2023.03.31 BY CHAOUECHI MOHAMED 麦德

ACOPOStrak Application : User Case

ABB Circuit Breaker Laser Marking Station

Agenda

Today’s Menu

Main content

- ACOPOStrak 产品优势介绍
- ACOPOStrak应用案例：ACOPOStrak在ABB断路器生产线
- 了解一下ACOPOStrak生命周期 ：从仿真到实际应用，从安装到运行

Advantages of ACOPOStrak
产品优势

Next generation transport systems

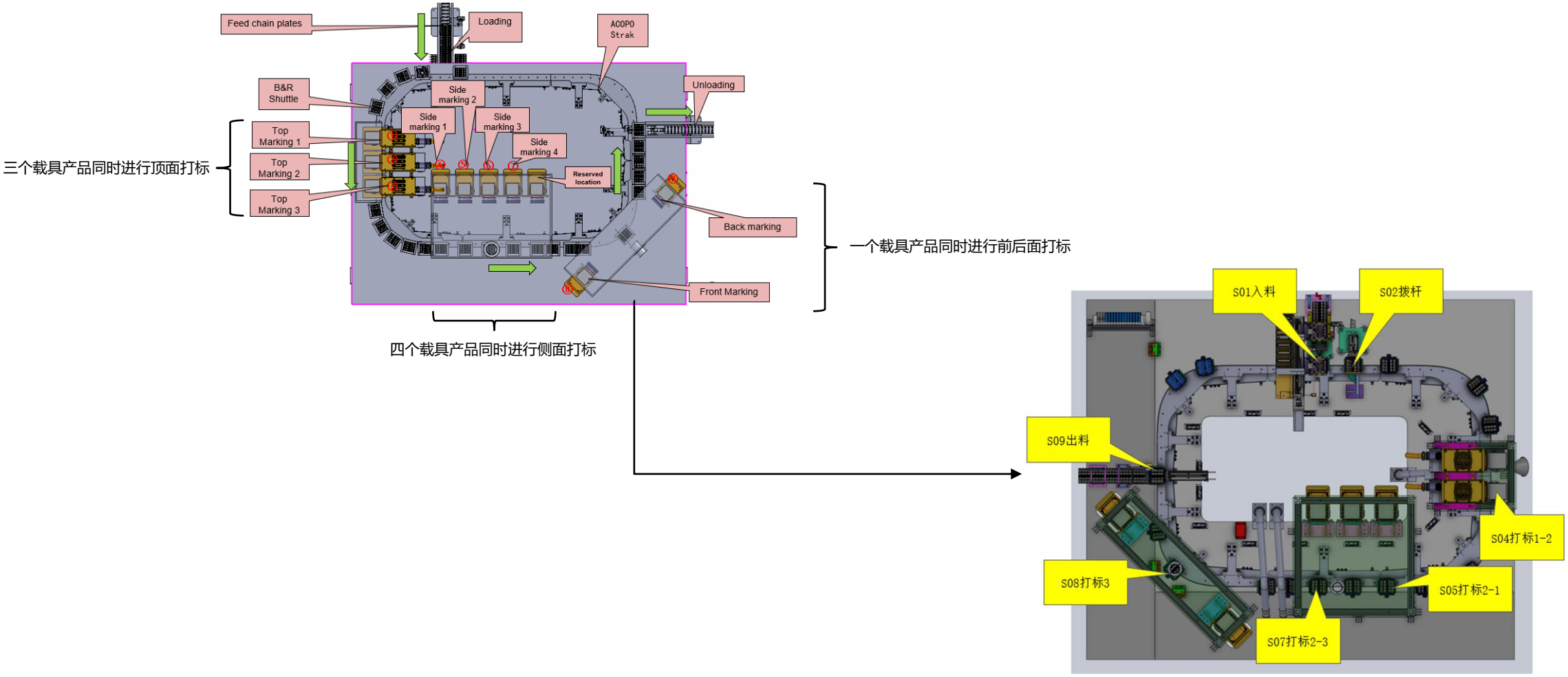
此处视频请见Teams与Y盘保存的PPT

- 可热插拔的穿梭小车
- 强大的仿真功能
- 设备综合效率（OEE Overall Equipment Effectiveness）最大化
- 防撞功能（Integrated collision avoidance）
- 4米/秒速度*
- 重复精度 < 100 um
- 加速度 50米/秒²
- 2KG 产品

Depends on the application and the layout

Laser Marking

Laser Printing Machine Number Decreasing



https://www.trumpf.com/en_US/products/lasers/marking-lasers/trumark-series-3000/

Overview

ACOPOStrak应用案例 ：ACOPOStrak在ABB断路器生产线

Production Line’s Final Product

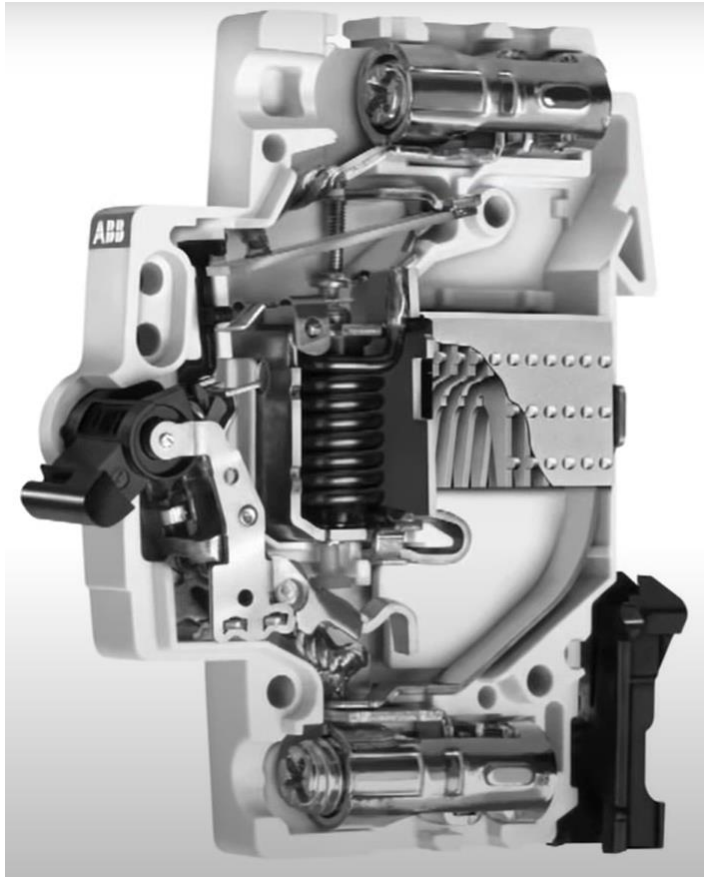
ABB MCB (Miniature Circuit Breaker)

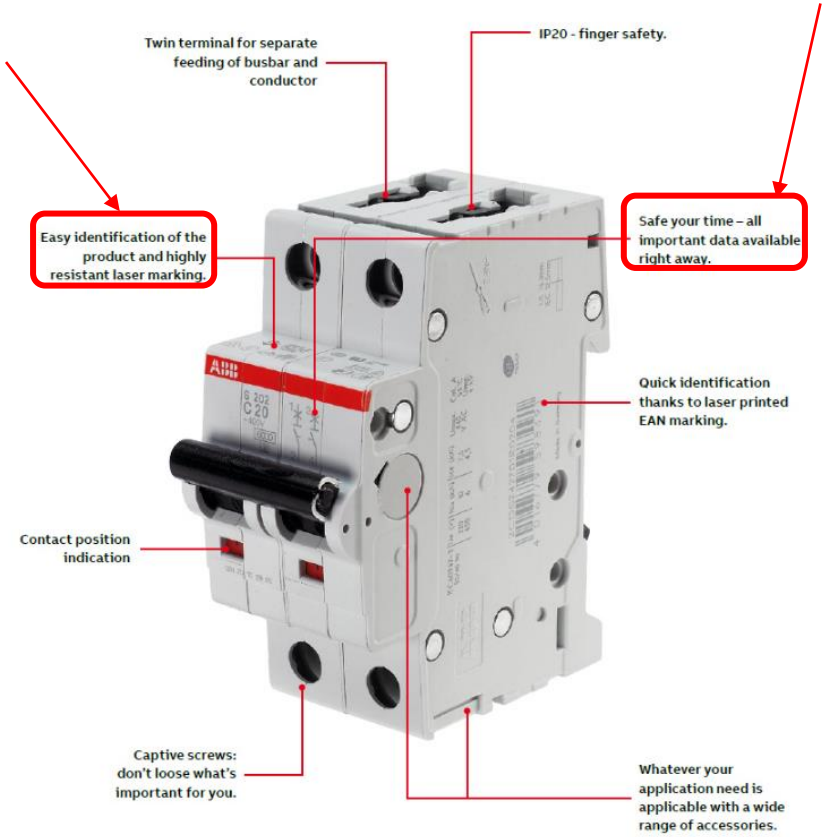
- Configurations: 1P, 2P, 3P, 4P
- Breaking capacities up to 25 kA
- Rated currents up to 100 A

https://new.abb.com/products/2CDS251001R0634/s201-c63

Final Product

- Easy Identification of the product
- Highly Resistant Laser Marking
- All Important Data Available

