LEAN MANAGEMENT ACADEMY

# SMED Game

## Breaking through to dramatic setup time reduction / Simulation Game & Exercise





World-Class Standards of Lean Operational Excellence

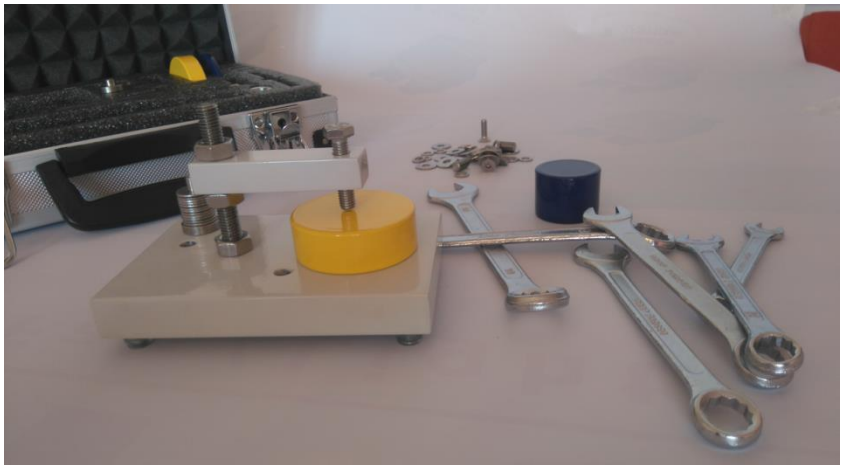
# Simulation Objectives

1. Simulate a complete process of changeover
2. Run brainstorming and seek for improvements
3. Discover and describe the **SMED method!**

# Simulation Kit

## Two identical sets per package

x 2



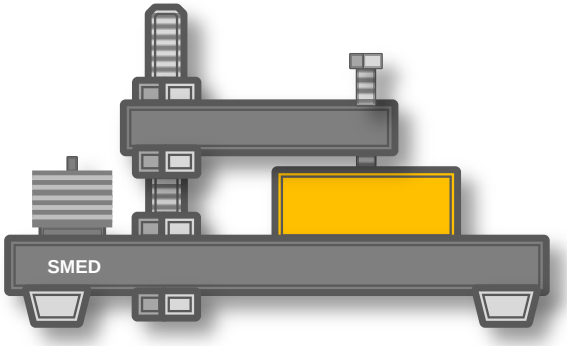
# SMED Simulation Game

## The rules

**Run a machine setup from „situation 1” to „situation 2”**

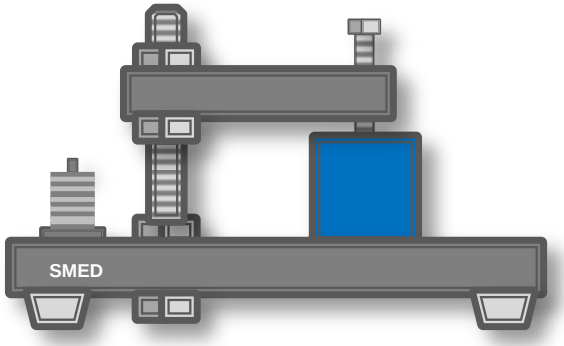
## Situation 1:

- Yellow tool on the machine
- Container filled with 11 large discs




## Situation 2:

- Blue tool on the machine
- Container filled with 15 small discs



# SMED Simulation Game

## The rules

## Participants

### 1 Operator

- Runs changeover activities
- Takes responsibility for the overall changeover time

### 1 Controller

- When changeover is finished he/she makes control whether machine's settings are proper and whether machine is ready to work (health & safety)
- Checks if the tool is centered and if the distance of 9mm between tool and clamp (± 1mm) is kept. Finally, approves the setup is done correctly.

