
KUKA

eLearning Upcoming Products 8.3
Hand-out for Modul 2

- Werner Angerer
- Product Management

Upcoming Products

KR C4, KSS 8.3

Technology

Upcoming Products

KR C4, KSS 8.3

Technology

KR C4 – System Software

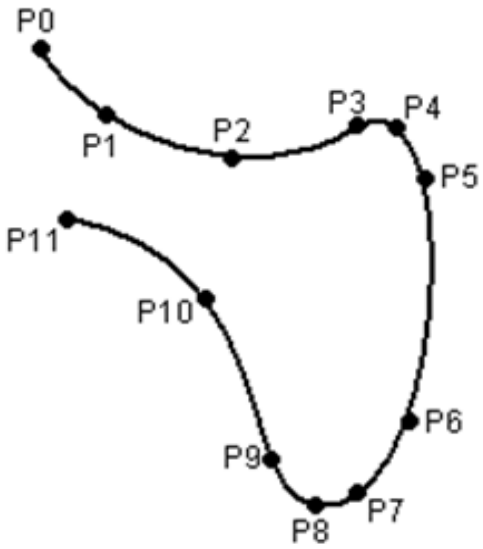
KR C4 – KSS 8.3	New Motion (Step 2)
	General products
	KR C4 Safe Single Brake
	VxWin with Win7
	Fieldbus communication
	Energy suite - Step 1

KSS 8.3 – New Motion - Step 2

- PTP Motion – spline based
- Mixed blending (PTP-CP)
- Reversed motion on path
- Spline based RoboTeam-cooperation

All features available

KSS 8.3



New Motion ready to be used in applications

KR C4 – System Software

KRC4 - General products

KRC4 CK (Customer build Kinematic)

General motion capability

KRC4 Safe Single Brake

- KR C4 CK is the new naming for KMC (KRC2)
- Standard, midsize and extended cabinets are usable for customer build kinematics
  - freely configurable KSP´s and KPP
  - Several motor interfaces (multiple axes and single axis)
  - fitting Single axis and multiple axes cables, motor and RDC boxes
- Configuration with WoV
  - Basic safety (Standard) Safe Single Brake (option)
  - No save range monitoring and save operation!
  - Several standard transformations (Kinematic tool box)

KR C4 – System Software

KRC4 - General products

KRC4 CK (Customer build Kinematic)

General motion capability

KRC4 Safe Single Brake → KSS 8.3 / WoV 3.0

- Master Slave capability
  - multiple master/slave axes are possible
  - Up to 15 slaves each master (HW restriction)
  - position, torque and tension master/slave
- Configuration with WoV

KR C4 – System Software

KRC4 General products

KRC4 CK (Customer build Kinematic)

General motion capability

KRC4 Safe Single Brake

KSS 8.3 / WoV 3.0

- Software replaces Hardware
- Based on *Safe Operation* technology
- mainly for the failsafe stop of additional axis

KUKA.SBM

KR C4 – System Software

VxWin with Win7

Windows XP embedded discontinued by Microsoft

Extended Support until Jan 2016 (Patches)

KSS 8.3 and higher based on Win7 embedded

-> future proof basis for KUKA

-> no influence for customer & applications

KSS 8.3 (31.12.2012)

KR C4 – System Software

Fieldbus support of new communication standards

KRC4 EtherCat	available ✔
KRC4 Profibus	available ✔
KRC4 Interbus	available ✔
KRC4 Devicenet	available ✔
KRC4 EthernetIP	available ✔
KRC4EthernetIP / CIP/Safety	new
KRC4 ProfiNet 3.0	advanced

- Cip/Safety (SW Stack)
  - Safety over Ethernet
    - E/A
    - Safe operation and safe range monitoring
- ProfiNet 3.0 (SW Stack)
  - supporting PROFIenergy

Component support for KUKA *EtherCAT* extension bus

EtherCat_Whitelist_V0.pdf

Do not distribute

- Supported I/O modules:
  EL/EP/ES 1xxx, EL/EP/ES 2xxx, EL/EP/ES 3xxx, EL/EP/ES 4xxx, EL/EP/ES 5xxx; EL/EP/ES 9xxx
- MDF profile 5001 support for modular devices is being discussed as part of KUKA roadmap planning, target implementation for Jan 2013.
  According to the product planning process, more specific statements as to the manner and time of implementation cannot be given before Q4/2012.
- EtherCAT based drives (profile 402) will not be supported in the short to mid-term.
- Until further notice, EtherCat gateways and interface modules will only be supported in the form of *Profibus* and *DeviceNet* gateways currently offered as products by KUKA, additional gateways / interface modules are not planned.
- Safety communication, based on FSoE will not be supported either until further notice on KUKA extension bus
- Analog *EtherCAT* modules >16 bit are not supported until further notice.

KR C4 – System Software

Energy suite - Step 1

PROFIenergy support (PN 3.0)

Energy optimized motion

SmartPad plug-in

→ For supporting the energy management system of the production area

- PLC inquiry for the current consumption and last one hour ✔
- KUKA energy modes (drive off / stand by / sleep) via PLC

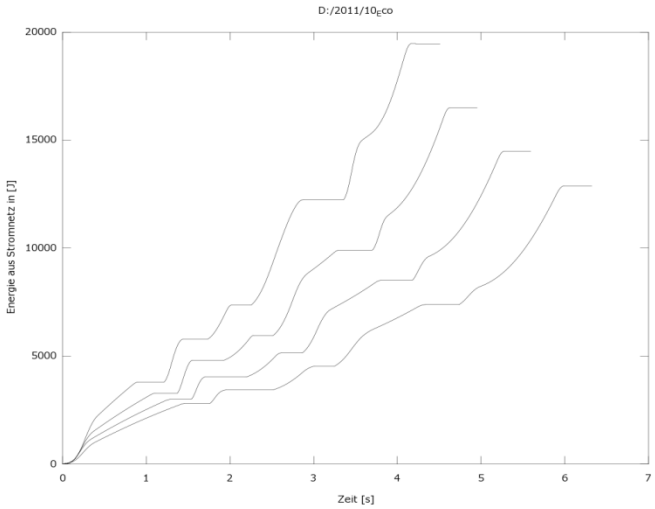
Energy suite - Step 1

PROFIenergy support

Energy optimized motion

SmartPad plug-in

- KUKA ECO motion modes (plug in)
- 3 levels: low/medium/high
- effects all Robot & additional axis 1-12
- Savings depending on robot type, paths and ECO_Mode



Energy suite - Step 1

PROFIenergy support (PN 3.0)

Energy optimized motion

SmartPad plug-in

- SmartPad plug-in for energy consumption
  - start/stop by SmartPad keys
  - value between start/stop in the KRL program
  - Last three energy consumption values are displayed

Screenshot!!!