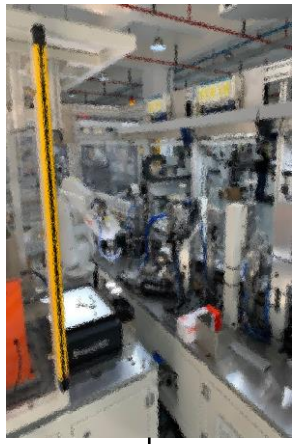


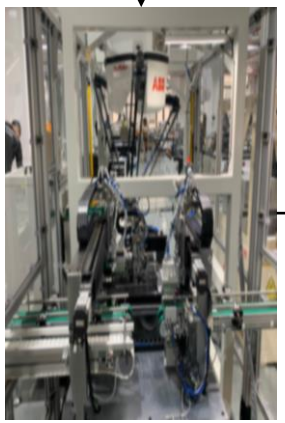


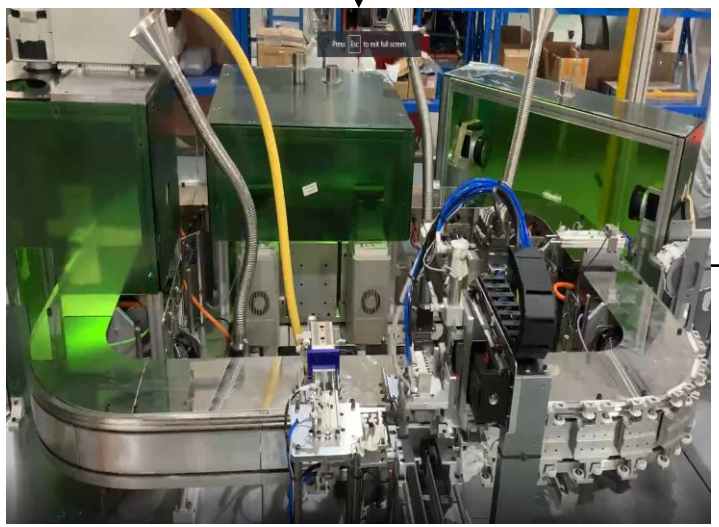
https://www.youtube.com/watch?v=850aO98OAyI
https://new.abb.com/low-voltage/products/system-pro-m/miniature-circuit-breakers

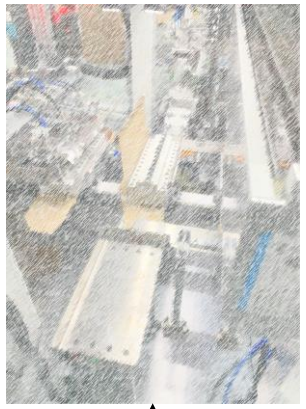
Production Line

外壳安装机 介电机 松钉机 安装卡 红带机 激光机 包装机









Laser Marking

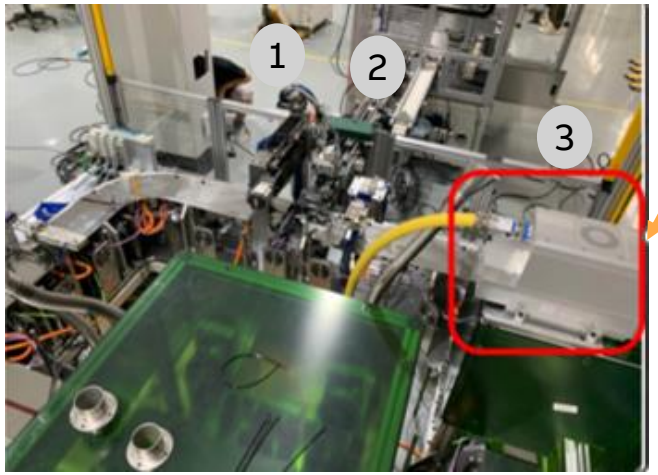
- Highly Resistant Laser Marking
- Fast Marking Process
- Clean and eco-friendly

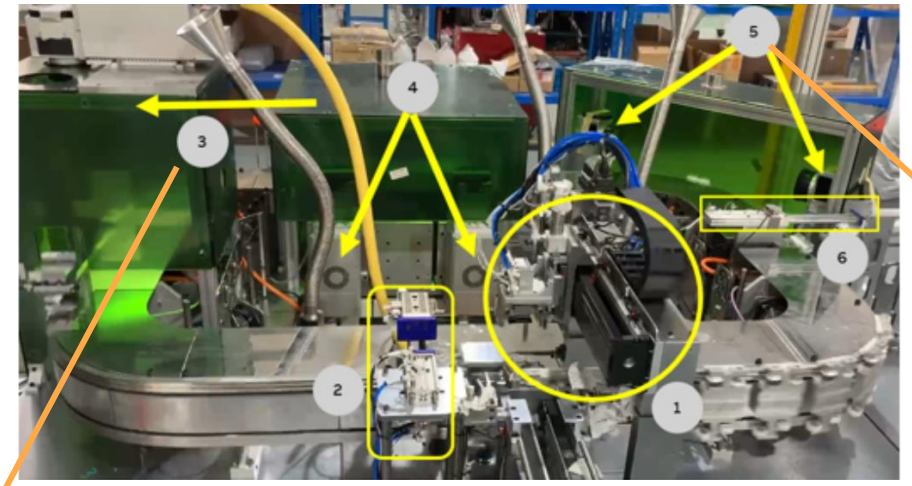
此处视频请见Teams与Y盘保存的PPT

https://www.reichelt.com/de/en/automatic-circuit-breaker-3-pin-characteristic-b-20-a-abb-s203-b20-p69800.html?GROUPID=3388&&r=1
https://new.abb.com/products/2CDS251001R0634/s201-c63
https://www.trumpf.com/de_DE/produkte/laser/beschriftungslaser/trumark-serie-3000/