### 1 Process Engineer

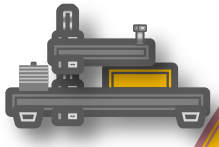
- Makes timing of all particular changeover elements

# SMED Simulation Game

## The rules

**Two teams:**

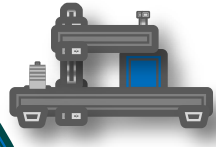
Team YELLOW



- Operator
- Controller
- Process Engineer

**Vs.**

Team BLUE

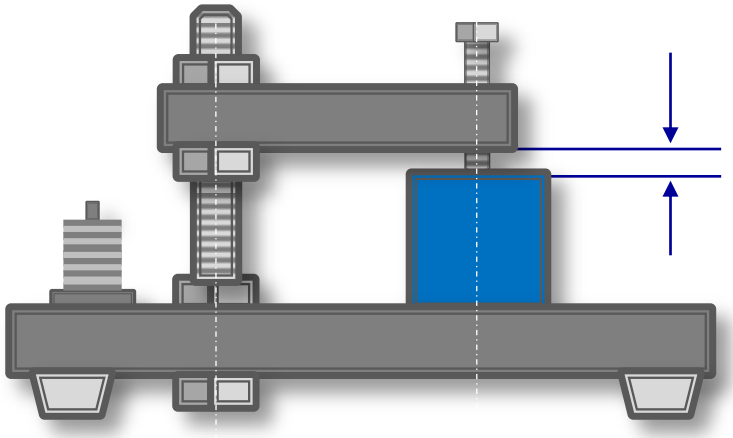


- Operator
- Controller
- Process Engineer

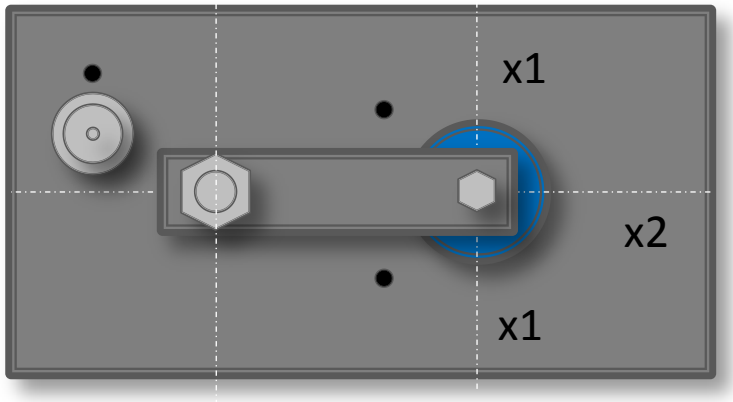
Let them compete against each other!

# SMED Simulation Game

## The rules



**9 mm ± 1mm**




**x1 = x1**

**x2 ≠ x1**

# SMED Simulation Game

## Objectives

- Overcoming bias and pre-conceived way of thinking
- Discover the SMED philosophy
- Why it is worth to set high targets
- Increase our awareness of strategic cost (OEE) as well as flexibility of plant resources

# SMED Simulation Game

## 3 rounds: Overview

**Team's brainstorming**

**Collect data:**
- Actual setup duration
- Actual method, tools, equipment
- Break down into internal, external, adjustments

**Come up with improvement solutions!**

**Reach for breakthrough:**
- Reduce all wasteful / unnecessary steps!
- Focus on the overall setup time reduction

**Come up with dramatic (!) improvement solutions!**


Target: cut setup time **in two**!

Target: **DRAMATIC** setup reduction!

- Operator strictly follows the current setup standards
- Time is measured

- Operator takes into account improved setup elements
- Time is measured

- Operator follows the final setup standard
- Time is measured

# SMED Simulation Game

## The Rules

Round 1

**When the moderator yells START:**

- Start the stop-watch.
- Follow the actual setup standard:
- Use only spanners to loose or tighten screws
- Respect technical requirements (9 mm ± 1mm, x1=x1, x1≠x2)
- Measure the distance between the tool and the clamp with the ruler
- Call for the Controller when ready
- Controller approves setup correctness. If Ok, then time STOP. If not, Operator continues adjustments, then Controller comes again.