KUKA WorkVisual

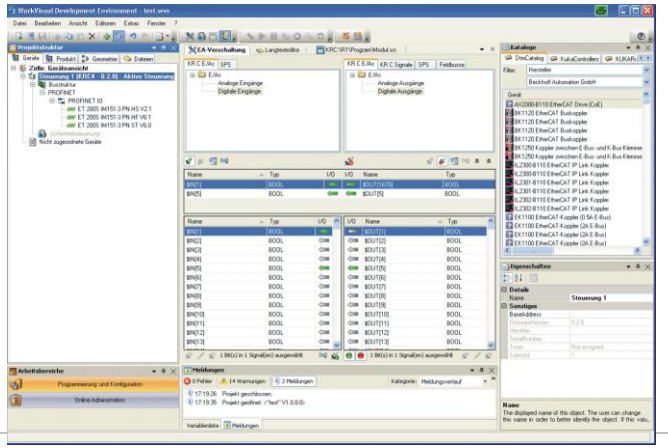
KRC4 – Advanced engineering and diagnosis – WoV 2.4 / 3.0

Visual Catalog

Option Package Editor

Advanced Diagnosis

Automation becomes easy



KR C4 – Motion Control Software

KRC4 – motion control software

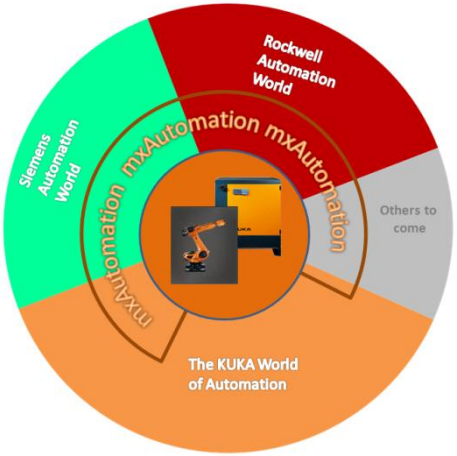
- mX Automation
- KR C4 – extended Motion
- KRC4 – KUKA CNC

KR C4 Motion Control Software

KRC4 - mX Automation

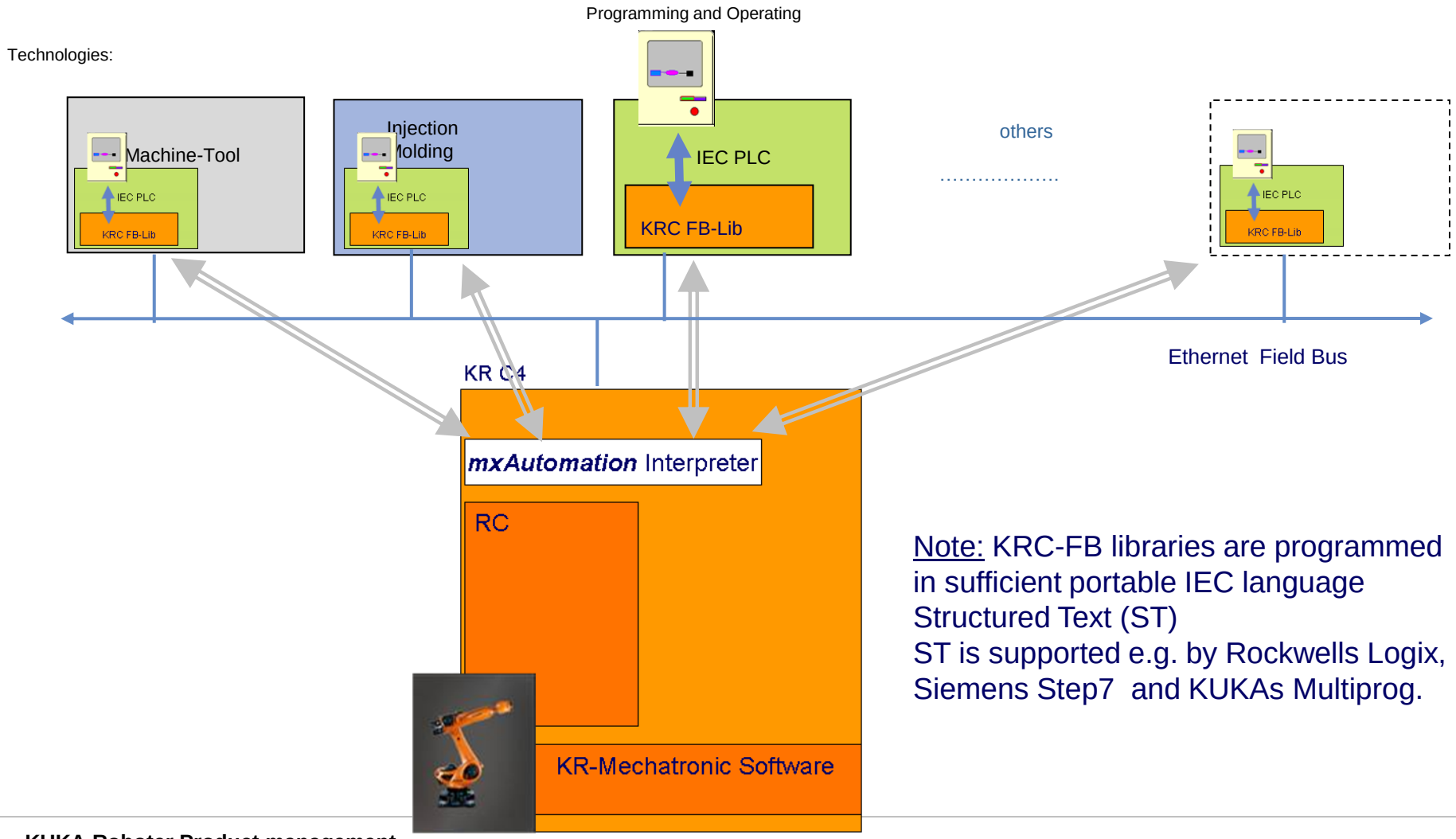
mxAutomation Siemens (Sinumerik, Simatic)	KSS8.2 ✔
mxAutomation ProConOS	KSS8.2 ✔
mxAutomation Rockwell PLCs	KSS8.2 ✔
mXAutomation CoDeSys	(31.05.2013)

