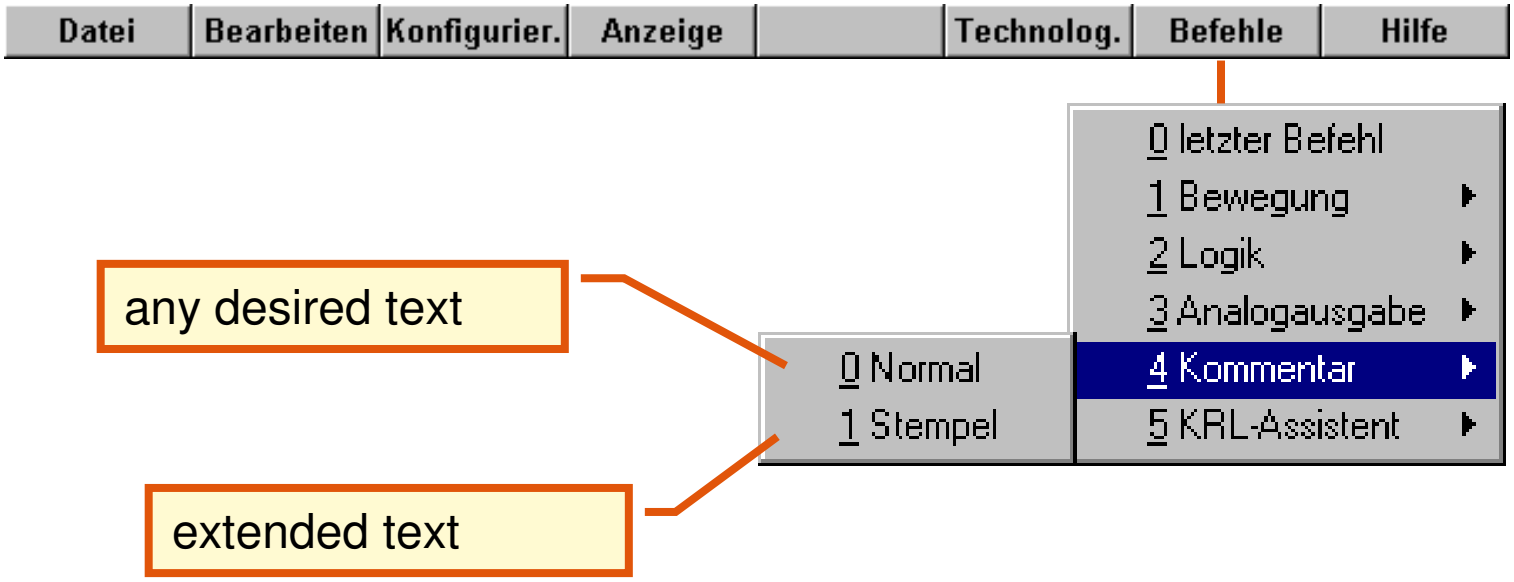
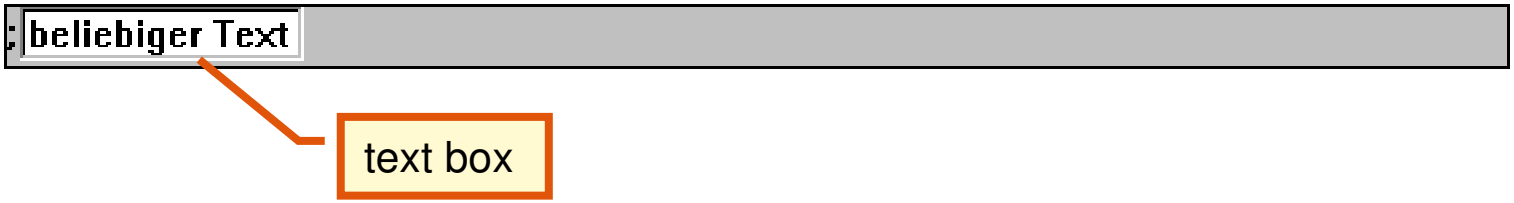
You can choose between two kinds of comments:



After choosing „NORMAL“ you can insert any desired text:



Example:

```
1   INI
2   PTP HOME  Vel= 100 % DEFAULT
3   ; beliebiger Text
4
5   PTP HOME  Vel= 100 % DEFAULT
```

After choosing „STAMP“ you can insert the name and any desired text (time and date is automatically added):

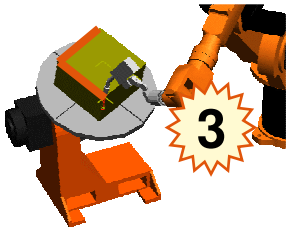
Example:

```
1   INI
2   PTP HOME  Vel= 100 % DEFAULT
3   ; 12.8.98 13:08  NAME: User CHANGES: beliebiger Text
4
5   PTP HOME  Vel= 100 % DEFAULT
```

What happens during the tool measuring ?

The tool get a
Cartesian coordinate system
by the user. The origin
is defined by the user.

Why do we need tool measuring ?