- **When Round 1 is over, get the team together and identify the reason of what it takes to complete setup…**

# SMED Simulation Game

## Setup Reduction Worksheet

- Break down the overall setup into internals, externals and adjustments
- Use the Setup Reduction Worksheet
- Identify all wasteful steps (mark Waste)
- Measure all elements separately
- Try to convert internals into externals
- Try to reduce adjustments
- Validate the improvements
- Get ready for Round 2

- **Your target for next round is to reduce the previous result by 50%!**

**Setup Reduction Worksheet**

| Team: | | Machine / Tool: | | | | | Date: |
|---|---|---|---|---|---|---|---|
| No. | Setup Element | Internal | External | Waste * | Total Time | Net Time | Comments/Improvement Ideas |
| | | | | | | | |
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* Waste categories:

1. **Setup waste, external** - activities such as searching, finding, or transporting tools, jigs, bolts, instructions.
2. **Setup waste, internal** - alignment activities required to remove or install tools (example - using a fork truck to remove/install tools)
3. **Replacement waste** - activities related to removing items from "A" tool to be placed in the "B" tool (ex. Fasteners, etc.)
4. **Adjustment waste** - any activitiy which would require the machine to cycle without producing a good part (stroke/stop adjustmens, etc.)

# SMED Simulation Game

## Round 1: Setup elements breakdown. Example

| | | |
|---|---|---|
| ▪ Get and open toolbox | …s | … |
| ▪ Take the right spanner to loosen the clamp | …s | … |
| ▪ Loosen tool | …s | … |
| ▪ Take away tool | …s | … |
| ▪ Supply new tool | …s | … |
| ▪ Find spanner to lift the clamp (which one?) | …s | … |
| ▪ Loosen and lift clamp | …s | … |
| ▪ Put new tool on the machine | …s | … |
| ▪ Find and grab the ruler | …s | … |
| ▪ Adjust and tighten clamp with spanner 17 | …s | … |
| ▪ Adjust tool position | …s | … |
| ▪ Tighten tool with spanner 13 | …s | … |
| ▪ Take away old raw material | …s | … |
| ▪ Supply new container | …s | … |
| ▪ Put new raw material in place | …s | … |
| ▪ Controller intervenes | …s | … |

**TOTAL: …s**

# SMED Simulation Game

## Round 2: Brainstorming

- Run brainstorming to come up with ideas for setup improvement
- Focus on the cost-effective solutions!
- Check if it works!
- Improve the setup workflow
- Instruct operator

- Run the round 2

# SMED Simulation Game

## The Rules

Round **2**

**When the moderator yells START:**

- Start the stop-watch (Round 2)
- Follow the **improved** setup activities
- ….
- Always respect technical requirements (9 mm ± 1mm, x1=x1, x1≠x2)
- ….
- **When Round 2 is over, get the team together and let them work on developing solutions for dramatic improvement!**

# SMED Simulation Game

## Round 3: Making a breakthrough in setup time reduction

- You will be given a new target for this Round. Even if the target seems to be shocking, you will be challenged to get it done!
- The target will be given by moderator only during the session.
- You will need to widely open your mind and go far beyond the borders to discover the real potential for improving
- Once you progress with improvements, you will understand why we must set high targets.
- Still you need to focus on the cost-effective solutions!
- **Run the round 3.**

# SMED Simulation Game

## The Rules

Round

3

**Before the moderator yells START:**

- Make sure you and your team is fully capable to make it!
- Remember, all the requirement must be kept.
- Once you are ready, run the setup and capture the time.
- ….

- **Done?**
- **Congratulations! You just discovered the way to make a breakthrough in dramatic setup time reduction!**

- **Basing on your experience, you will be able to standardize the process and optimize productivity!**

# Appendix:
# How to get ready to play a game

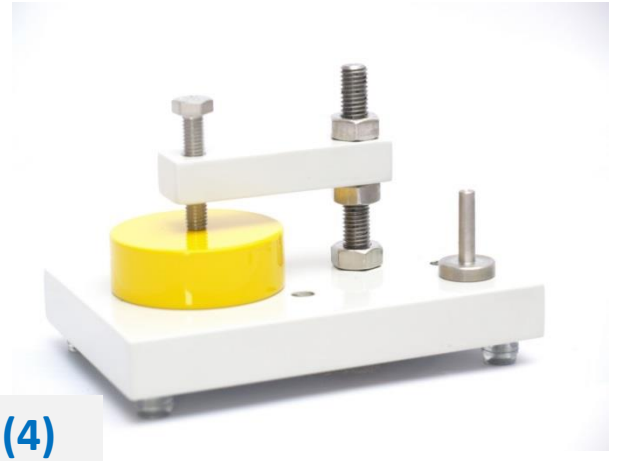
# Assembly instructions

## Step 1: Base assembly of the machine and the tool

(1)

