

VKRC Robot Check: 5 robot projects

How I checked: I read the robot data of all 5 projects (\$config.dat, \$machine.dat and the .cal files). I searched all Folgen, UPs and Makros: 115 Folge/UP program pairs and about 340 Makro files. I compared every tool and base number used in the .dat files with the configuration, and every E1/E2 point value with the software limits. Nothing was changed.

Comparison of the robots

Robot	Model / payload	KSS / VW user	TPVW	Tools used	Bases used	7th axis	Errors	Warnings
K2MXAB104410R01	KR210 R2700 / 210 kg	8.2.20 / KS 22.0	8.1.8	1	1	E1 servo gun -20..120	0	1
K5TRWE118830R02	KR210 R3100 / 210 kg	8.2.17 / KS_21.1	8.1.8	5-8, 15- 18	3-7, 15-17	E1 track -9500..450	2	5
K8LQZN127740R03	KR210 R3100 / 210 kg	8.3.21 / KS26.01	8.3.15 + 8.3.17	1	1	E1 track -10000..185, E2 -20..298	0	5
kapfeh++142250r04	KR270 R2700 / 270 kg	8.3.18 / KS24.24	8.3.10	1, 3, 7, 10, 11, 12	1, 2, 11, 12, 13	none	6	8
K6DOVU109960R05	KR240 R2900 / 240 kg	8.2.20 / KS_17.4.2	8.1.8	1, 3, 8, 9, 32	1 (#TCP, glue gun)	none	2	3

The 5 robots come from different cells (different robot names and subnets), so different VW user versions are expected here. The IP addresses are all different.

Findings per robot

kapfeh++142250r04: most problems

- **ERROR: UPs are called but their files are missing.**
 - UP511 is called twice and UP516 once in Folge12.
 - UP5 is called in Up911 and Up912; UP6 in Up913 and Up914.
 - UP112 is called in Folge124.
- **ERROR: Makros are called but their files are missing:** SPSMAKRO24 (8 calls), SPSMAKRO699 and SPSMAKRO809.
- **ERROR: Base 2 is used in 93 points, but it has no data and no type.**
- **ERROR: Base 13 is used in 15 points. Its type is #TCP, but it has no data.**
- **ERROR: Tools 1, 3, 7 and 12 are used, but they have no load data.**
- **ERROR: Tools 3, 7, 10, 11 and 12 are used, but they have no tool calibration in the .cal file.** Only tool 1 has one.
- **WARNING: Hand-entered loads.** Tool 10 has 60 kg with the centre of mass and inertia all 0. Tool 11 has 120 kg with inertia 0. There is no KUKA.Load project.
- **WARNING: Default names on used entries:** tools T10 and T12, base B1.
- **WARNING: Tools set but not used:** 2, 4, 15, 31, 32.
- **WARNING: Bases set but not used:** 10, 21, 22, 23. Base 14 has type #TCP but no data.
- **WARNING: Bases 11 and 12 have the same name ("Sick Kaliplatte stat") with different data.** Bases 10 and 11 have the same origin.
- **WARNING: Base 12 is a #TCP base (external TCP setup).** The programmer must confirm this setup.
- **WARNING: The IP address is the same as the gateway (10.84.61.27).**

- **WARNING:** UP333.src has no &COMMENT.
- **INFO:** 25 Makros are never called, for example 2, 5–12, 14, 39, 40, 81, 83, 87, 89, 160, 162, 333, 341, 343, 900, 911, 957, 991. Many UPs (test, Sick, reference) are also never called.