- Enables external PLCs (also internal ProConOS), to command KUKA robots through PLC function blocks
- Single Point and Method of programming, operation, diagnosis and maintenance for machine and robot
- unified Graphical UI, ICON based languages, messaging



mxAutomation - the Solution

Complete robot programming and operation through remote PLC function blocks (FBs)



Note: KRC-FB libraries are programmed in sufficient portable IEC language Structured Text (ST)
ST is supported e.g. by Rockwells Logix, Siemens Step7 and KUKAs Multiprog.

KR C4 Motion Control Software

KR C4 – extended Motion

KR C4 – extended Motion MultiProg MCFB 4.0

KR C4 – extended Motion MultiProg MCFB 4.0 XT

Part 4 - Coordinated Motion

- KUKA.PLC - Multiprog MCFB 4.0
  - Standard MCFB´s (like KRC2)

KR C4 Motion Control Software

KR C4 – extended Motion

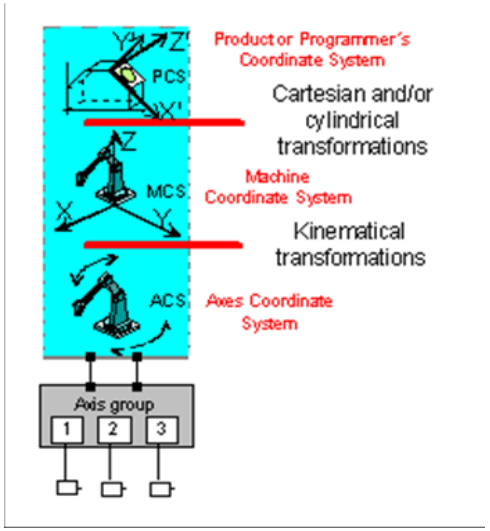
KR C4 – extended Motion MultiProg MCFB 4.0

KR C4 – extended Motion MultiProg MCFB 4.0 XT

Part 4 - Coordinated Motion

PLCopen motion control

- KUKA.PLC - Multiprog MCFB 4.0XT
  - Additional MCFB´s according to PLC open Part 4 (coordinated motions)
  - Programing of axis groups
  - G-Code Files are running (without CNC-HMI)



KR C4 Motion Control Software

KR C4 – extended Motion MultiProg MCFB 4.0 XT

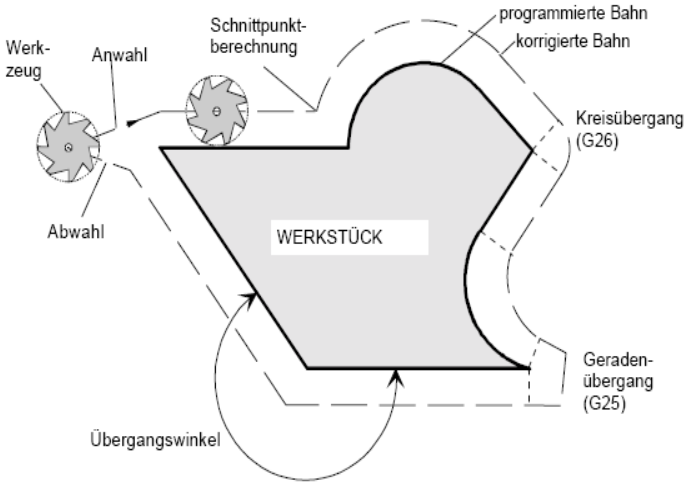
KUKA.PLC Multiprog MCFB 4.0

- Preparing of the axes parameters by graphic based editor
- Start-up via WorkVisual
- Programing via KUKA.PLC
- current-position in KR C4 HMI Plugin
- Jog-motion via Smart Pad motion keys
- Diagnostics and Traces directly on the controller

KR C4 Motion Control Software

KRC4 – KUKA CNC

- Brand labelled by ISG in Stuttgart, Germany
- SmartHMI Plug-in for programming and operating
- Robot acts as a Machine Tool
- Largest workspace
- Unique – standard process chain
- Higher accuracy combined with higher process speed
- Look ahead of up to 500 points
- Tool compensation
- Two-way access to motion kernels



Upcoming Products

KR C4, KSS 8.3

Technology

Arc Welding

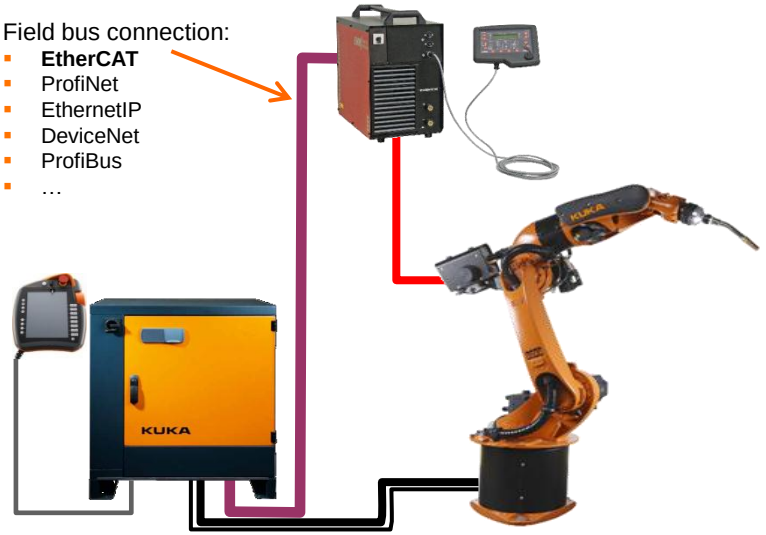
KUKA.ArcTech Technology Packages

ArcTech Basic 1.1

ArcTech Advanced 1.0

TouchSense 2.1

Field bus connection:
- **EtherCAT**
- ProfiNet
- EthernetIP
- DeviceNet
- ProfiBus
- …



Fronius
LORCH
EWM group
MERLE
migatronic
ESAB
Miller
KEMPPI The Joy of Welding

and others ...

