Background

Even in modern manufacturing facilities, it is still standard practice for workpieces to be chaotically stored and transported in crates or wire boxes, because this dispenses with the need for costly stacking and no special containers are required. However, this makes subsequent automated removal of the workpieces a significantly more complex task, with the result that this operation is still carried out manually in the majority of cases these days.

IPA’s solution

To address this problem, Fraunhofer IPA has developed software that is capable of localizing the workpieces in a crate to allow them to be picked by a robot. Localization is possible by means of specially developed, efficient algorithms based on the relevant CAD model and with almost any shape of workpiece. As localization alone is not sufficient for reliable picking of the workpiece, the software additionally features collision-free gripping point determination and path planning. This allows the reliable picking of workpieces also in difficult positions, such as near the bottom of the crate. Additional motion axes in the gripper can further improve accessibility and are also supported by the software.

One of the key advantages of bp3™ is its versatility. For example, the computed robot path is transmitted vendor-neutral by TCP/IP, which means that the software can be used with different robots and handling kinematics. The software even supports two-armed robots, which can help, for example, to reduce cycle times and further increase the flexibility of bin picking.
Also as far as sensors are concerned, bp3™ is not limited to a specific type, but can be used with various sensors and 3D measuring methods (e.g. time-of-flight measurement, laser triangulation, stereo vision). This makes it possible to choose the best sensor for the particular application.

As crates or wire boxes are often changed manually, they are not always in exactly the same place. For this reason, bp3™ autonomously detects the precise position of the bin and takes this into consideration when planning how to pick the workpieces.

bp3™ also provides support when it comes to placing the gripped workpieces at the desired position. The chaotic arrangement of the workpieces in the bin means that they sometimes have to be gripped at different gripping points in different orientations. To still allow the workpieces to be placed in a defined position irrespective of the gripping point, bp3™ can determine the motion path of the robot for this task.

### What we offer
Fraunhofer IPA will assist you in the design and initial start-up of automated workpiece feeding systems:
- feasibility studies
- development of solutions for your workpiece picking needs (design of robot cell, key performance requirements, design of gripper systems)
- supply and customization of bp3™ software package

To enable it to perform feasibility studies in connection with bin picking, Fraunhofer IPA has access to a test set-up with an industrial robot and various state-of-the-art 3D sensors. This makes it possible to study the entire bin picking process, from workpiece localization through to complete emptying of the bin.

### How you benefit
The use of this tried-and-tested solution allows the cost-effective automated picking of workpieces from crates or wire boxes. In comparison with all-mechanical methods of workpiece separation, such a system offers significantly greater flexibility and adaptability thanks to its simple software configuration.

3 Visualization of sensor data and localized workpieces.
4 Removal of a gripped gear shaft.