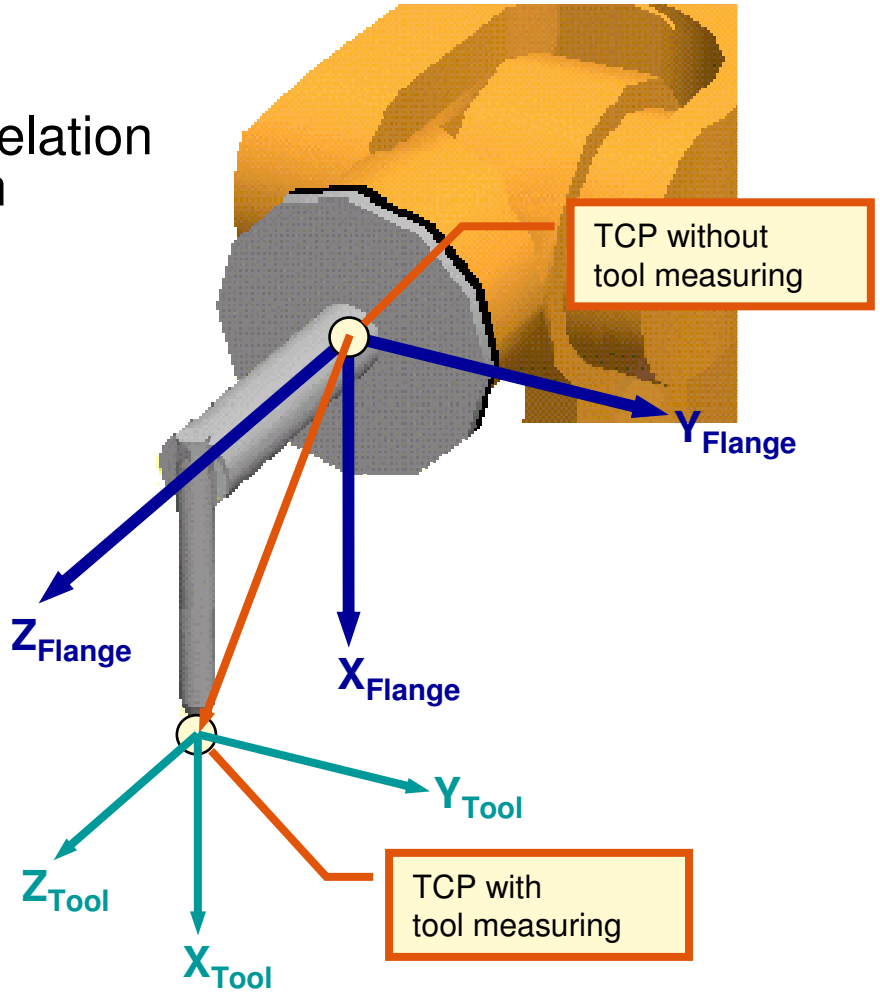


1.Step:

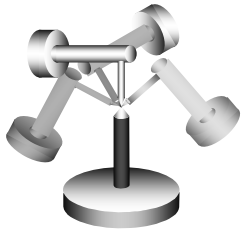
Determination of the TCP in relation to the flange coordinate system

2. Step:

Fixing the **Rotation of the tool coordinate system** in relation to the flange coordinate system