Arc Welding

KUKA.ArcTech Technology Packages

ArcTech Basic 1.1

ArcTech Advanced 1.0

TouchSense 2.1

- **ArcTech Basic** is a technology package software for arc welding and provides all the necessary functions for welding simple components.
- **ArcTech Basic** comprises all necessary software functions for communication between the robot controller and the welding power source.
- **ArcTech Basic** provides the programmer with all inline forms (KUKA programming aids) required for quick and easy programming of the welding application.
- **ArcTech Basic** provides for starting up the robot and connected welding machine an easy to use configuration plugin or a 1-click-configuration in WorkVisual
- **ArcTech Basic** offers a welding parameter management

Arc Welding

KUKA.ArcTech Technology Packages

ArcTech Basic 1.1

ArcTech Advanced 1.0

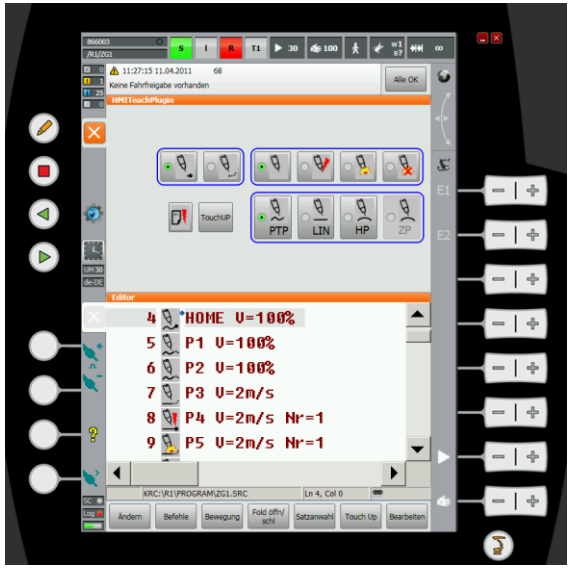
TouchSense 2.1

- **ArcTech Advanced** is the KUKA technology package which adds to ArcTech Basic additional functions for the implementation of more demanding welding tasks.
- **ArcTech Advanced** can always upgrade ArcTech Basic
- **ArcTech Advanced** supports arc welding with 2 robots in a RoboTeam

- ArcTech Advanced 1.1 will offer by end of 2013 the missing thick plate welding functions

Features and customer benefits

- Easy configuration via WorkVisual and Catalogs – faster start up
- New welding-parameter-management – supporting WPS philosophy
- Easier understandable InLineForms – reduced to a minimum
- The most advanced -Move backwards as an error strategy
- Optimizing CP-movements at slow speed – more accuracy
- Upgradable software – reduction of restrictions



The first ArcTech software
to compete with our competitors

ArcTech functionalities

- Overview of the functions by keyword (KRC4 – KSS8.3)

Functions (application)	ArcTech Basic 1.1	ArcTech Advanced 1.0	ArcTech Basic 1.2	ArcTech Advanced 1.1
Power source control with program number	✓	✓	✓	✓
Power source control with reference value specification	✓	✓	✓	✓
Welding with RoboTeam (2 arc-robots)		✓		✓
Welding with RoboTeam (4 arc-robots)				✓
Welding with ArcSense				✓
Backward motion as fault service function (with Spline only)	✓	✓	✓	✓
Functions for thin sheet welding	✓	✓	✓	✓
Functions for thick plate welding				✓
RapidTeach plug-in (faster teaching – no clicking through menus)			✓	✓
Production display			✓	✓
Flexible ArcTech (general new requirements due to new welding equipment)	✓	✓	✓	✓
Configuration with WorkVisual	✓	✓	✓	✓
Compatible with TouchSense	✓	✓	✓	✓

ArcTech functionalities

- Overview by function (KRC4 – KSS8.3)

Welding functions in detail	ArcTech Basic 1.1	ArcTech Advanced 1.0	ArcTech Basic 1.2	ArcTech Advanced 1.1
Spline support	✓	✓	✓	✓
Mechanical weaving	✓	✓	✓	✓
Thermal weaving				✓
User-specific mechanical weave patterns				✓
Weld parameters, ramp functions				✓
Programmable burnback			✓	✓
Check for wire stuck to part at end of seam	✓	✓	✓	✓
Wire burnfree after wire stuck to part	✓	✓	✓	✓
Global fault service function	✓	✓	✓	✓
Individual fault service functions per seam				✓
Backward motion as fault service function (with Spline only)	✓	✓	✓	✓
Online optimization of the weld seam			✓	✓
Interface for ArcSense				✓
Interface for multilayer welding				✓
Editor for copying, mirroring, shifting programs			✓	✓
Multiple power sources per robot				✓
Special Arc commands (step seam / OnFly)				✓
User interfaces				✓

Arc Welding

KUKA.ArcTech Technology Packages

ArcTech Basic 1.1

ArcTech Advanced 1.0

TouchSense 2.1

- Easy configuration via WorkVisual
- Supporting fast “search-movement”
  reducing cycle time in combination with highest accuracy
- Providing more interface flexibility
  furthermore no restrictions on welding equipment
- synchronous search in RoboTeam applications
  reduction of cycle time
- Intuitive programming through status-keys