Laser Marking Stations
通快标记激光器 TruMark 3000

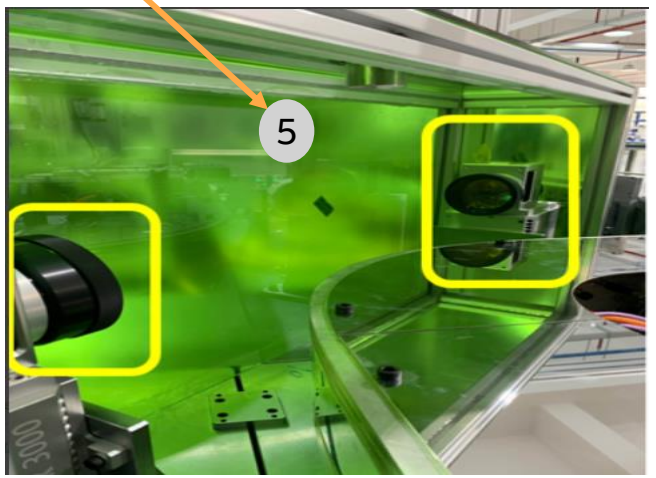
•Top Marking



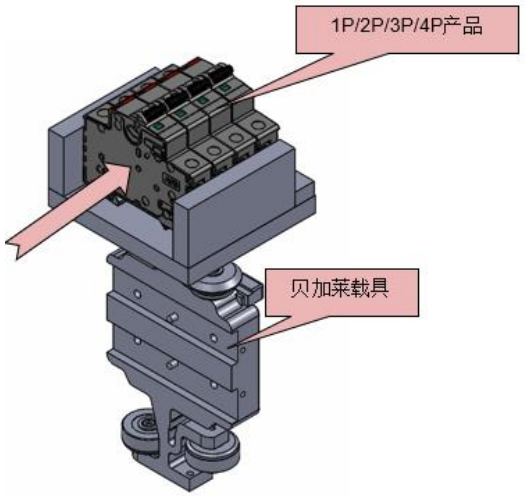


•Different position installation

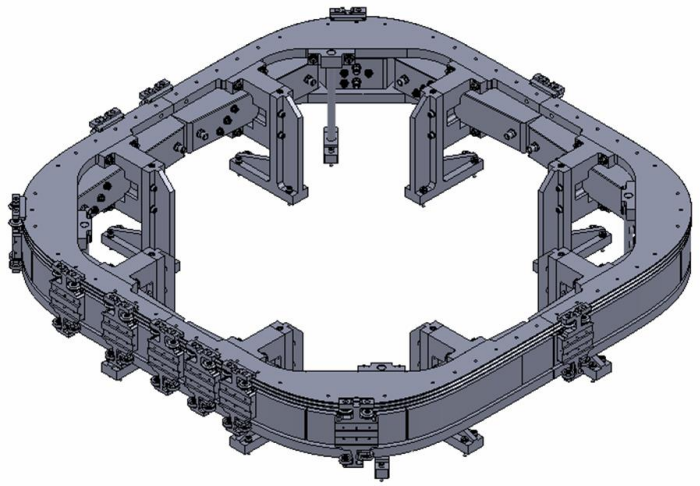
•Front Back marking



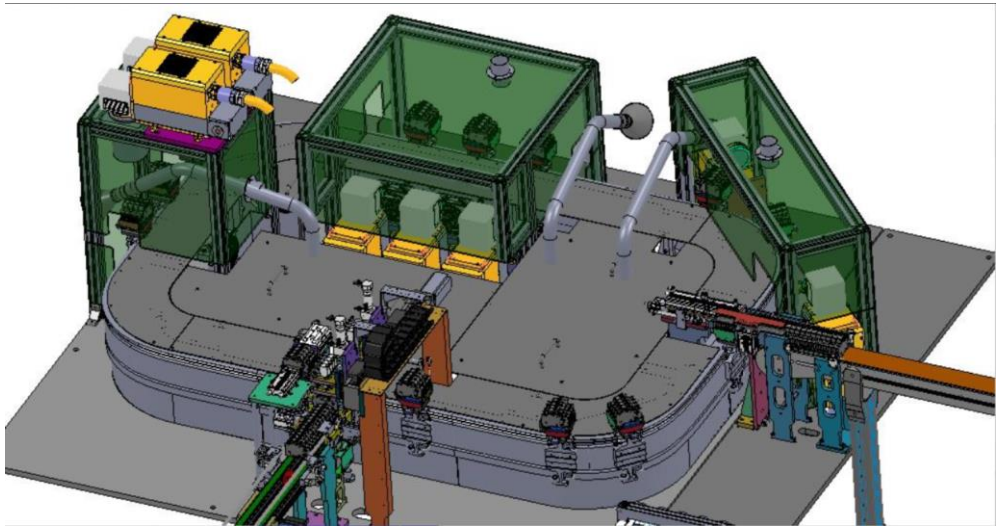
ACOPOStrak Solution



•High precision shuttles



•Flexible layout

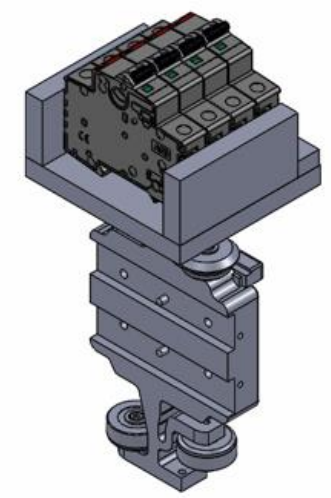


•Reliable and High Productivity rate solution

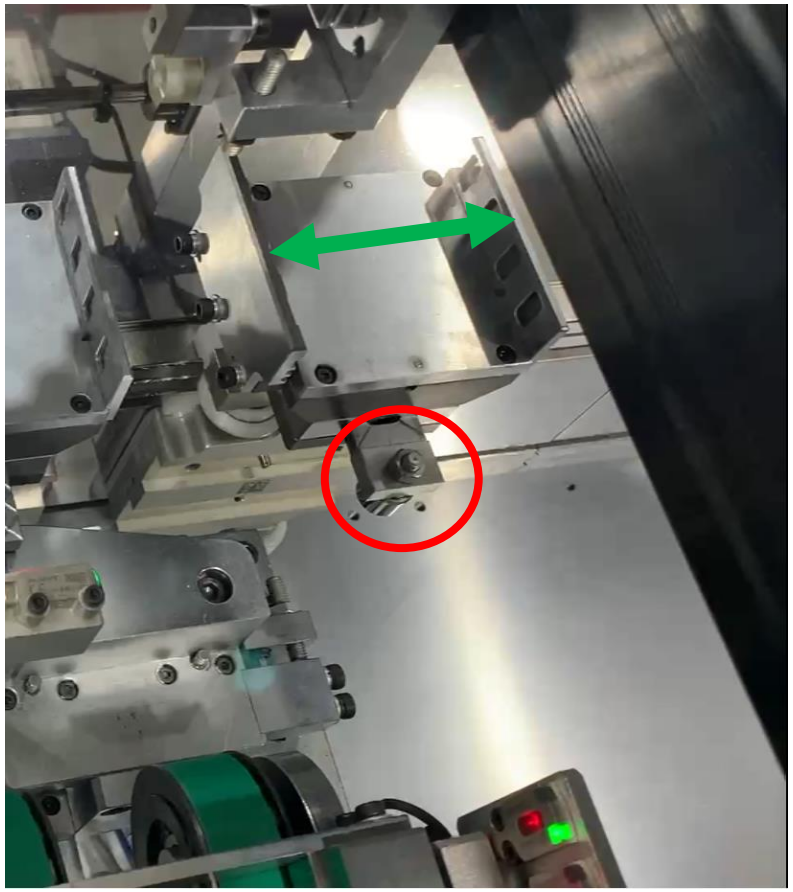
Loading Station
上料工站

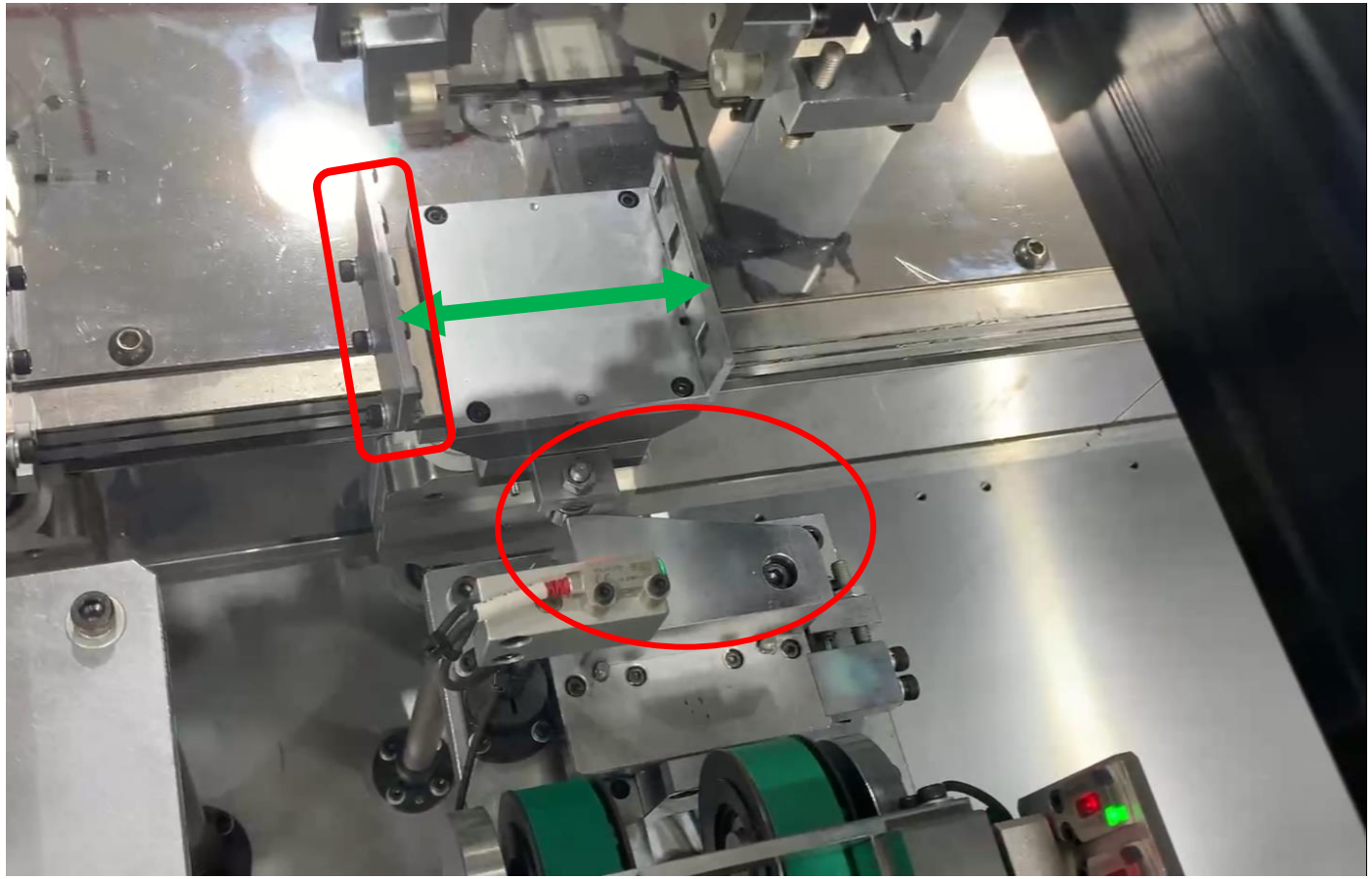
- Process Time 0.8 – 1 秒
- 1 Shuttle （小车）needed
- Shuttle Speed : 2.2米/秒
- 加速度 : 0.6G

此处视频请见Teams与Y盘保存的PPT



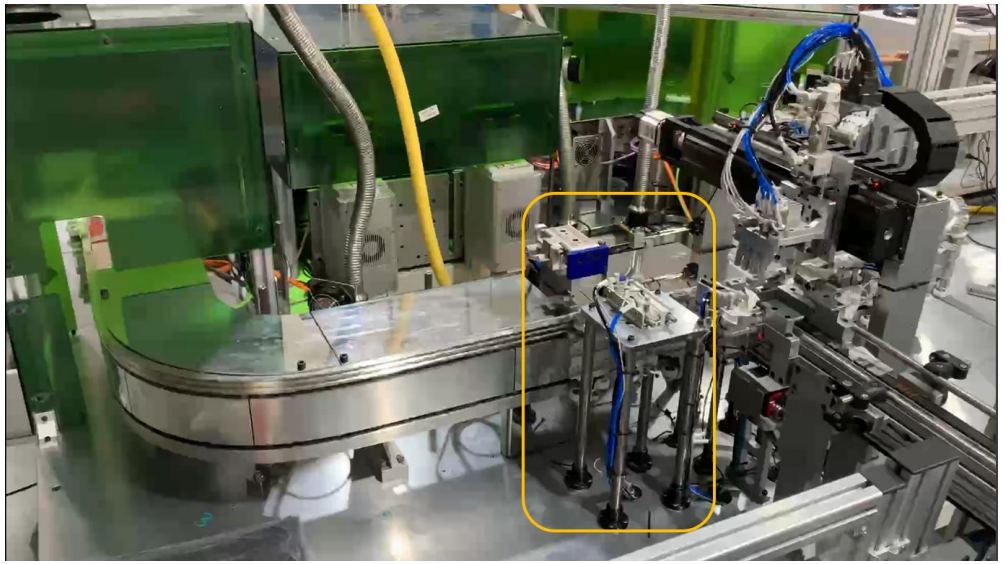
Locking Carrier





Position Adjustment Station
产品夹紧工站

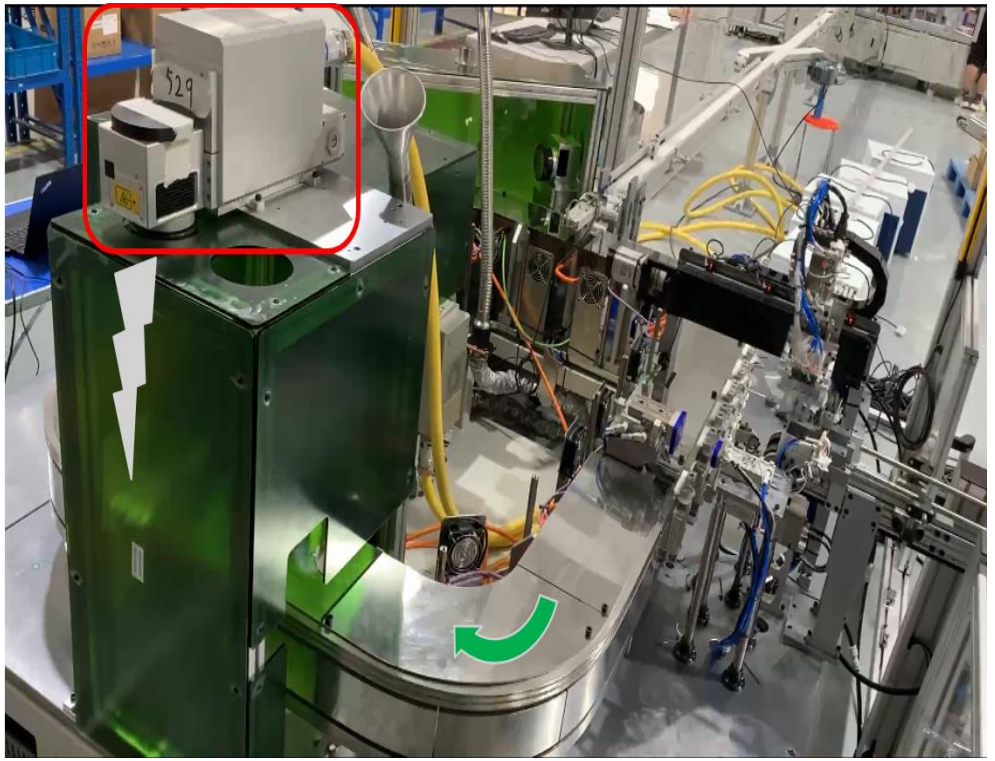
- Process Time 0.4 – 0.8 秒
- 1 Shuttle （小车）needed
- Shuttle Speed : 2.2米/秒
- 加速度 : 0.6G