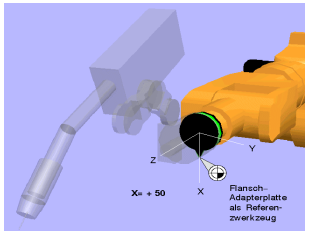


1. TCP measuring



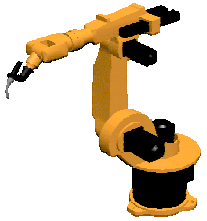
XYZ-4 Point

or



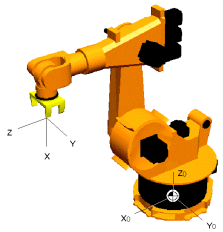
XYZ-Referenz

2. Orientation measuring



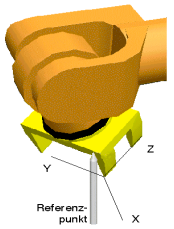
ABC-World 5D

or



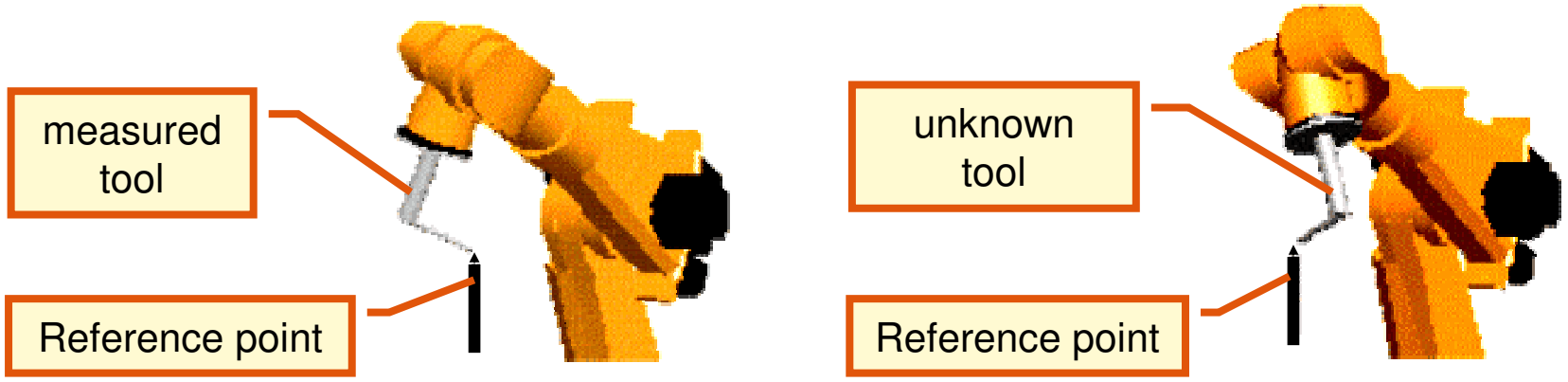
ABC-World 6D

or



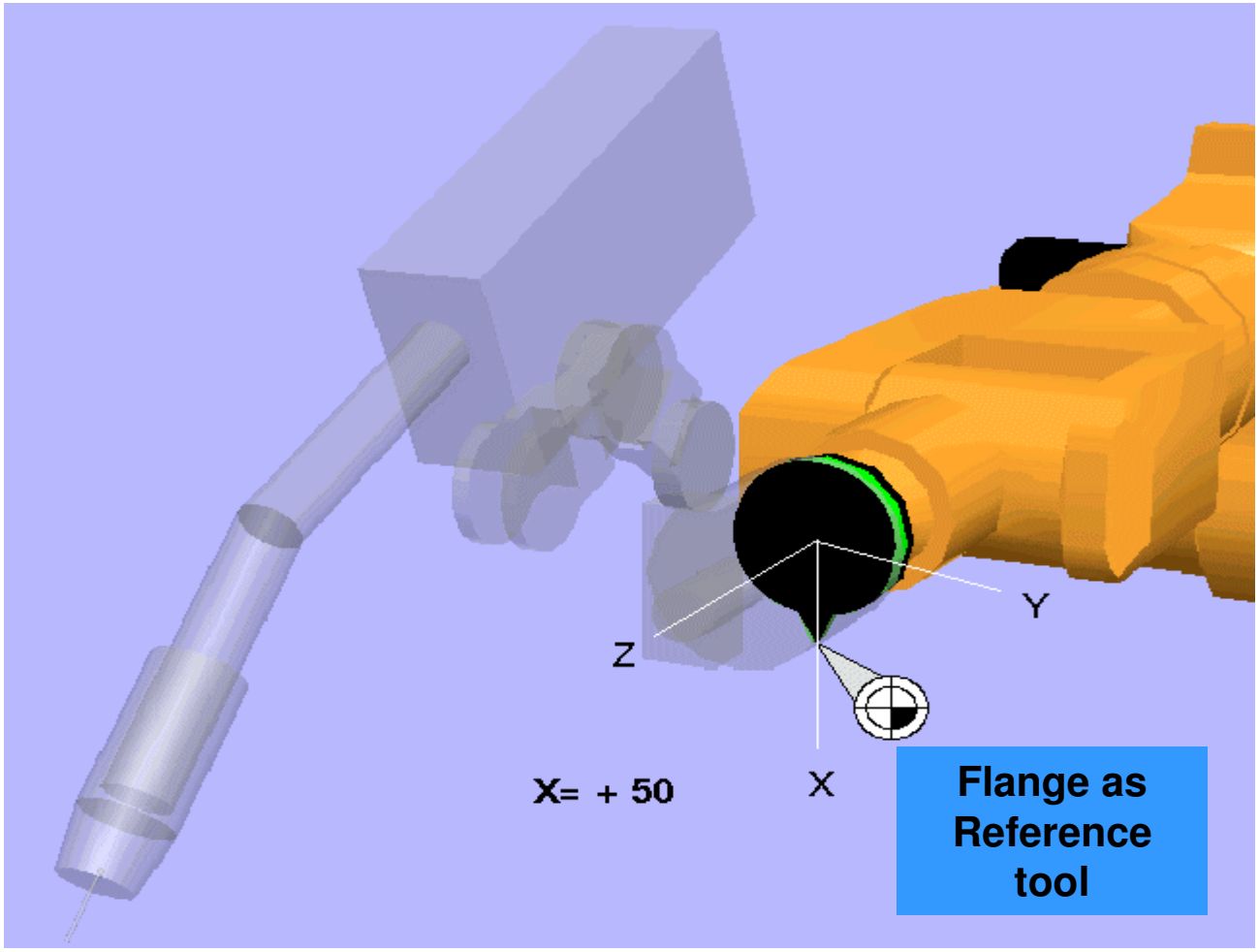
ABC-2 Point

By means XYZ reference method the data of the TOOL CENTER POINT is calculated by comparison with a already known tool.

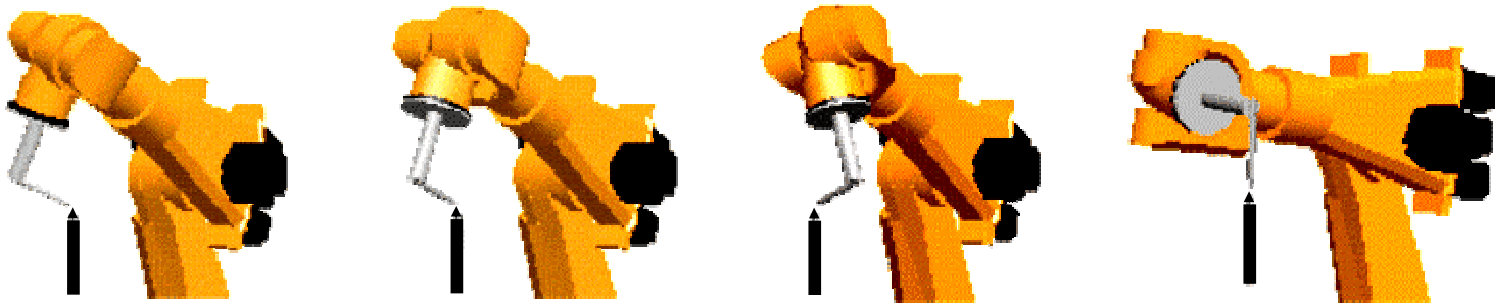


The new TOOL CENTER POINT will be calculated by the diffrent flange and axis positions.