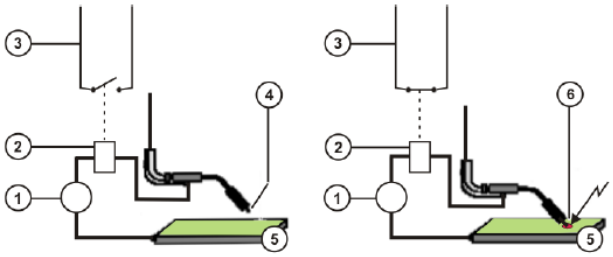


Fig. 2-1: Functional principle

1	Welding power source	4	Welding wire
2	Relay	5	Workpiece
3	“Fast Measurement” cable	6	Current flow on contact

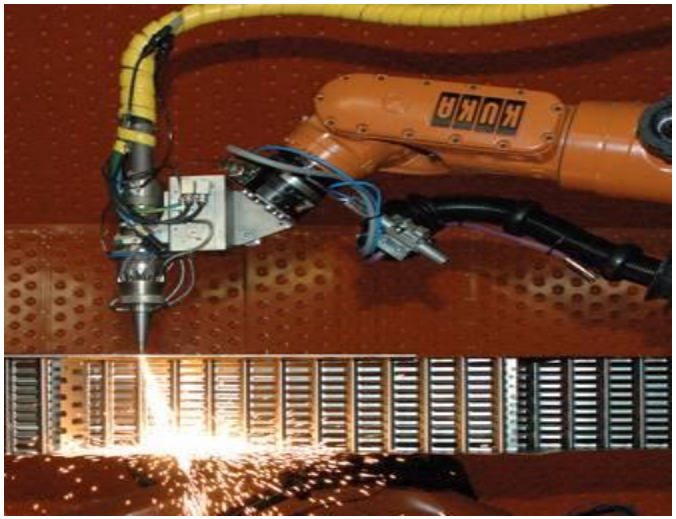
Laser Tech

KUKA Technology Package

LaserTech Cut&Weld

LaserTech (KSS 8.3)

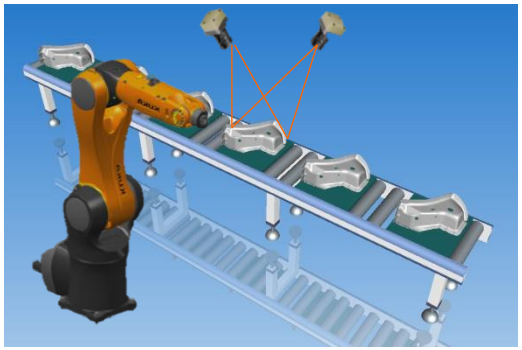
- Providing LaserTech (welding and cutting) solution for KRC4
- RPFO weitere Strategieklärung im Januar!!!



VisionTech

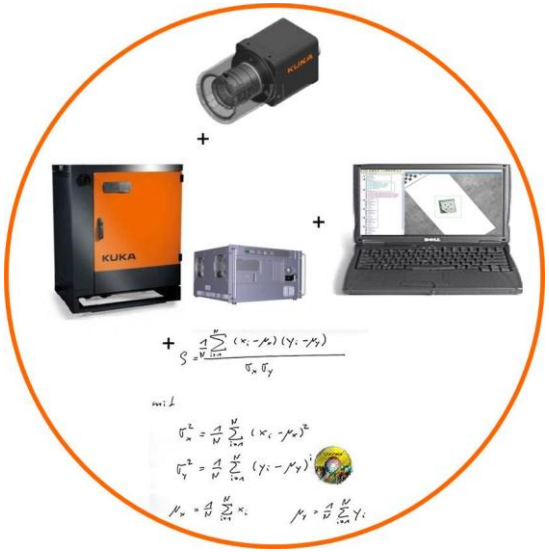
KUKA Technology Package

KUKA.VisionTech available



KUKA.VisionTech “on Board” Technology

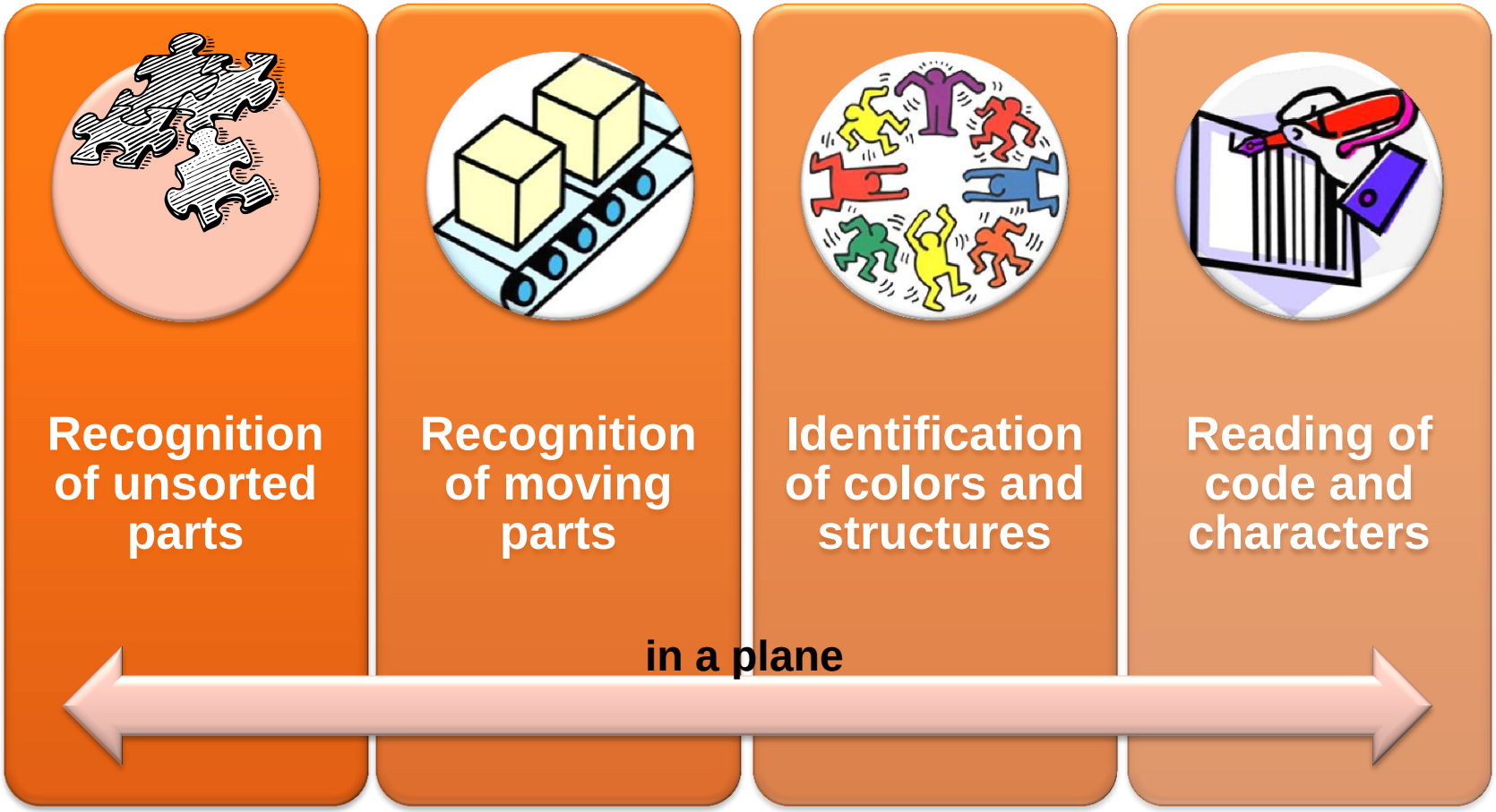
- Easy to Use
- Product for the volume player KUKA
- Key Success Factor for KUKA Small Robots



