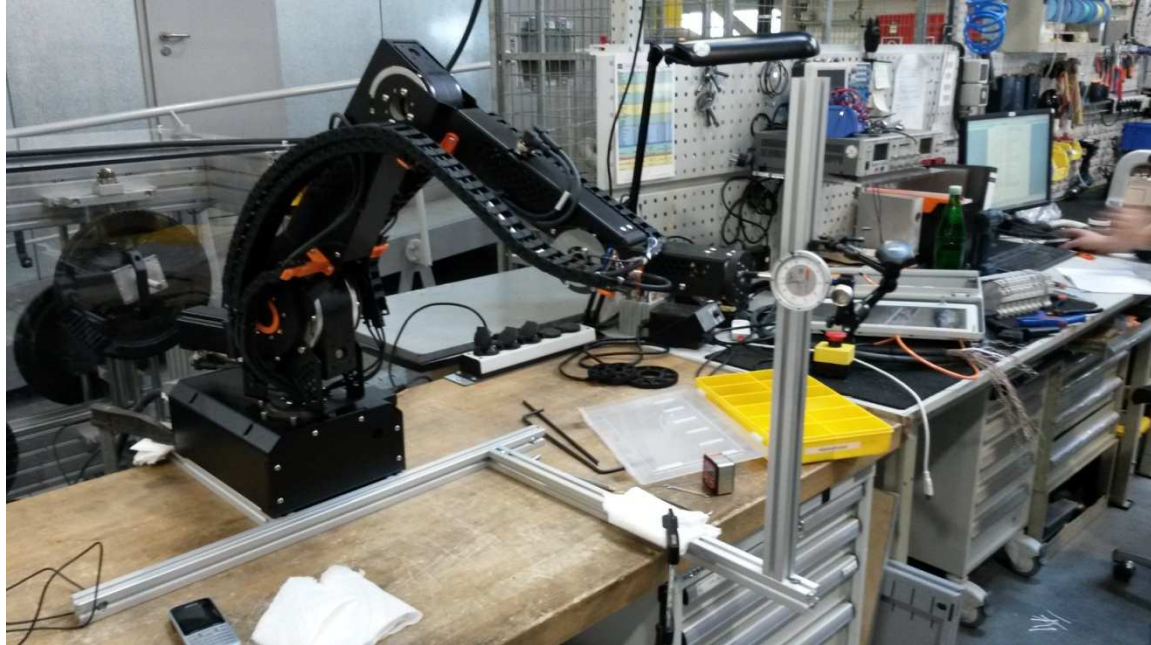


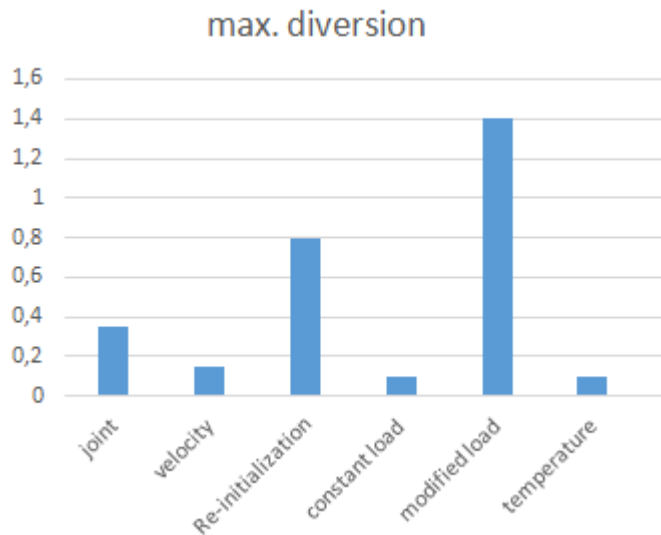
In his project for bachelor thesis at igus, Mr. Markus Behrens investigated the accuracy of a robolink **RL-D-RBT-5532S-BC-AE** joint arm. Both the dependency of individual parameters on the one hand and absolute and repetition accuracy based on ISO 9283 on the other hand were checked. As robot control a module from our cooperation partner Commonplace Robotics (CPR) was used.



Set-up qualitative tests

Qualitative tests revealed highest diversions due to:

- Load-dependent deflection
- Re-initialization (homing)

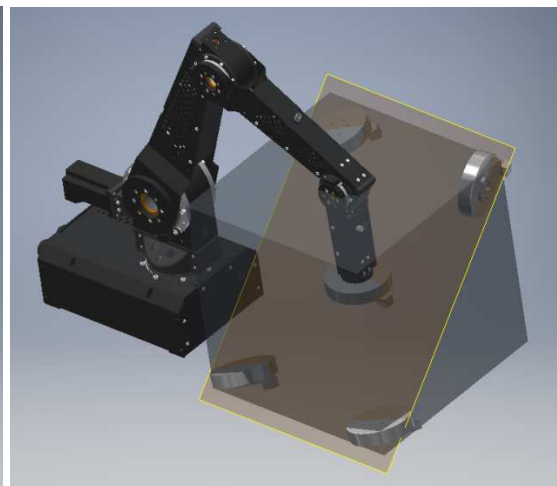
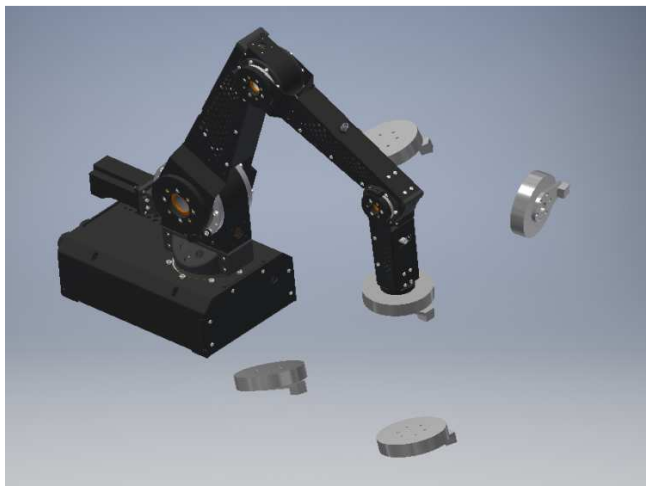


Accuracy of re-initializing could be improved by reducing joint velocity at initialization to a minimum. It's dependent to hall sensor trigger time and data processing time.

Absolute and repetition accuracy were tested with a Mitutoyo Chrysta Apex C 700 measurement portal.



Set-up measurement portal



Measurement positions according to ISO 9283

Repetition accuracy is:

$$RR_1 = \bar{I} + 3S_1 = 0,160\text{mm} + 3 * 0,072\text{mm} = \mathbf{0,376\text{mm}}$$

Absolute accuracy is:

$$AP_p = \sqrt{(\bar{x} - x_c)^2 + (\bar{y} - y_c)^2 + (\bar{z} - z_c)^2} = 5,147\text{mm}$$

$$3 * AP_p = \mathbf{15,441\text{mm}}$$

Measured repetition accuracy is suitable for most of robolink applications. Nevertheless there's still potential for improvement in absolute accuracy. Reasons for diversions are:

- Offsets at axis-zero-positions (improve calibration!),
- diversions in structure dimensions (part tolerances, mounting tolerances),
- deflections (lack of stiffness)

These results will help our customers to estimate our robolink product performance. igus will take these results as a basis for future improvements and development.