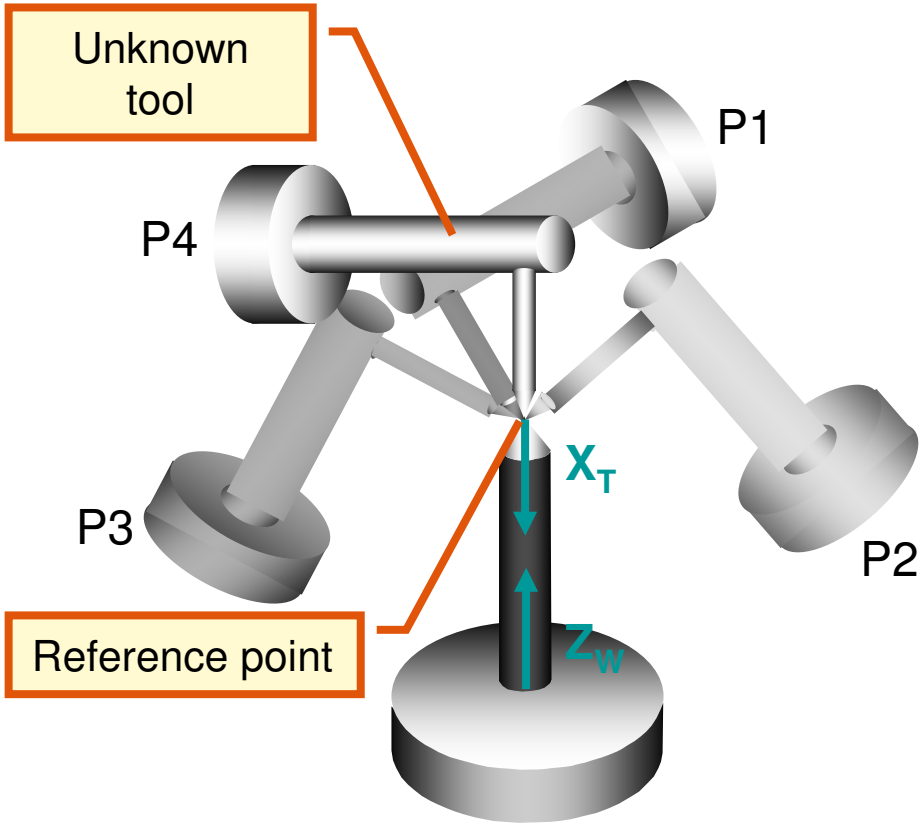
Exempale of XYZ Refernce method



By means of XYZ 4 point method the TOOL CENTER POINT is jogged to a refernce position out of 4 diffrent direction.

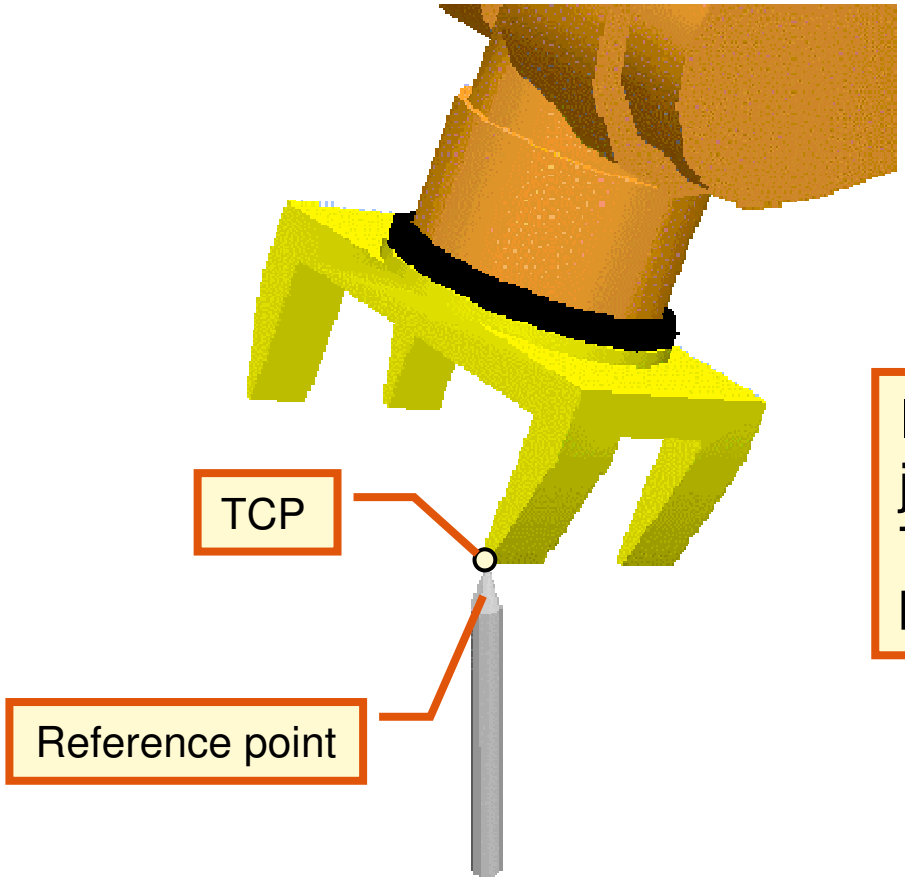


The TOOL CENTER POINT will be calculated by the diffrent position of the flange and the robot axes.

