

# Training Day 1

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**Aim of the day:** Successfully perform the commissioning of a standard axis

**Instructors:** Yannik Zemp, Filippo Marinho

**Participants (8):** to be determined

**Material:**

- Motors, drives, and power supplies from Triamec

**Preparation:**

- The participants bring their own laptops
  - [Current TAM Software](#) installed
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## MORNING

Start: 08:30

**Aim:** Get to know the hardware and software, commissioning and control theory

Product overview (HW) ~30min

- Types of drives, Option Modules
- Interfaces of the Drive
  - Encoder
  - Motor
  - STO (Safety-Functions)
  - DigIO
  - USB
  - Ethernet (Bridge-Mode)
  - Trialink/EtherCAT
  - Logic Supply
  - Option Modules
- Power Supply
  - Funktion TP (TPDC)
  - Supply via transformer or switch-mode power supply
- Field Busses
  - EtherCAT
    - EtherCAT Master
  - Trialink
    - TL Triamec PCI-Express Adapter Card
- Shielding / Grounding

## TAM System Explorer ~1h

- Documentation
- Establish connection (Preferences?)
- Triamec Workspace
- How to use TAM System Explorer
  - Stations (Device Information)
  - Register Tree (Topology)
    - (Information)
    - Parameters: Prepare/Commit/Revert Parameters
    - Commands
    - Signals: Scope
  - Axis Monitor
    - Emergency Stop & Stop (Halt), Global Keys
    - Override
    - VM State
    - Errors / Warnings
  - Scope 1 - basic introduction
    - Pan/Zoom
    - Sampling Time
    - Zoom/Pan
    - Repeat/Single Mode
    - Run Stop
    - Analysis
    - Save/Load Data
    - Templates
  - Tab Panel
- Tam Configuration
  - Save/Load Configuration
  - Persistence on the Drive
  - Open in Editor / Compare with Diff-Tool
  - Simulated Mode
- Modules
  - Add / Remove
  - Plug-in concept
  - Structure and content of Axis Group Module
  - Frequency response tool
- Firmware Update (Official Source Website)
- Debug opportunities
  - Report
  - Browser
  - Logs: Severity Settings, TSE Log
  - Dump files

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## COFFEE BREAK

10min

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## Theory ~30min

- Control structure
- Commutation variants and Iq/I<sub>d</sub> system

## Basics of Commissioning ~1h

- How to configure the parameters?
  - Go through relevant parameters and explain with a concrete example (AKM22E).
  - Motor
    - Thermal Protection
      - Temperature Sensors
      - I<sup>2</sup>T
  - Path Planner
    - Relevance of parameters
  - Position Controller
    - Feed Forward
    - Output Limit
    - Encoder
      - Topology (Option Module)
      - Supported Encoder types
      - Remark about the power supply of Magnescale encoders
    - Controller -> Bode
      - Why two control systems?
  - Commutation
    - Phasing
    - Differences between encoder types
  - Current Controller
  - Homing
    - Routines
    - Differences between encoder types
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## LUNCH 12:15

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## AFTERNOON

Start: 13:30

**Aim:** Hands-on experience with commissioning and tuning of an axis

## Commissioning and Tuning with practical exercise ~2h

- Overview Commissioning
- Frequency Response Measurement

- Exercise
  - Tuning with Bode and Nyquist Plots
    - Exercise
  - Feed Forward
  - Tests in Time and Frequency domain
    - Exercise
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## COFFEE BREAK

10min

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## Measurements, Scope 2 ~1h

- Trigger
- Axes
- Auto Save
- Streaming
- Data Analysis, FFT, STD

## Conclusion of the day ~15min

- Summary
  - Outlook
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End: ~ 17:00

# Training Day 2

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**Aim of the day:** TAM API und Tama

**Instructors:** Christian Marrocco, Nicola Steffen, Yannik Zemp, Filippo Marinho

**Participants (8):** to be determined

**Material:**

- Motors, drives, and power supplies from Triamec

**Preparation:**

- The participants bring their own laptops
- [Current TAM Software](#) installed
- One of those:
  - Visual Studio 2017 Express – free
    - Install the .NET Framework 4.8 Developer pack
  - Visual Studio 2019 or 2022 – free for open source projects and small organizations
    - Select the .NET desktop development workload
    - Add the optional .NET Framework 4.8 development tools

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## MORNING

Start: 08:30

**Aim:** Get to know the basics of the TAM API and IDE.

### Introduction to Tama ~1h

- What is a Tama program?
- Creating a Tama program
- Use of registers and Application Parameters/Variables
- Run and test Tama programs
- Debug Tama programs

### Interactive exercise ~1h

- Implementation of a simple sequence control

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## COFFEE BREAK

10min

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### TAM API Introduction ~30min

- Use cases
- Development environment

### Example of different use cases ~45min

- Triamec [GitHub](#) and how to use it
  - Use of simulation
  - Perform measurements
  - Perform move sequences
  - Streaming of reference positions from PC to drive
  - Automate manual processes
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## Lunch 12:15

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## AFTERNOON

Start: 13:30

**Aim:** Being able to create simple Tama programs

### Continuation of interactive exercise ~30min

- Implementation of a simple sequence control

### Tama demonstration ~45min

- Tables
- Cogging Compensation
- Axis Compensation
- Questions

### Conclusion of the programming part ~15min

- Summary
- Questions
- Wishes and needs for consolidation

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## COFFEE BREAK

10min

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Time at disposal for miscellaneous topics ~1.5h

- Questions
- Consolidation of topics according to participant requests

Conclision of training ~15min

- Summary
  - Outlook
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End: ~ 16:30-17:00