此处视频请见Teams与Y盘保存的PPT

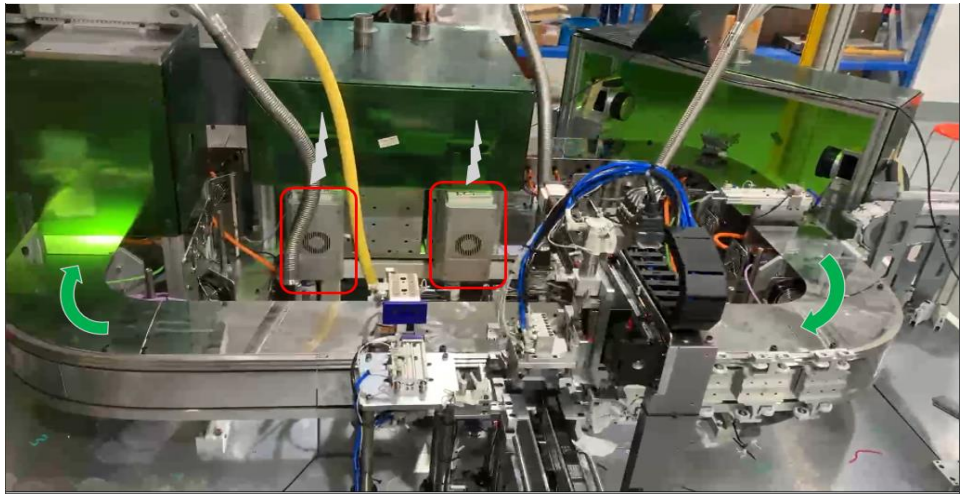
Top Laser Marking Station
顶部打标

- Process Time 1.4 秒
- 1 Shuttle （小车）needed
- Shuttle Speed : 2.2米/秒
- 加速度 : 0.6G



Side Marking
侧面打标

- Process Time 2.9 秒
- 2 Shuttles （小车）needed
- Shuttle Speed : 2.2米/秒
- 加速度 : 0.6G

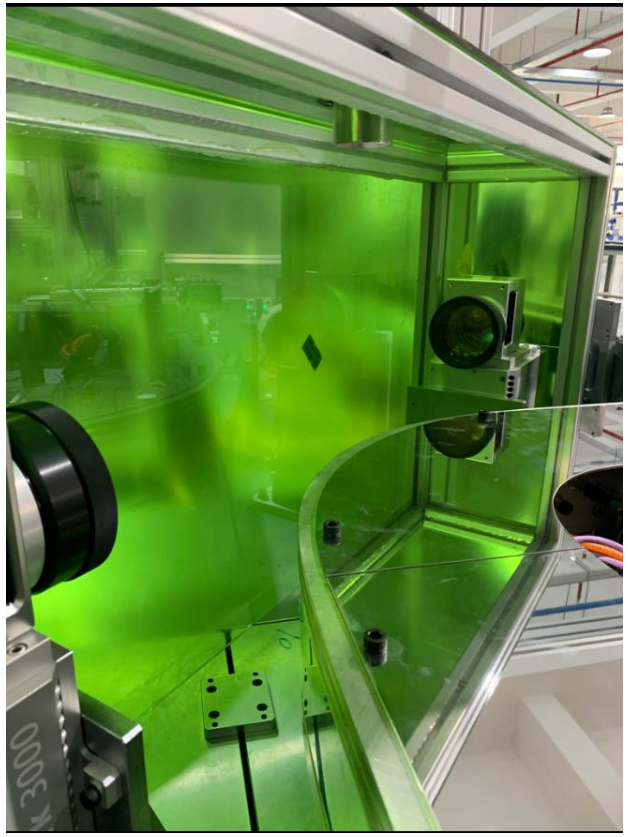


此处视频请见Teams与Y盘保存的PPT

Front and back marking
前后面打标

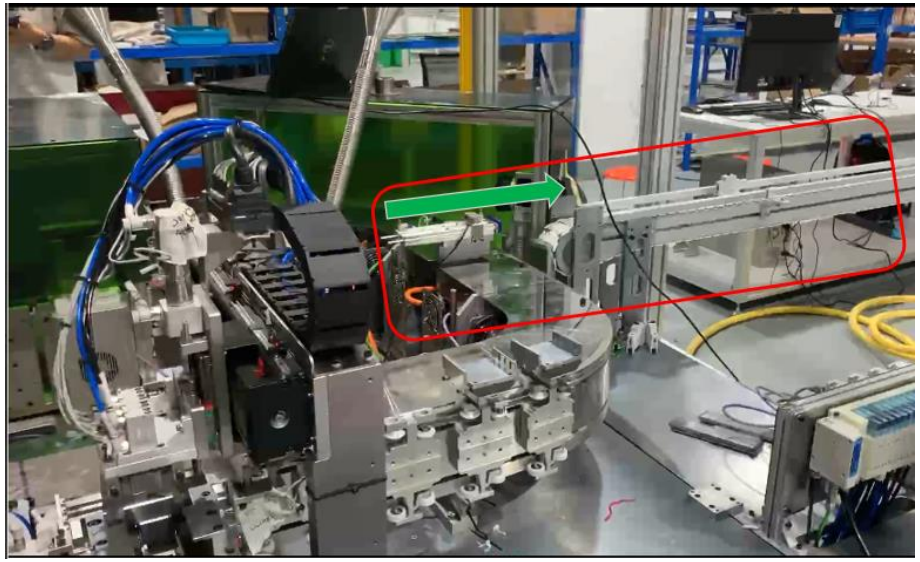
- Process Time 0.6 秒
- 1 Shuttle （小车）needed
- Shuttle Speed : 2.2米/秒
- 加速度 : 0.6G

此处视频请见Teams与Y盘保存的PPT



Unloading
出料站

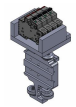
- Process Time 0.3 – 0.6 秒
- 1 Shuttle （小车）needed
- Shuttle Speed : 2.2米/秒
- 加速度 : 0.6G



此处视频请见Teams与Y盘保存的PPT

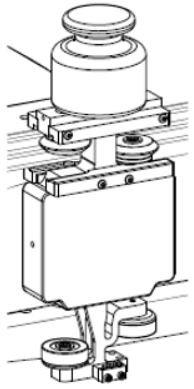
Design , Simulation & Evaluation

Questions To Ask

Application	Customer
ACOPOStrak的工作环境 (温度, 湿度, IP 等级, 是否有水洗要求, 是否存在特殊化学环境, 其他)?	25°
ACOPOStrak的系统布局	6米Trak (5.88)
是否有同步需求(比如滑块间同步，滑块与外部轴同步)	无
项目中产品重量	~390克
项目中使用夹具重量	~1600克
项目中产品与夹具的固定方式 是否已经确定 产品与夹具的安装位置	 载具参数 X 3mm / Y 9 mm / Z -109 mm 产品参数 X 0mm / Y 13 mm / Z -160 mm
整线外围设备（工站）之间最小与最大间距是多少	0.30444 - 0.4999 - 1.705 – 1.885 – 2.9120 – 3.1120 – 3.3120 – 4.6 – 4.7394
整线设计生产效率、具体产量要求	节拍≤1. 5秒
整线一共有多少工站，每个工站需要停留的时间	1) 0.8 – 1 秒 2) 0.4 – 0.8 秒 3) 1.4 秒 4) 2.9 秒 5) 0.6 秒 6) 0.3 – 0.6 秒

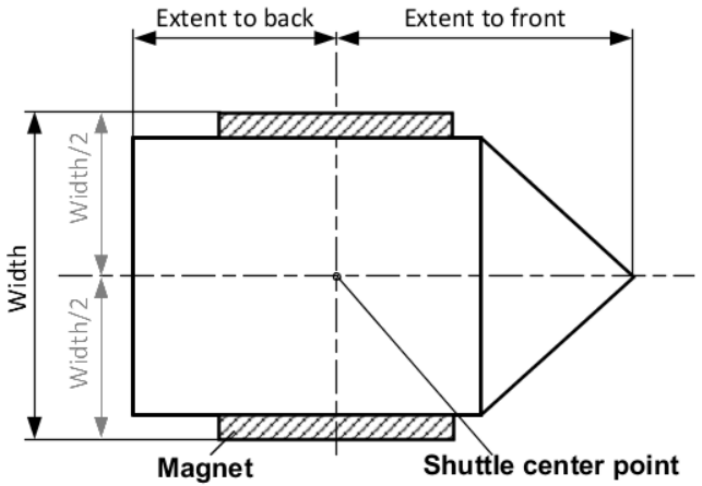
Shuttle Specifications
Application Requirements

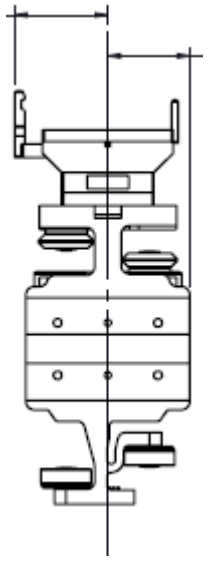
项目中产品重量	~390克
项目中使用夹具重量	~1600克
项目中产品与夹具的固定方式	 载具参数 X 3mm / Y 9 mm / Z -109 mm 产品参数 X 0mm / Y 13 mm / Z -160 mm
是否已经确定 产品与夹具的安装位置	