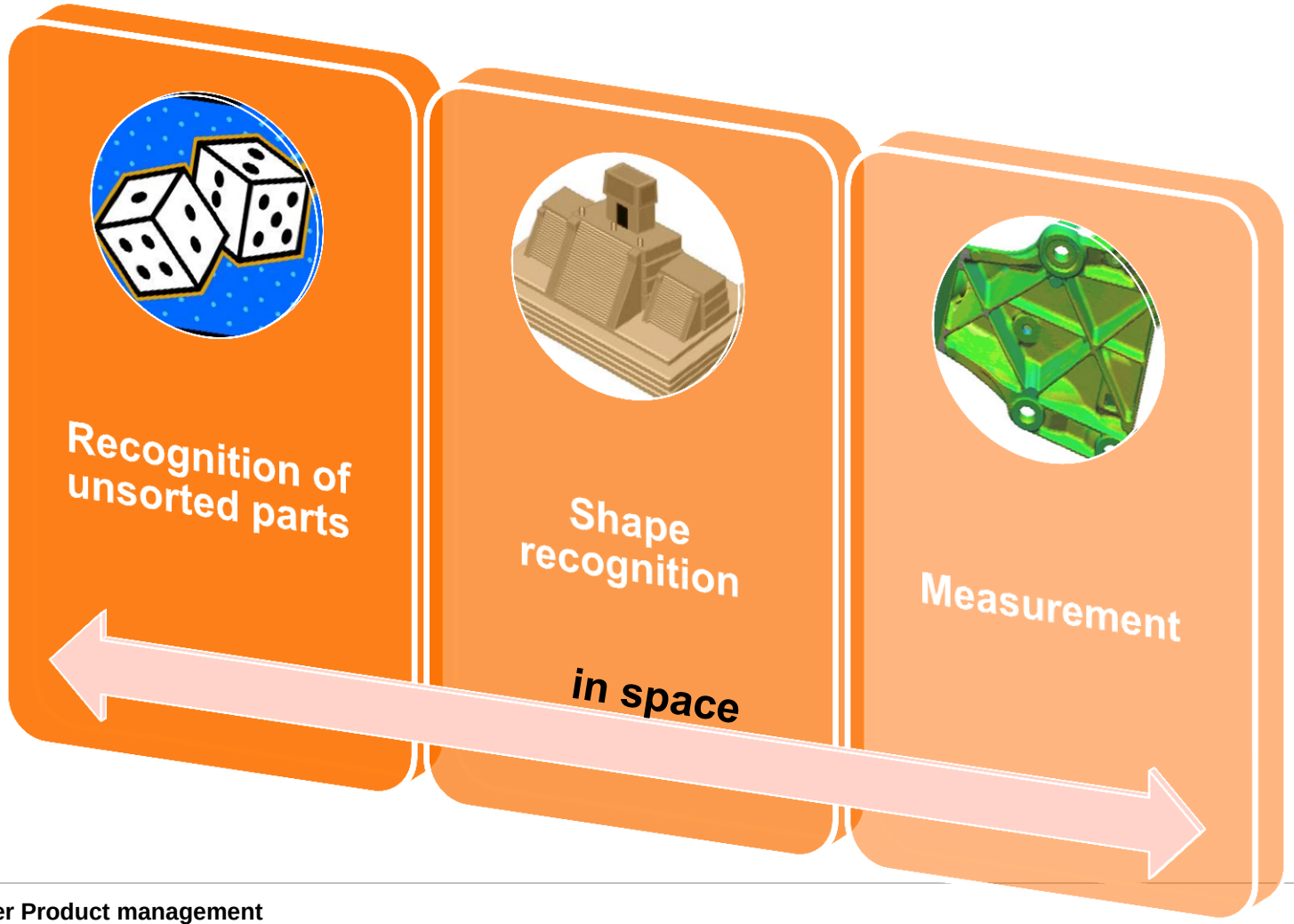
VisionTech System

- Standard camera
- KR C4 controller + WoV
- Image processing algorithms

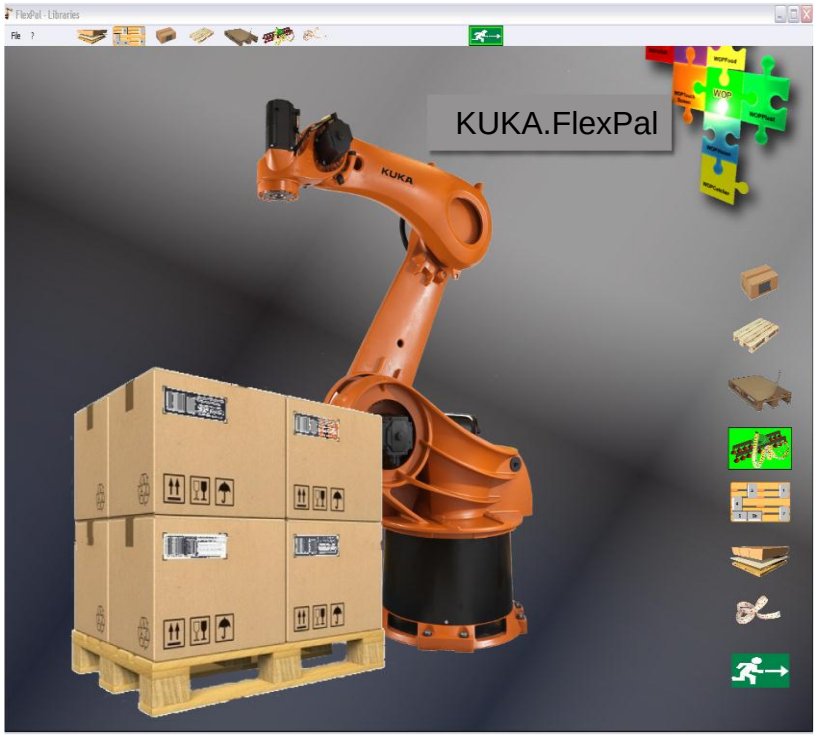
2D applications



3D applications



KUKA.FlexPal Editor

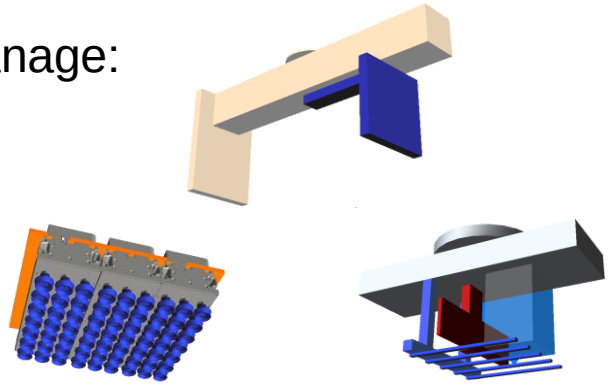


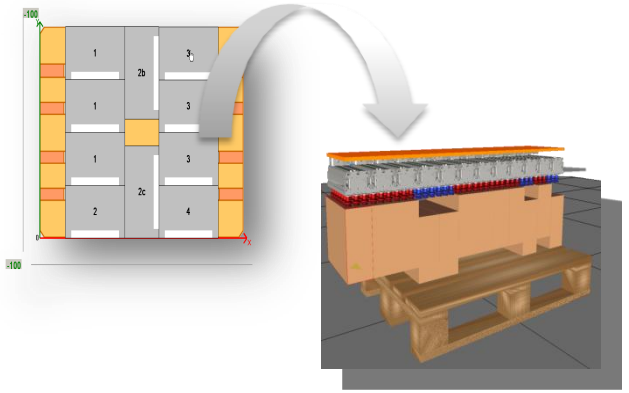
KUKA.FlexPal editor will allow you to design a infinity of pallet stack , with all sizes of packages of the same height on the same layer, all kinds of layers, slipsheet and pallets.

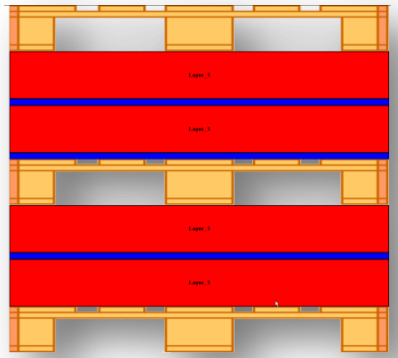
KUKA.FlexPal Editor

The KUKA.FlexPal palletizing software can manage:

- Different gripper types
  - Clamps
  - Forks
  - Vacuum
- multi-drop off
- multi-layers



