **Save Daily OEE**
- Wait for successful save message
- Save periodically, not just at end of shift

### Error 5: Confusion with Seconds and Minutes

**Problem:** Cycle Time Actual is entered in seconds, the rest in minutes.

**Solution:** Pay attention to field labels:
- **Cycle Time Routed** — minutes (2.5 min)
- **Cycle Time Actual** — seconds (165 sec)

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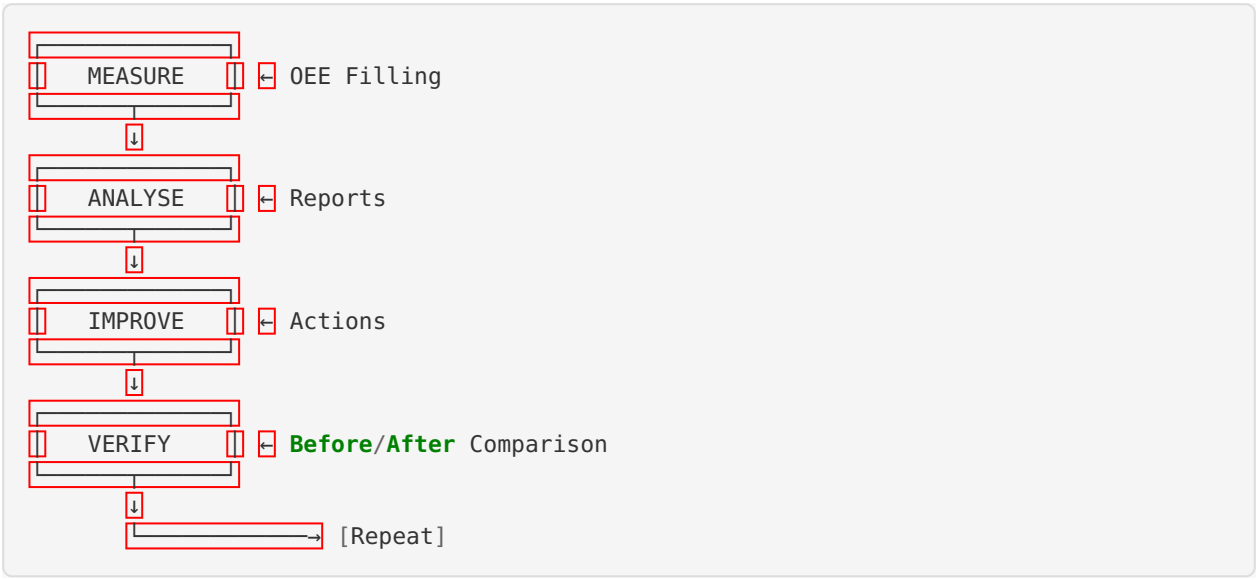
# 10. Conclusion

## 10.1 Role of OEE in Continuous Improvement

OEE is not just an indicator, but a **continuous improvement tool**.

**OEE Improvement Cycle:**




**What this cycle provides:**
- Objective assessment of current state
- Identification of priority problems
- Measurable improvement results
- Sustainable changes

## 10.2 How the System Helps Each Level

### For Operators:

- **Simplifies reporting** — quick filling instead of paper
- **Makes work visible** — achievements are recorded
- **Helps transfer information** — comments for shifts
- **Reduces claims** — data is objective

### For Supervisors:

- **Saves time** — reports generate instantly
- **Provides facts** — instead of subjective assessments
- **Helps make decisions** — real-time data
- **Simplifies upward reporting** — export to PDF/Excel

### For Management:

- **Transparency** — real workshop picture
- **Prioritisation** — where to direct resources
- **ROI from improvements** — measurable effect
- **Strategic planning** — data for decisions

## 10.3 Why the System Suits Mechanical Workshops

### Accounts for Production Specifics:

✅ **Frequent Changeovers**
- Separate Setting accounting
- Routed vs Actual Setup
- Setup Efficiency

✅ **Part Diversity**
- Accounting by Part No

- Individual standards
- Routing Accuracy

✅ **Three-Shift Operation**
- Night / A / B shifts
- Shift Efficiency
- Shift comparison

✅ **Complex Equipment**
- Detailed downtime analysis
- MTBF / MTTR
- Repair prioritisation

### 10.4 Modern Digital Production

OEE Management System is a step towards **Industry 4.0**:

- **Digitalisation** — paperless
- **Transparency** — data accessible to all levels
- **Real time** — current information
- **Analytics** — data transforms into knowledge
- **Mobility** — work from any device

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## Appendix A: Glossary of Terms

| Term | Description |
|---|---|
| **OEE** | Overall Equipment Effectiveness — overall equipment effectiveness |
| **Availability** | Ratio of actual operating time to planned |
| **Performance** | Ratio of actual speed to standard |
| **Quality** | Proportion of good parts |
| **MTBF** | Mean Time Between Failures |
| **MTTR** | Mean Time To Repair |
| **Routing** | Standard processing parameters |
| **Cycle Time** | Time to process one part |
| **Setup Time** | Changeover time between batches |
| **Downtime** | Time when equipment is not producing |

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## Appendix B: Quick Actions

| Action | How to Perform |
|---|---|
| Select multiple slots | Hold mouse + drag |
| Add comment | Double-click on slot |
| Quick PDF export | “Export to PDF” button |
| Reset filters | “Clear All” button |
| Select all machines | “Select All” button |

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## Appendix C: Support Contacts

For questions or issues, contact:

**Technical Support:**
- System operation questions — system administrator
- Data questions — shift supervisor

**Methodological Support:**
- OEE filling questions — shift supervisor
- Report interpretation questions — quality engineer

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