Shuttle type (width)	100 mm
Load weight	2 kg
Track alignment	Horizontal
Maximum acceleration on the straight line	18 m/s²
Maximum speed in the curve	3 m/s
Load center of gravity	25 mm above upper support 

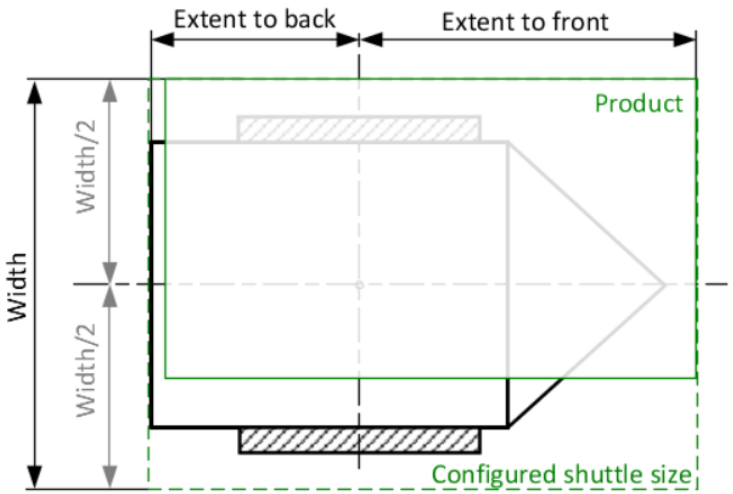
Shuttle size
产品尺寸

- Safe functionality (If the size is not specified correctly, shuttles and products may collide)
- Spacing between two shuttles





•Basic shuttle without product



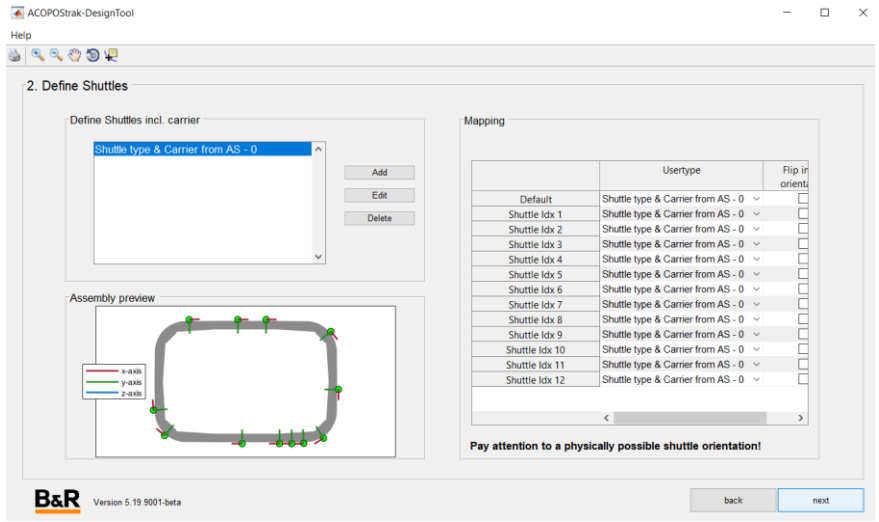
•Basic shuttle with product

ACOPOStrak design task

TrakDesign ACOPOStrak-DesignTool

The ACOPOStrak DesignTool is a tool for the (pre-)design of a ACOPOStrak with a view to :

- ✓ The thermal stress 电机温度（是否有电机过温风险）
- ✓ The mechanical “stability” 负荷（是否有飞车风险）
- ✓ The electrical supply 电源（电源数量）



Good Tool, but only for reference

The induction halt check is only a necessary but not sufficient condition! This means that despite a positive calculation result, shuttles may flyoff in reality due to the following points:

- The DesignTool checks a possible induction halt at the current velocity, for each shuttle in each time step. So, if as a result of the induction halt, deceleration areas before curves are overlooked, a shuttle flyoff may occur even if the DesignTool outputs OK.

此处视频请见Teams与Y盘保存的PPT

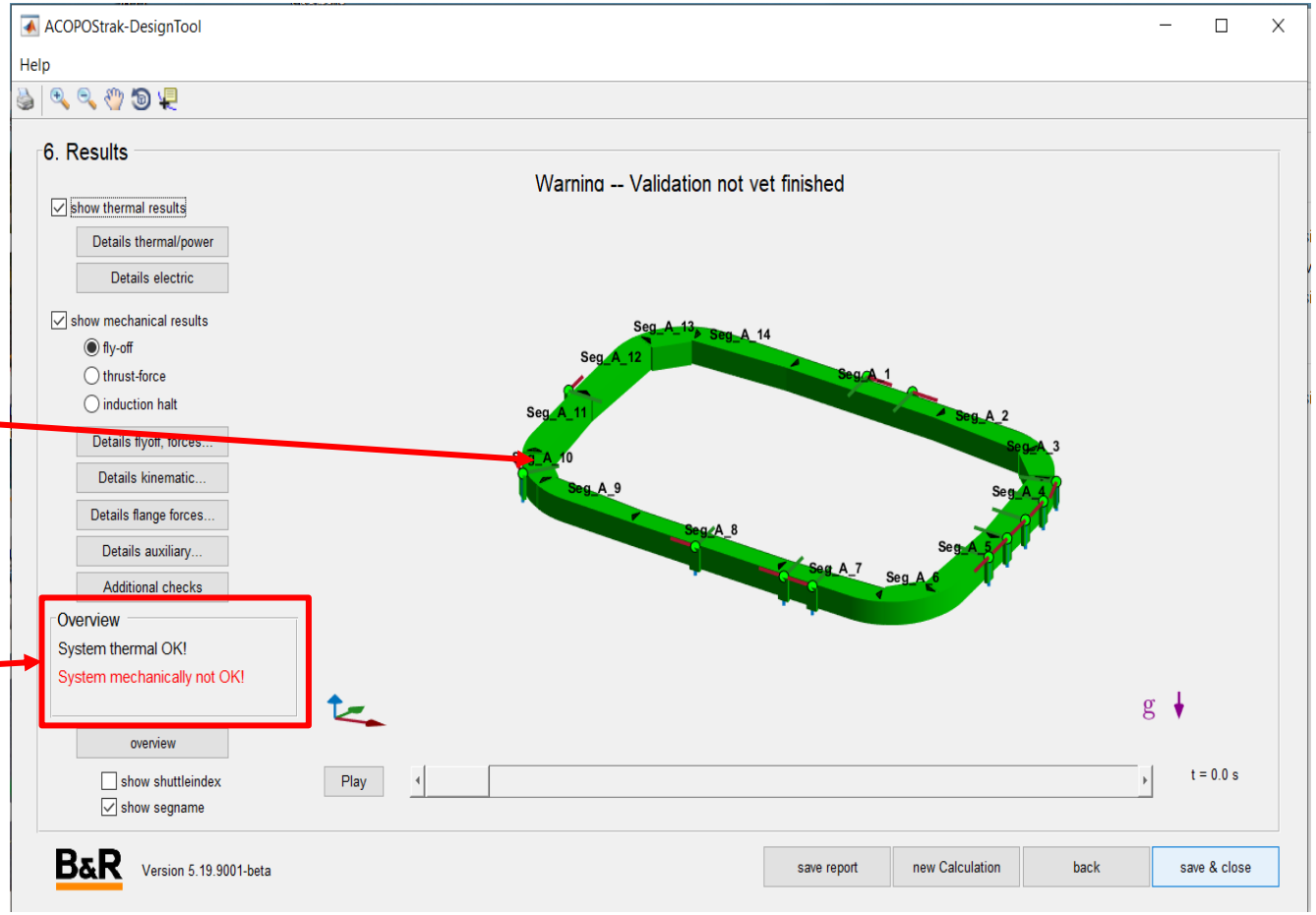
此处视频请见Teams与Y盘保存的PPT

ACOPOStrak design task

TrakDesign ACOPOStrak-DesignTool

The thermal stress

The mechanical “stability”