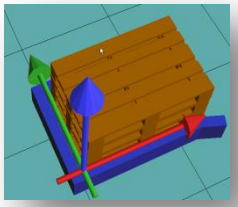




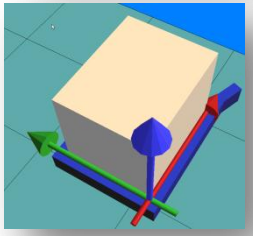
KUKA.FlexPal Runtime

The KUKA.FlexPal Runtime is ready for

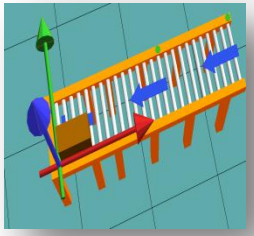
3 Pallet stations



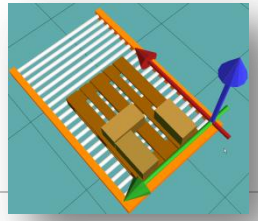
3 Slipsheet stations



3 Pick stations(conveyor)



3 Drop off stations

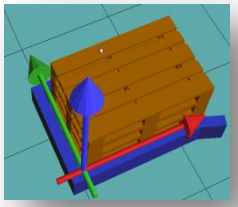


All the stations can be extended

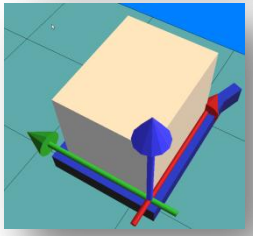
KUKA.FlexPal Runtime

The KUKA.FlexPal Runtime is ready for

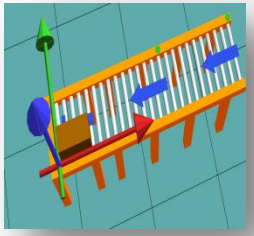
3 Pallet stations



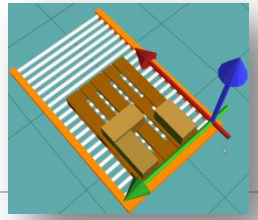
3 Slipsheet stations



3 Pick stations(conveyor)

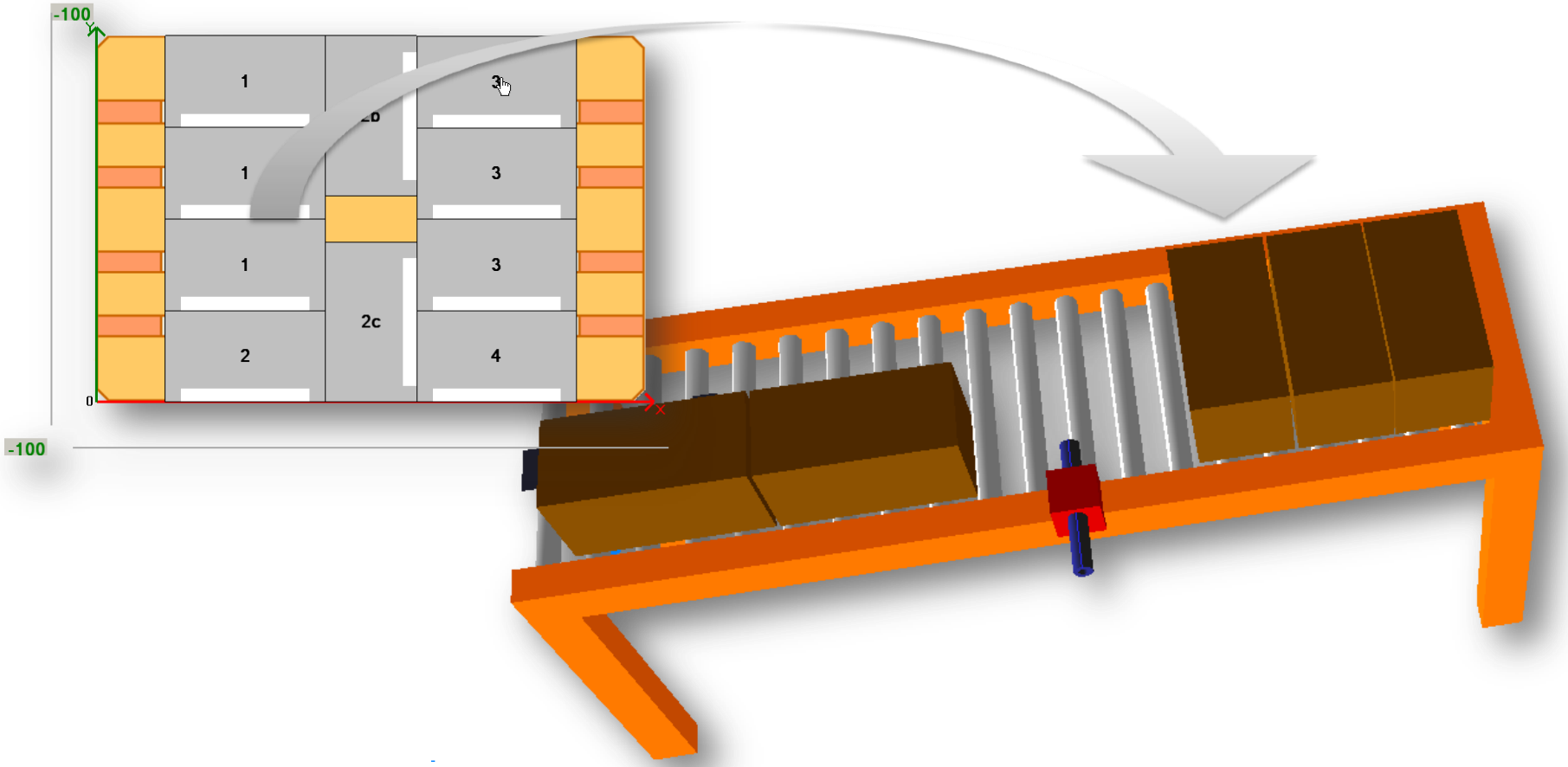


3 Drop off stations



All the stations can be extended

Management box according to the label and the quantity



KUKA.FlexPal Runtime

Pick process

BEGIN_TRAJ

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PICKED_TRAJ