(2)

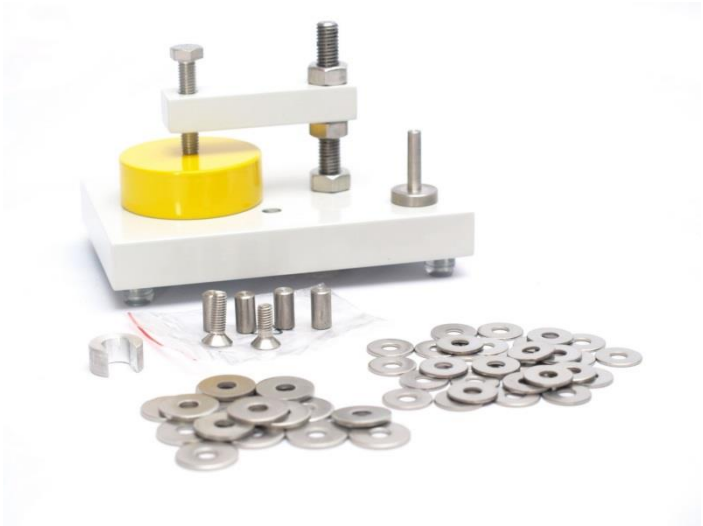
(3)



(4)

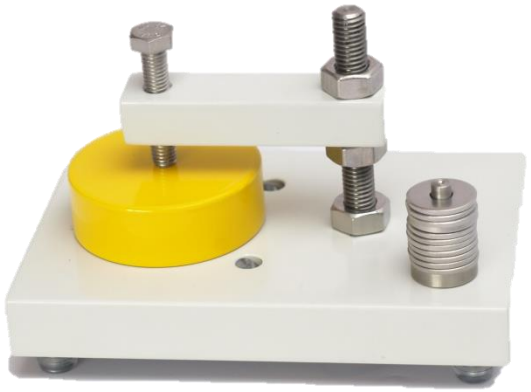
# Assembly instructions

## Step 2: Preparing components / raw materials. Getting ready to begin



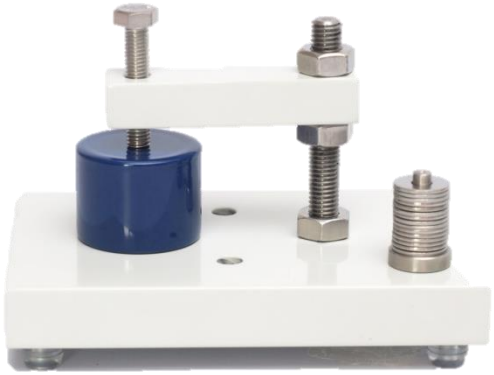
**(1)**

Use the parts from the bag attached



**(2)**

Ready machine: yellow tool (11 large discs)



**(3)**

Ready machine: blue tool (15 small discs)

# Improvement suggestions

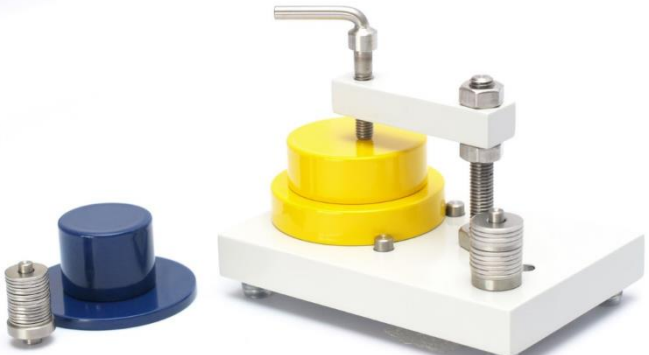
## How to standardize the tools

**(1)**

Use the elements provided to standardize both tools (eliminate adjustments and fine-tuning)

**(2)**

Both tools are standardized now (same size, height and diameter)



**(3)**

Objective: make now a quick setup in less than 2 seconds!