Interaction Interface

mappView HMI for better understanding

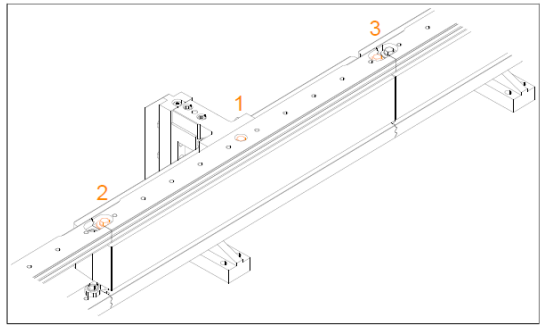
此处视频请见Teams与Y盘保存的PPT

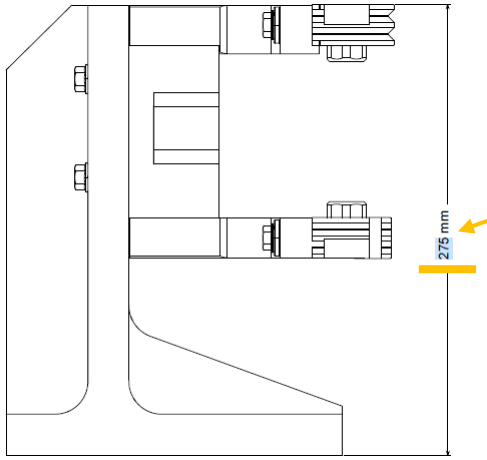
Installation

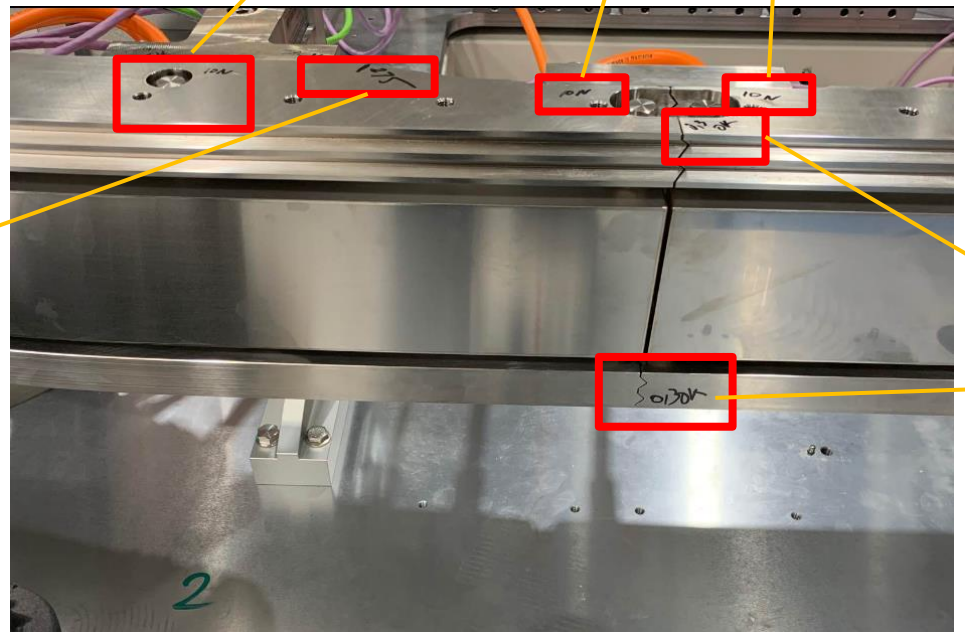
轨道安装
Guide System Installation

轨道安装
Guide System Installation

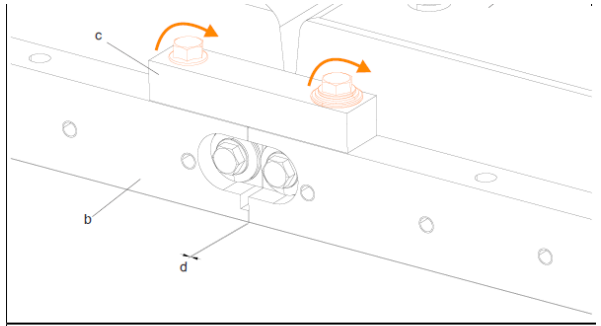
Tighten the screws of the segment starting from the middle screw in the order shown (1, 2, 3) (tightening torque 10 Nm).



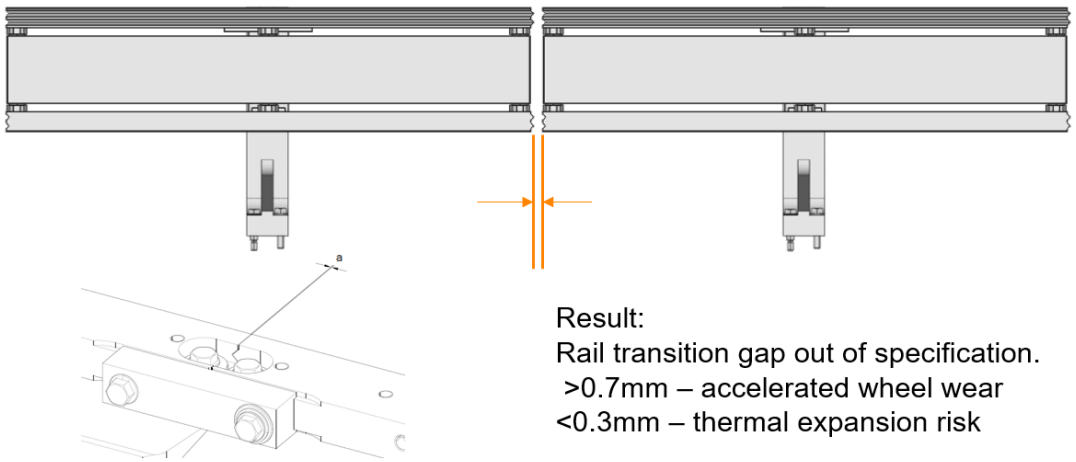




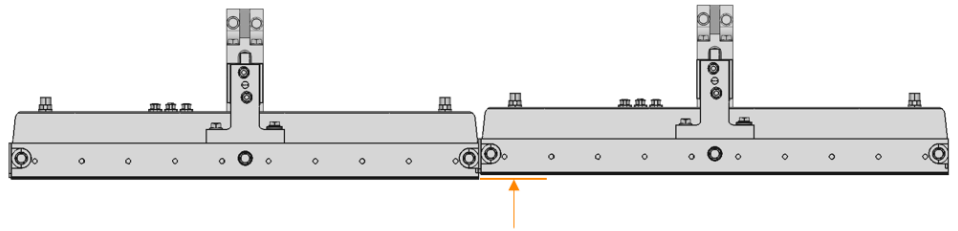
Check the gap (d) (0.5 ±0.2 mm) between the flat guide rails using a feeler gauge.
If the gap is outside the tolerance, loosen the hex head



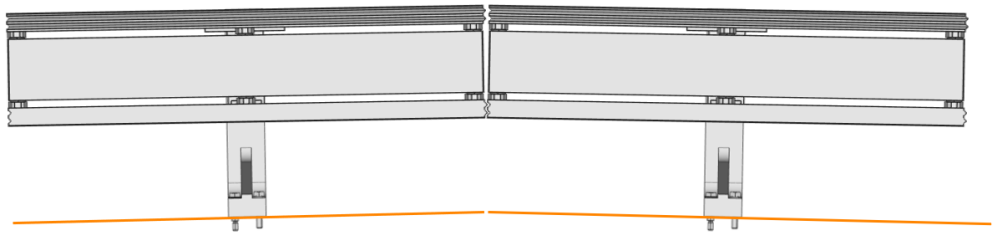
安装注意事件



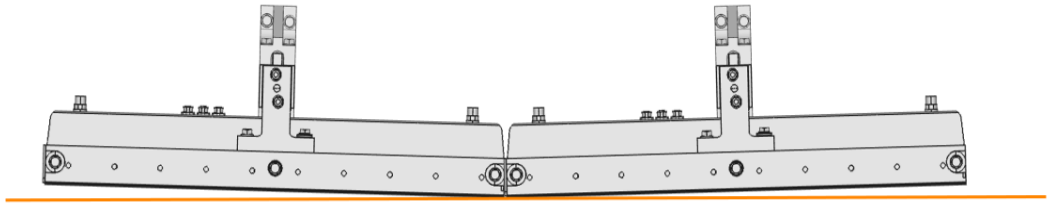
Result:
Rail transition gap out of specification.
>0.7mm – accelerated wheel wear
<0.3mm – thermal expansion risk



Result:
Rail transition offset measurement > 0.05mm
-Accelerated wheel wear
**Can use adjustable mounting arrangement of bolts if error can be spread across neighboring segments

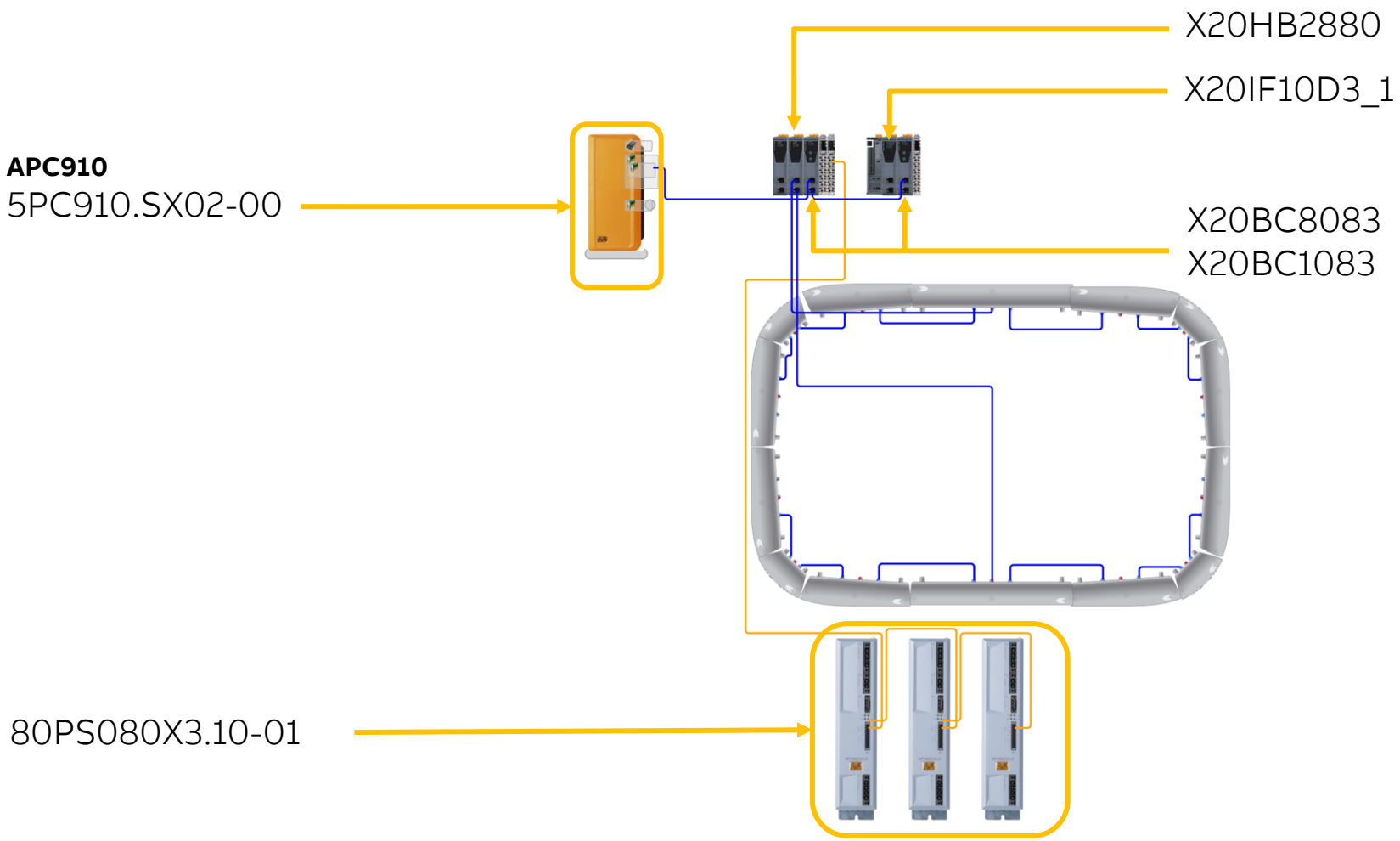


Result:
Rail transition gap out of specification at top or bottom
-Accelerated wheel wear