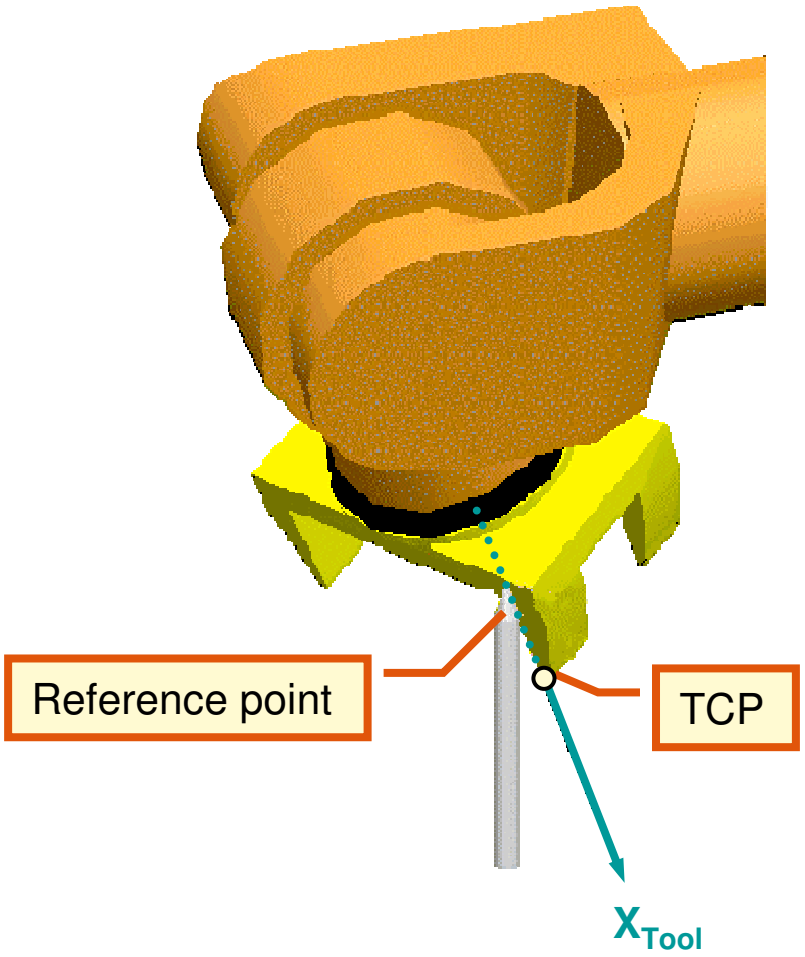


- Jog to reference point out of 4 diffrent directions. (P1 to P4)
- **Advice :** Choose the last orientation (P4) , so that $+X_t$ has the same direction as $-Z_W$
- **Important:** The different Orientations of the tool must differ a minimum amount.

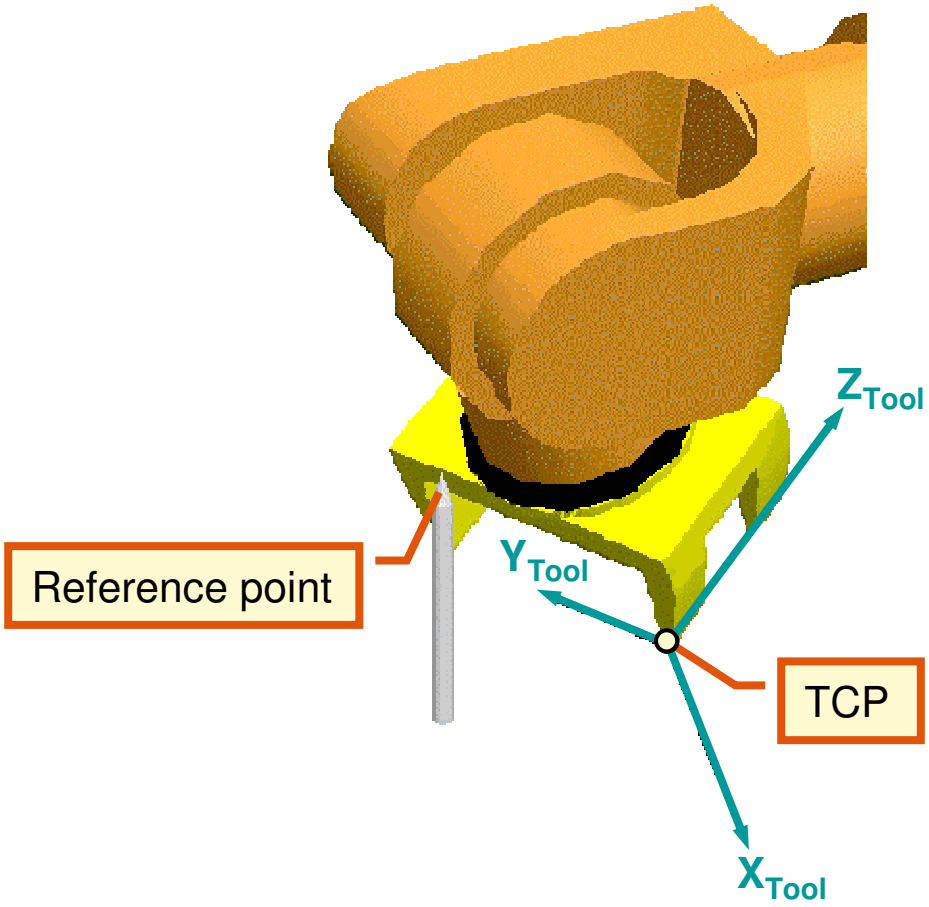
Reduce the HOV (hand override) near to the reference point in order to avoid a collison.