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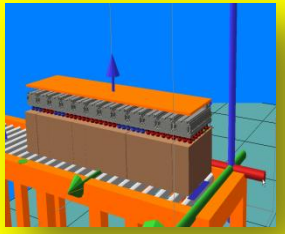

END_TRAJ

Drop off process

BEGIN_TRAJ

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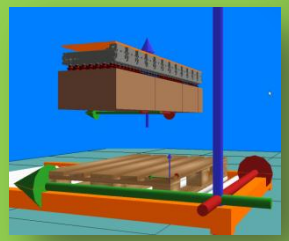

DropOff_TRAJ

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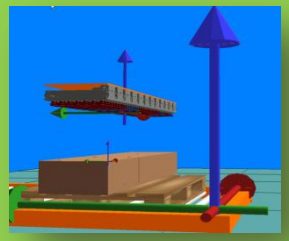
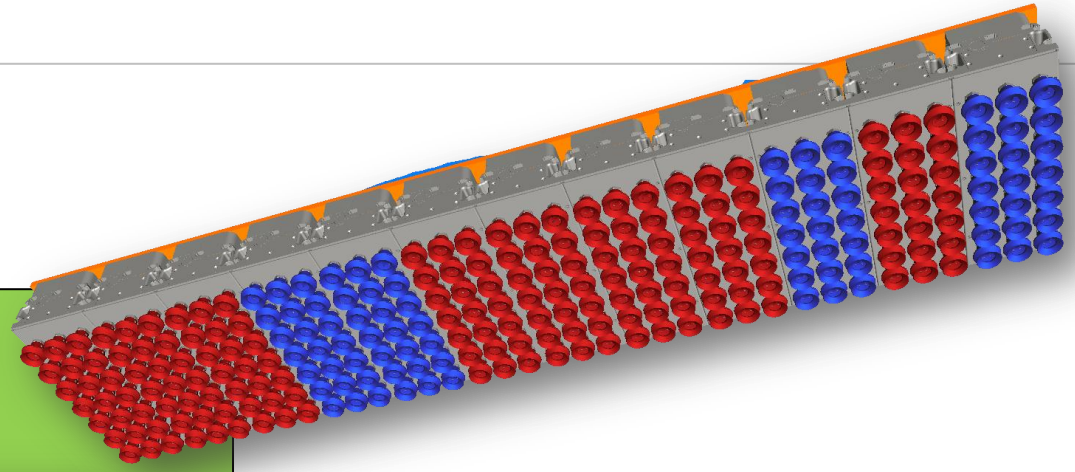


.END_TRAJ



All the of the palletizing process can be personalized. No black box, you have the hand on the totality of programs.

KUKA.Flexpal 1.0 – System Requirements

- **KUKA.Flexpal Editor 1.0 MK DVD** 00-215-422
  available for Windows XP / Windows 7
  (delivered with an USB dongle)

- **KUKA.Flexpal RT 1.0** 00-215-424
  available for KSS 8.2 / KSS 8.3 (in work)
  (license per robot controller required)

- **Requirements (must be ordered separately):**
  KUKA.UserTech 3.1 (KSS 8.2) 00-193-215
  KUKA.UserTech 3.2 (KSS 8.3) 00-215-940

Availability – see product calendar

Thank you for your attention