Result:
Rail transition offset measurement > 0.05mm (3mm from gap)
-Accelerated wheel wear (moderate condition)

Hardware Configuration
硬件配置



Power Supply
电源

8B0C0320Hx00.B00-1

8B0C0320HW00.B00-1	ACOPOSmulti auxiliary supply module , 35 A, AS, wall mounting, 42...58 VOut
	Cold-plate or feed-through mounting
8B0C0320HC00.B00-1	ACOPOSmulti auxiliary supply module, 35 A, AS, cold plate or pass-through mounting, 42...58 VOut

80PS080X3.10-01

80PS080X3.10-01	Power supply module, Input 3x 380-480 VAC ±10%, Power output 24-80 VDC 16.6 A (max. 1000 W), Output 24 VDC 2 A, X2X Link interface, integrated brake chopper, wall mounting. Order terminal blocks separately!

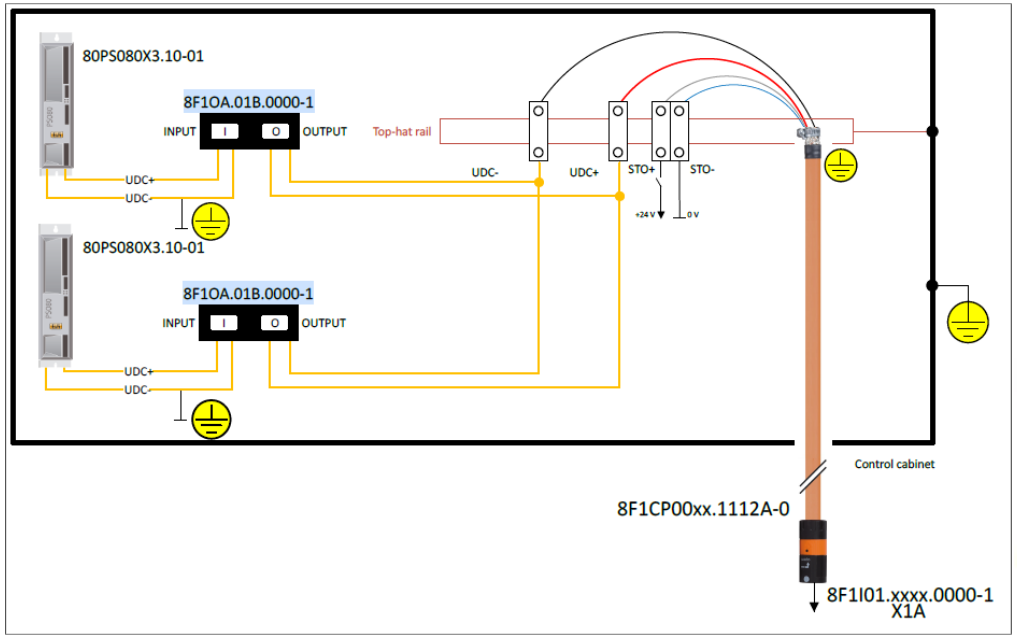
过压保护

8F1OA.01B.0000-1 overvoltage protection

Is **only permitted** to be used in combination with B&R power supply 80PS080X3.10-01 and ACOPOStrak

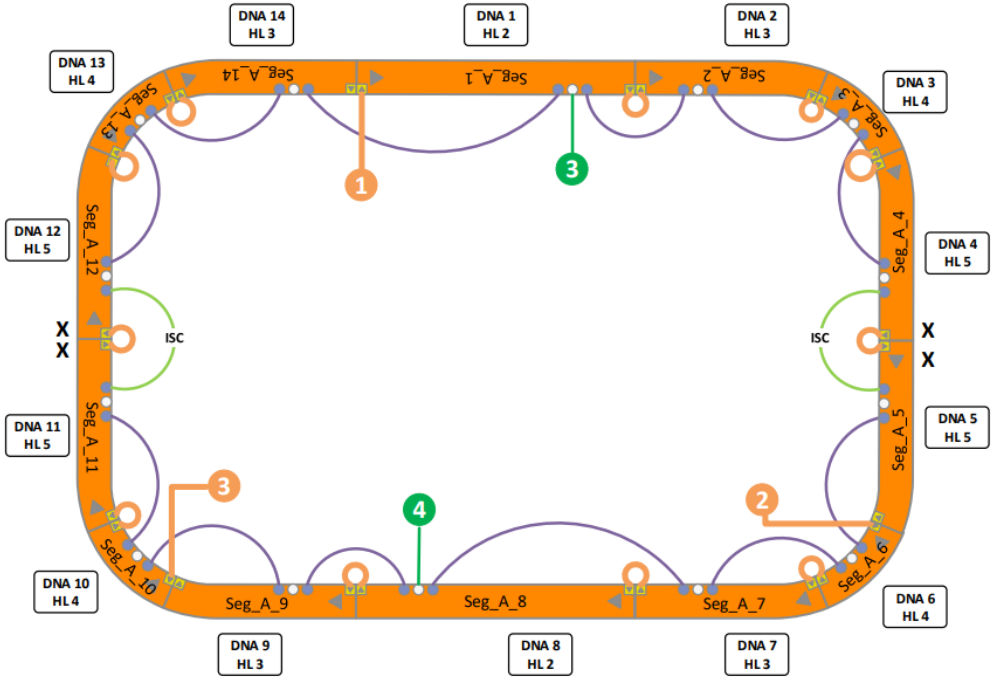
Overvoltage protection, input 24-80 VDC, output 24-59.25 VDC (switched on) or 0 V (switched off)

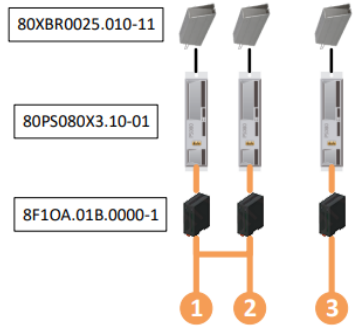
Output	
Output voltage	0 to 59.25 V
Output current	0 to 16.6 A

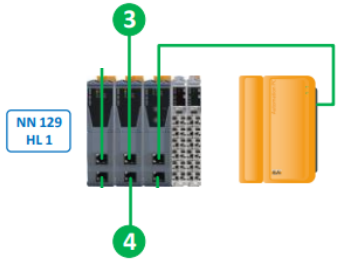


POWERLINK connections

Special but same

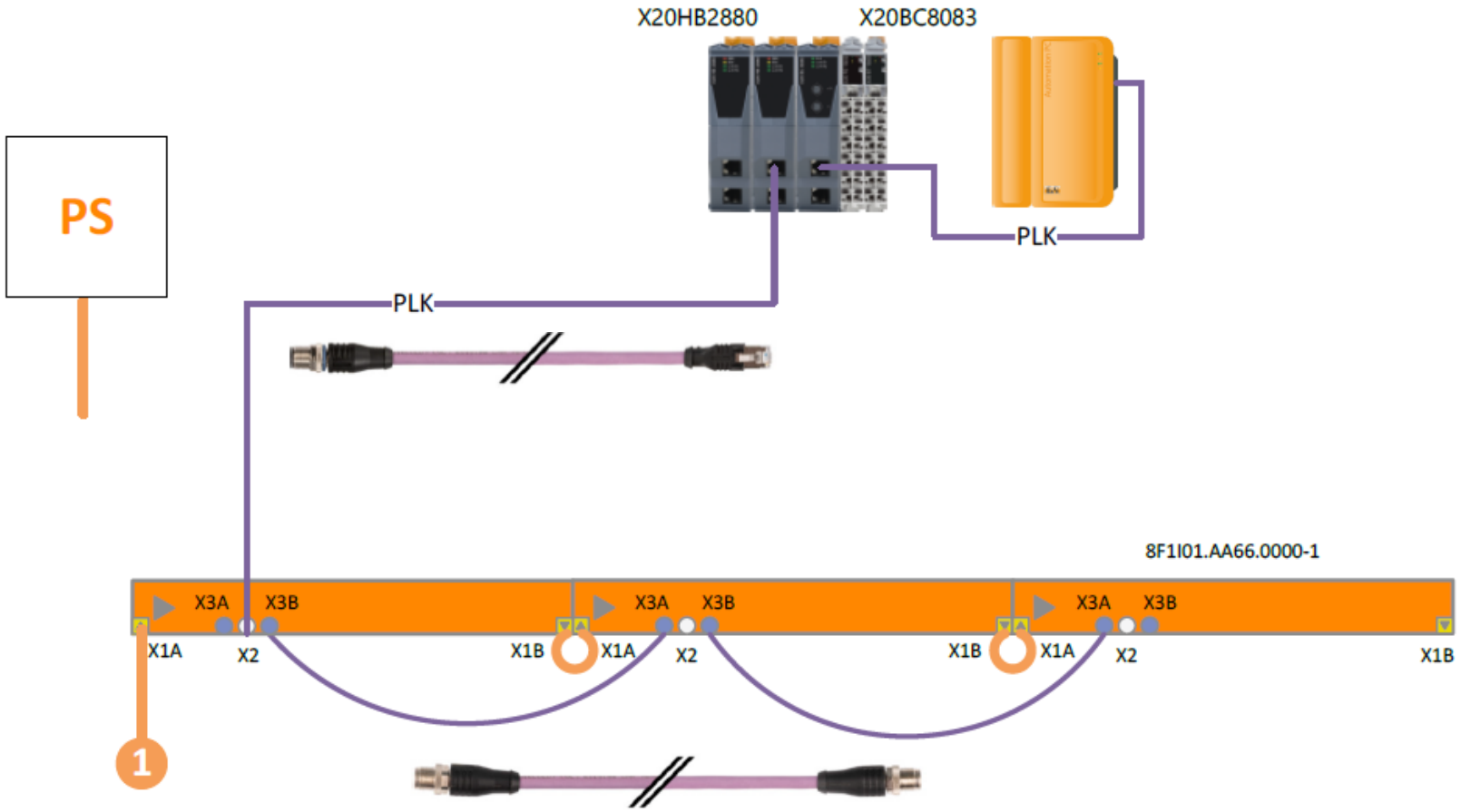






Hub To Segments Connexion

Sample



Software & Programming

Integrated engineering

Automation Studio

- Application development, simulation, diagnostics and maintenance all in one tool.