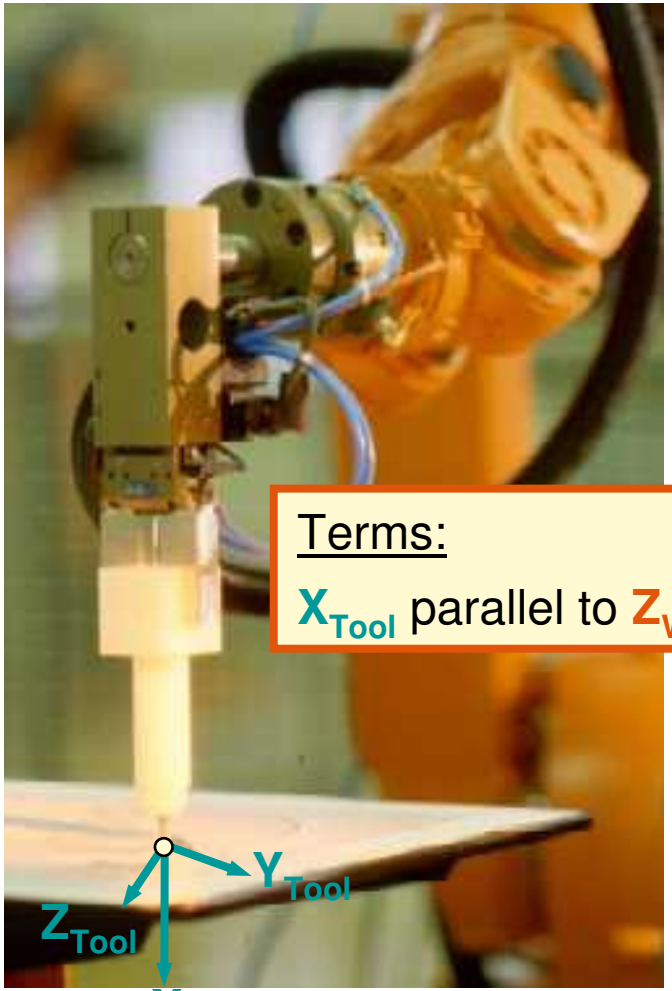
In the first step the TCP is jogged to the reference point . The TCP has to be measured before.

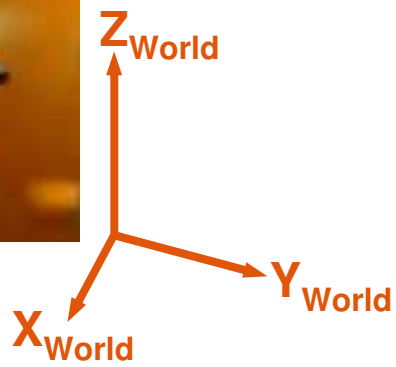


The second point must be teached in the minus of the working direction.

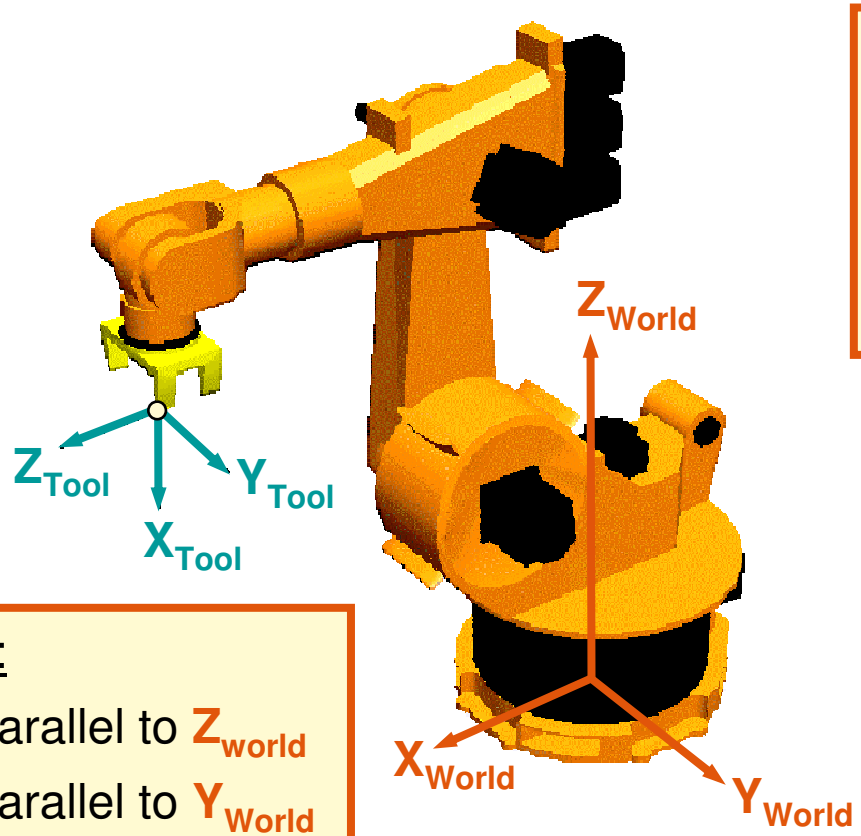


The third point has to be on the positiv side of the Y axis.





Using the method the working tool direction has to be parallel to the Z-Axis of WORLD coordinate system. The orientation of the other axes will be determinded by the controller.



By using this method the tool has to be positioned ecactly in a way that all axes are according to the WORLD coordinate system

Terms:

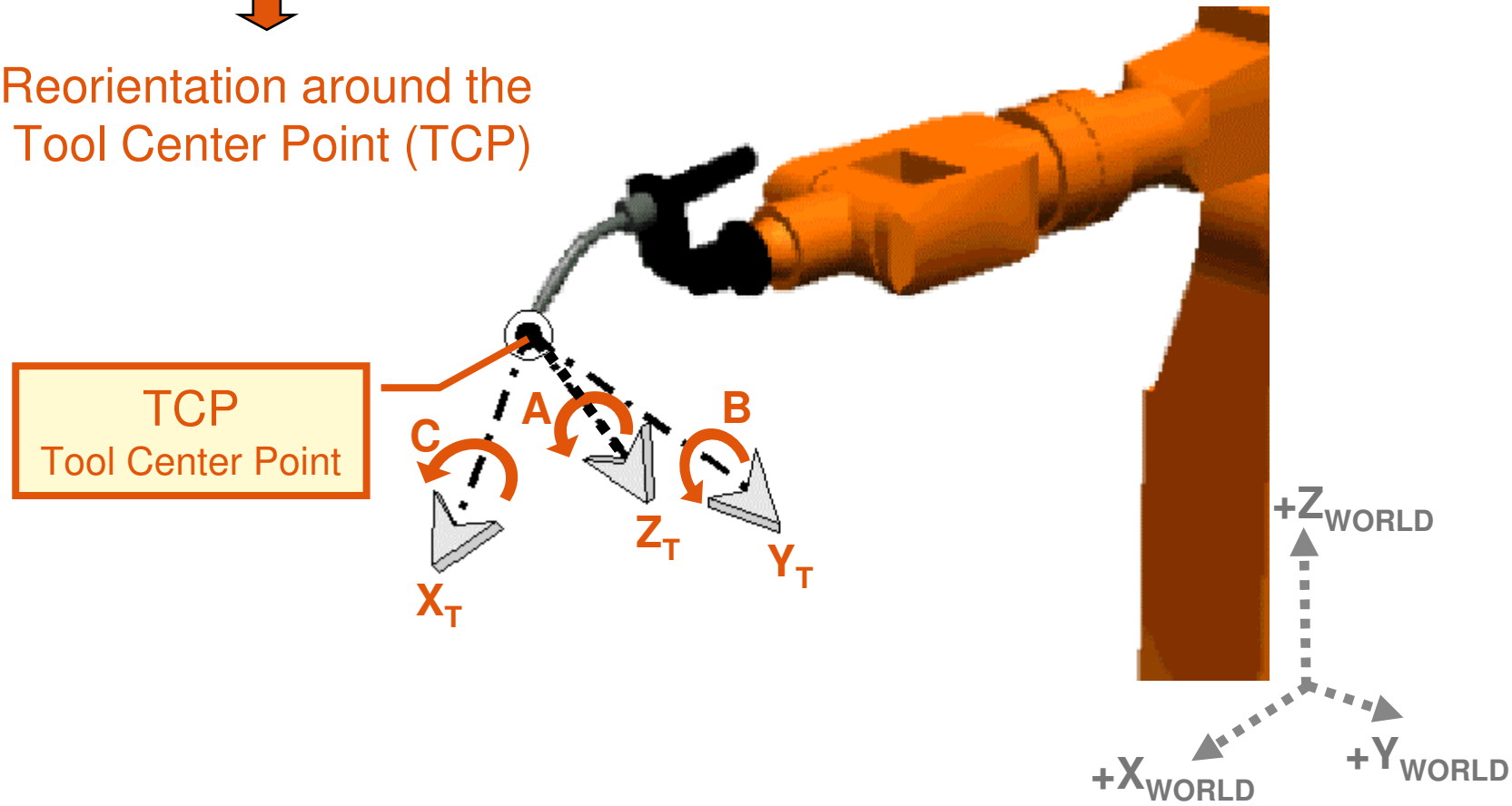
X_{Tool} parallel to Z_{world}

Y_{Tool} parallel to Y_{World}

Z_{Tool} parallel to X_{World}

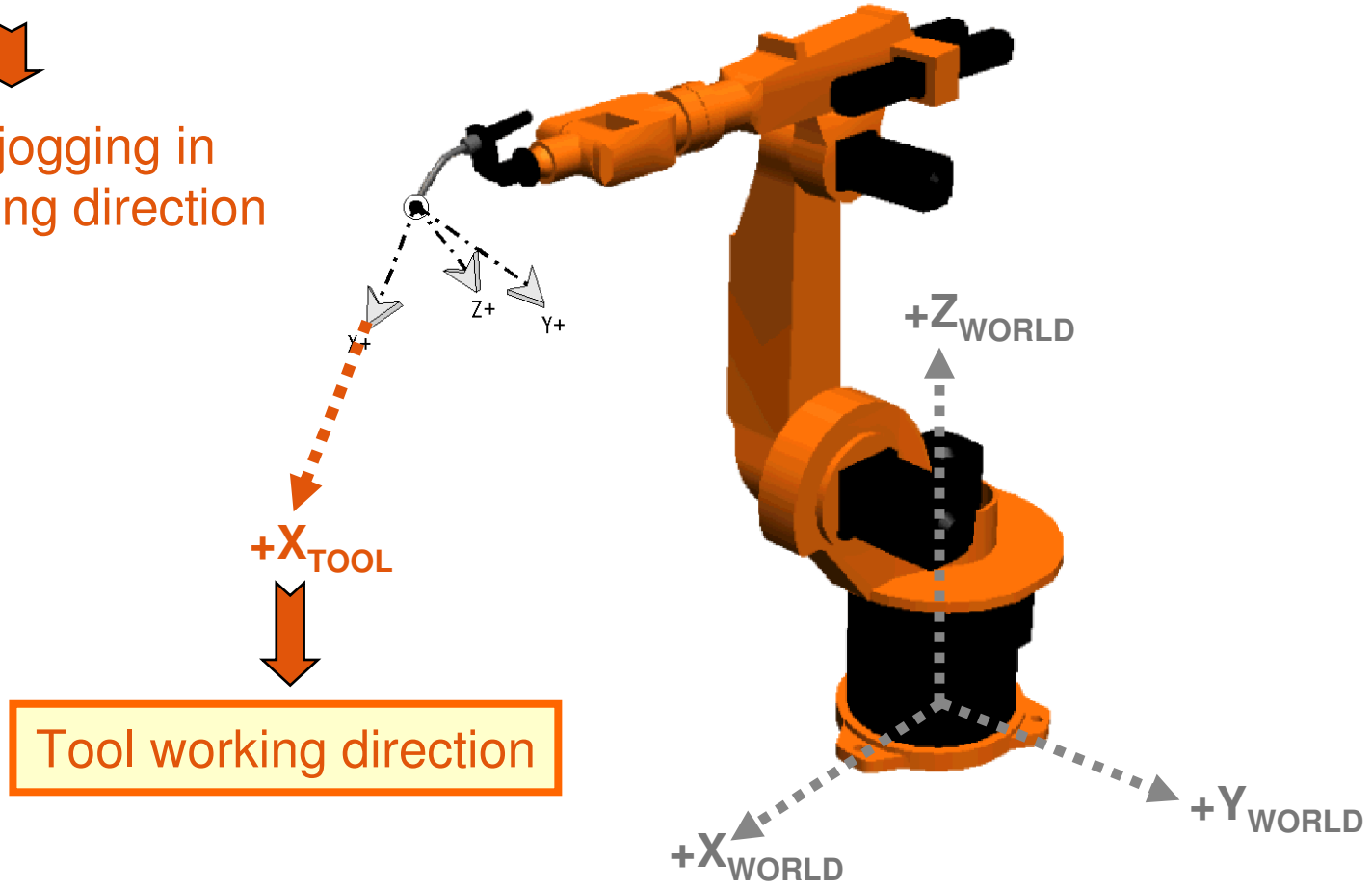
Jogging

Reorientation around the Tool Center Point (TCP)



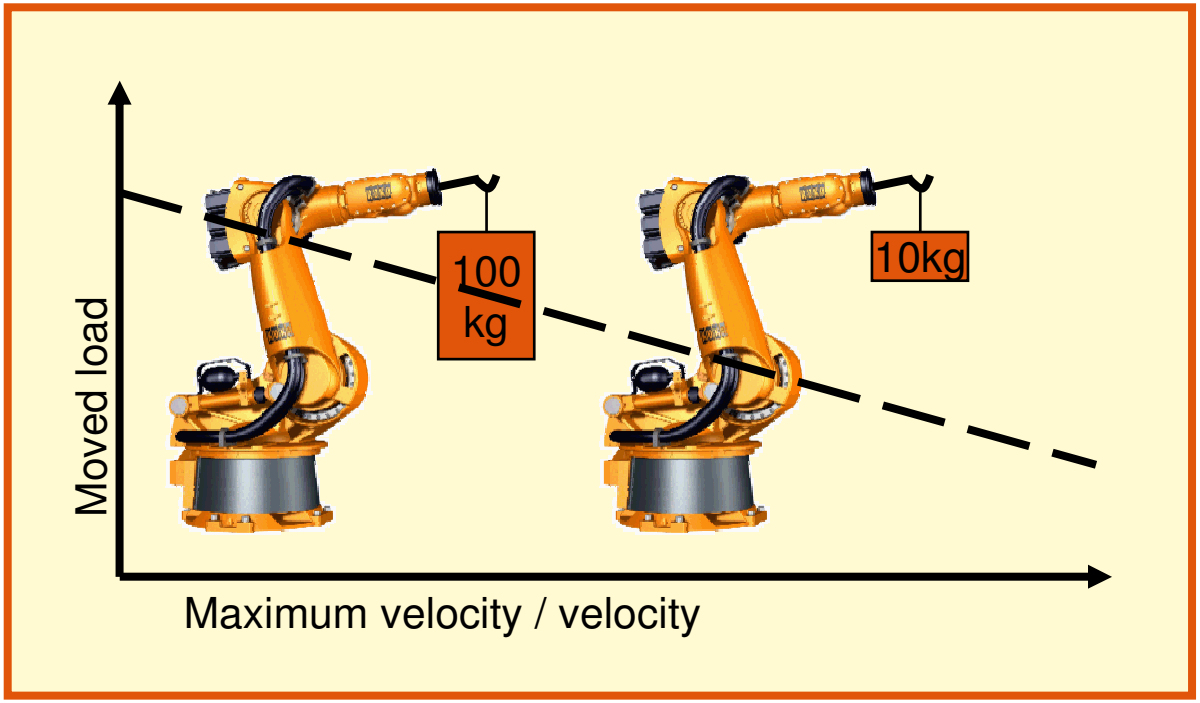
Jogging

Straight jogging in
Tool working direction



Tool working direction

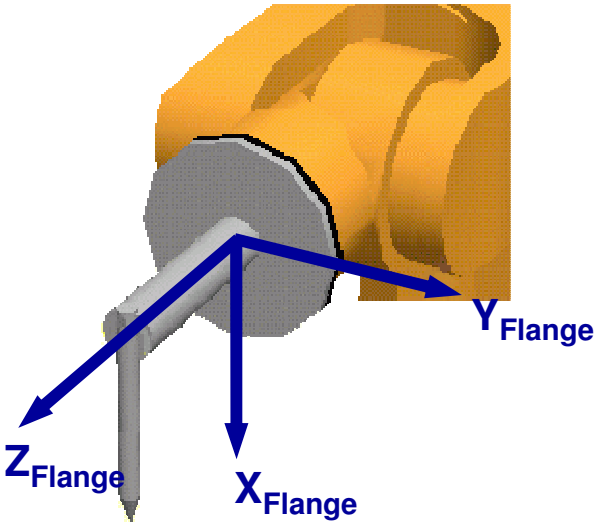
To move the robot with maximum speed, it‘s necassery to set the correctly payload data



Don‘t forgett the extended payload!

M Weights of the payload.

X, Y, Z Distance between the tool point of gravity and the orgin of the robot flange system



A, B, C Rotation of the main inertia axes of the tool against the robot flange coordinate system.

J_X, J_Y, J_Z Mass inertia torque of the tool main inertia axes