K5TRWE118830R02

- **ERROR:** Tools 5–8 and 15–18 are used, but none of them has a tool calibration (MotorDifference). Only tool 1 has one, and tool 1 is not used.
- **ERROR:** Base 31 has data but type #NONE. It is not used, and its data are the same as base 3.
- **WARNING:** The calibration difference of axis 7 (E1) is 168197.69. This value is not plausible. The E1 mastering must be checked.
- **WARNING:** Bases 1 and 30 have type #BASE but no data.
- **WARNING:** Tools 1 ("G1 FZ0") and 11 ("Gr.2 FZ0") are set but not used, and their TCP is more than 3 m from the flange.
- **INFO:** Tools 15 and 16 have the same TCP but different loads. This looks intended (with and without part).
- **INFO:** Makros 9–14 and UP205 are never called.
- **OK:** All E1 values (–8728.5 to 250.0 mm) are inside –9500..450. All loads are below 61 % of the rated payload. A KUKA.Load project is present.

K6DOVU109960R05

- **ERROR:** Tool 32 ("T32 Docking") is used in 38 points, but it has no load data.
- **ERROR:** Tool 3 is used in 45 points, but it has no tool calibration.
- **WARNING:** Tools 20 ("test") and 30 ("T30") are set but not used.
- **WARNING:** Tool 7 has a calibration and a load entry with mass 0, but no tool data.
- **INFO:** This is an external TCP setup: base 1 is #TCP (the fixed glue gun). Tools 1 and 3 are vehicle frames about 2.7 m from the flange.
- **INFO:** Makros 185, 186, 187, 434 and 435 are never called.

K8LQZN127740R03

- **WARNING:** Tool 1 has 142 kg with the centre of mass and inertia all 0. This was entered by hand; it must be measured with KUKA.Load.
- **WARNING:** The calibration difference of axis 7 is 629010.31. This value is not plausible. The E1 mastering must be checked.
- **WARNING:** Tool 2 has type #BASE but no data.
- **WARNING:** The programs use two TPVW versions, 8.3.15 and 8.3.17.
- **WARNING:** The Folge does not call UP301 ("orig Schweissen"), UP555 ("Schweisstest") or UP999 ("base_mess"). They are probably left over.
- **INFO:** E2 (servo gun) goes up to 295.0 mm, which is 3 mm from the +298 limit.
- **INFO:** Makros 0, 40, 87, 89, 901 and 911 are never called.
- **OK:** E1 is inside –10000..185. All called Makros and UPs exist.

K2MXAB104410R01

- **WARNING:** Makros 2–14 are never called.
- **INFO:** UP106 (current scaling) is not called by a Folge. That is normal, because the SPS starts it.
- **OK:** Tool 1, base 1, load (99.7 kg), calibration, and E1 (0 to 110 mm inside –20..120) are all OK.

All robots

- **OK:** The axis 1–6 limits are fine.
- **OK:** The calibration differences of axes 1–6 are all below 0.02°.
- **OK:** \$MAMES is present.

What the programmers must do

1. **kapfeh++142250r04:** Add or restore UP5, UP6, UP112, UP511 and UP516, and Makros 24, 699 and 809, or remove the calls.
2. **kapfeh++142250r04:** Enter the data and type of base 2 and the data of base 13. Their points can't run correctly until this is done.
3. **kapfeh++142250r04** tools 1, 3, 7, 12 and **K6DOVU109960R05** tool 32: measure the loads with KUKA.Load and enter them. Re-measure the hand-entered loads of K8LQZN127740R03 tool 1 and kapfeh++142250r04 tools 10 and 11.
4. **Tool calibrations:** add the missing ones on K5TRWE118830R02 (tools 5–8, 15–18), kapfeh++142250r04 (tools 3, 7, 10–12) and K6DOVU109960R05 (tool 3).
5. **K5TRWE118830R02 and K8LQZN127740R03:** check the E1 mastering of the linear unit, because the axis 7 calibration difference is not plausible.
6. **K5TRWE118830R02:** delete base 31, or give it a type.
7. **Clean-up:** remove the unused tools, bases and Makros only after the programmer confirms. Remove the IP = gateway setting on kapfeh++142250r04.

Not checked: I didn't find \$EX_AX_NUM or \$ROBROOT in the archives. So the external axes were taken from the axis limits and the point values, and the robot mounting couldn't be checked.