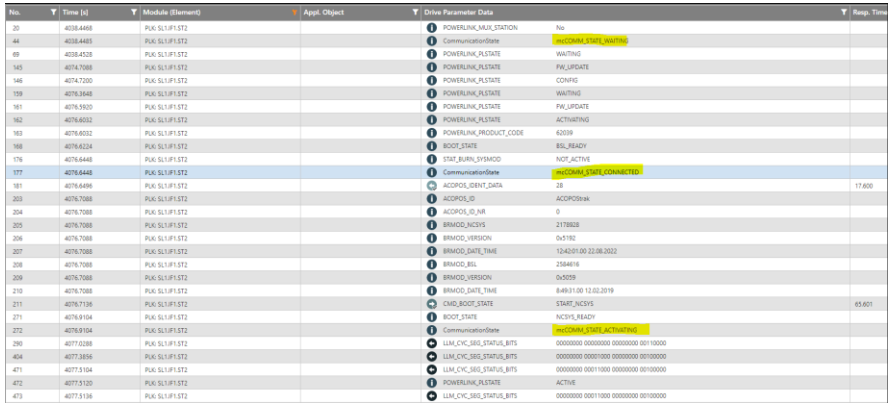
- Assembly , Segments and Shuttles Diagnosis

- Simulation of the Shuttles and the Assembly over Scene Viewer

Runtime Versions

mapp Motion must be there

- Every action/response of the mapp Motion components is stored in the logger and logged there.
- Detailed analysis of communication with the drives (mapp Motion drive log)



5PC900_TS17_00 - Properties

I/O | OPC | Simulation | VC Terminals

General | Runtime Versions | Build | Transfer | Comparison | CiR | Build Events

5PC900_TS17_00

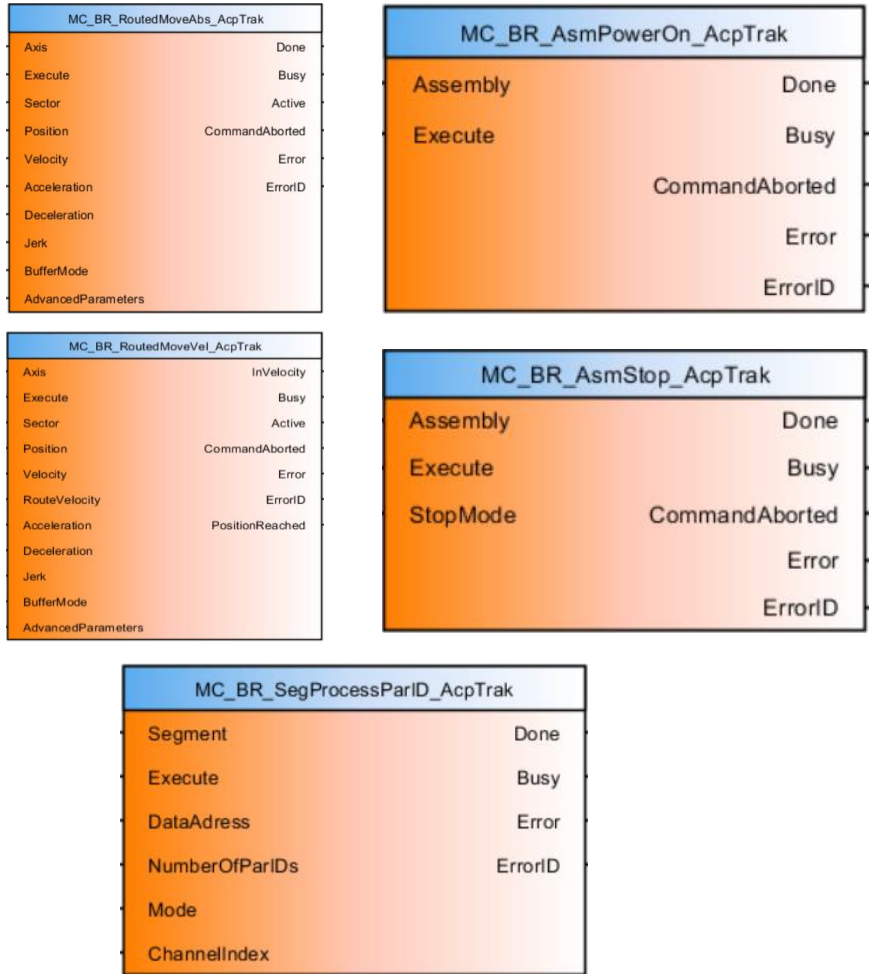
Component	Preferred	In use	Scope
Automation Runtime	B4.92	B4.92	
Visual Components	V4.72.5	V4.72.5	
ACP10 ARNC0 (Motion)	not defined	not defined	
mapp Motion	5.21.1	5.21.1	
mapp Services	5.21.0	5.21.0	
mapp View	5.21.0	5.21.0	
mapp Cockpit	5.21.0	5.21.0	
mapp Vision	not defined	not defined	
mapp Control	not defined	not defined	
mapp Safety	not defined	not defined	
Safety Release	not defined	not defined	

Trak Control 主控
环形流道逻辑 + 工位工站逻辑

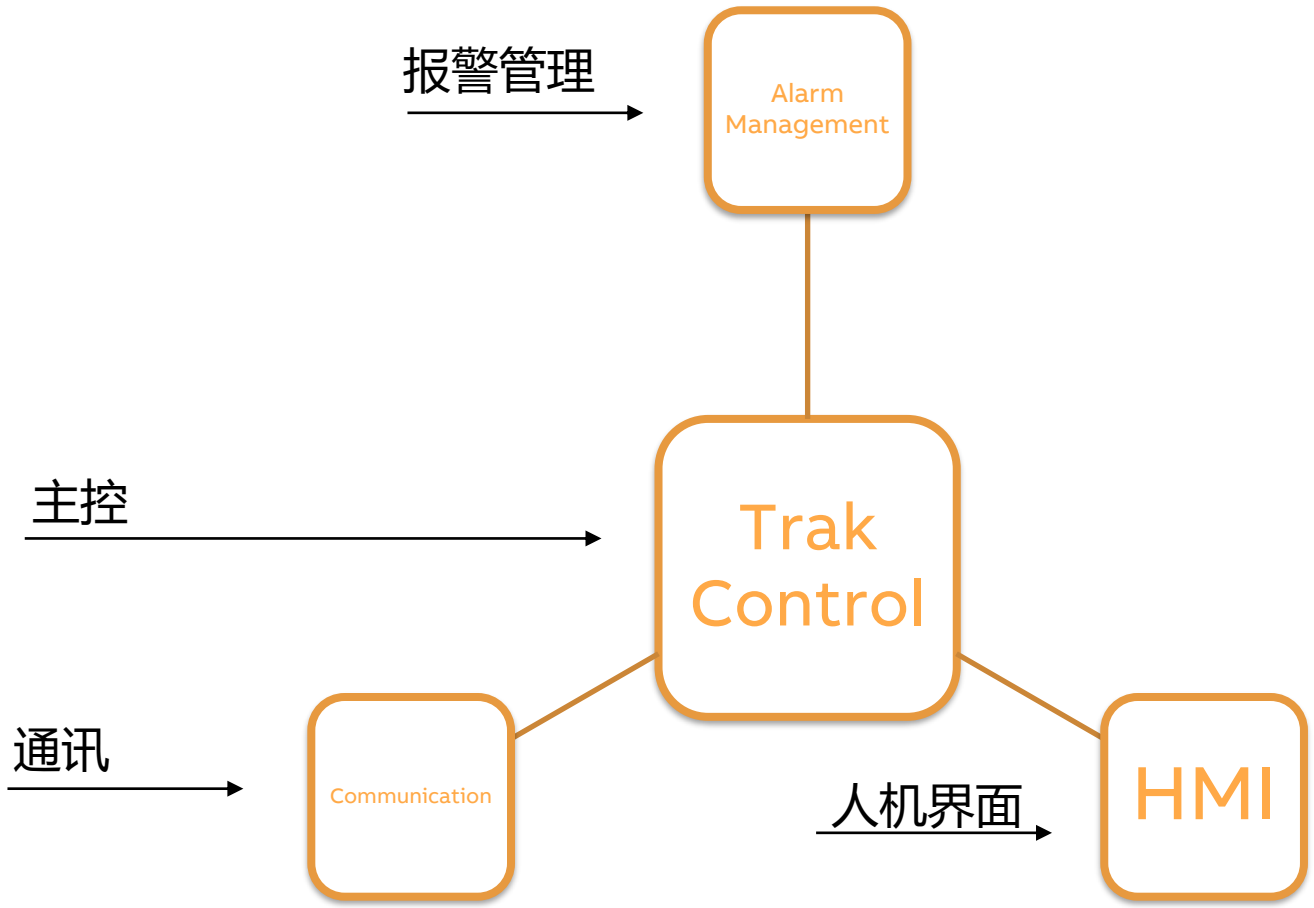
McAcpTrak

This library provides motion function blocks for the ACOPOStrak system.

- Configure **target positions** and motion profiles.
- Collision prevention.
- Diagnostics and alarm handling.



软件架构



Testing Results

Testing Video
To be Continued

此处视频请见Teams与Y盘保存的PPT

ACOPOStrak

High productivity


B&R
A member of the ABB Group