# INTEGRATION CHECK LIST

## WingGuard® / FAST 3000

Table of content

| Date | Version | Description | Name |
|---|---|---|---|
| July 6th 2021 | 1 | First issue | ps |
| December 13th 2021 | 2 | New Layout and application health check added | ps |
| May 3rd 2023 | 3 | Added step-by-step mode | ps |
| May 15th 2023 | 4 | • Remark regarding recommendations.<br>• 33 mm added in sentence “Band end support, horizontal position 33 mm,…”<br>• Rewording regarding down holder force<br>• Title “Operation sequence for automated clamp loading” added | ps |

# 1. Purpose and forword

Purpose of this document is to provide a checklist for a successful implementation of the WingGuard® Strap Clamps 270 and the FAST 3000 into customer applications.

In order to achieve this, there are several phases an implementation project goes through. The most important phases are:

- Designing the customer application.
- Designing the customer assembly cell and the assembly process.
- Validation of the Assembly process before start of production.

Therefore, this document has different addressees:

- Customer Product Design Engineer, go to chapter 3.
- Mechanical Engineer responsible for the mechanical design of the customer's assembly cell, go to chapter 4.1.
- Electrical / Software Engineer in charge of the design of the customer assembly cell electrical and software-wise, go to chapter 4.2
- Person in charge of the validation of the Assembly process before start of production, go to chapter 5.

This document is structured that way, that each person can find the needed information in a compact form, and there are check lists which can be used to make sure that all important aspects are addressed in a proper manner.

The individual items of the checklist are to be regarded as Oetiker best practice recommendations, from which deviations may be made in justified cases.

Personnel involved in the design of the customer application and the assembly cell must make sure to read and understand the Operating instructions, especially chapters 2 and 6.

## 2. Customer-/ Assembly Cell-/ FAST 3000-Identification

Fill out one checklist per FAST 3000.

| Customer details | | |
|---|---|---|
| Customer | | |
| Customers responsible person | | |
| Street and number | | |
| City, State + Zip-Code | | |
| Country | | |
| Phone number | | |
| Email | | |
| | | |
| **Assembly cell details** | | |
| Customer Project Identification | | |
| Assembly cell identification | | |
| Assembly cell drawing number | | |
| Position of the FAST 3000 (for example 1 or 2, Left or right…) | | |
| | | |
| **FAST 3000 details** | | |
| *Component* | *Material number* | *Serial number* |
| Mechanics | | |
| Connecting cable | | |
| Control cabinet | | |
| 2-Hand Control | | |

## 3. Check list for the design of the customer application

| | |
|---|---|
| ☐ | The horizontal and tilting movement of the FAST 3000 must not be obstructed by contact with the customer application. The FAST 3000 shall only be in contact with the WingGuard® strap clamp during the clamp closure. |
| ☐ | During the closure process, the crimp head of the FAST 3000 must not touch any parts other than the WingGuard® clamp that is being closed. |

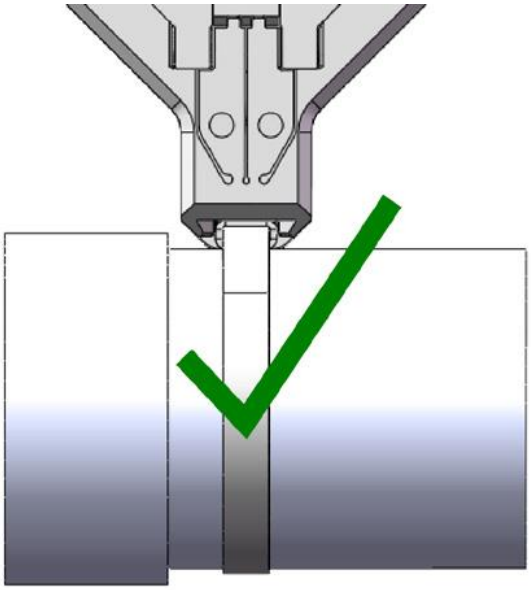

*Figure 1: The crimp head must be at a sufficient distance from the application. No collision with the application.*

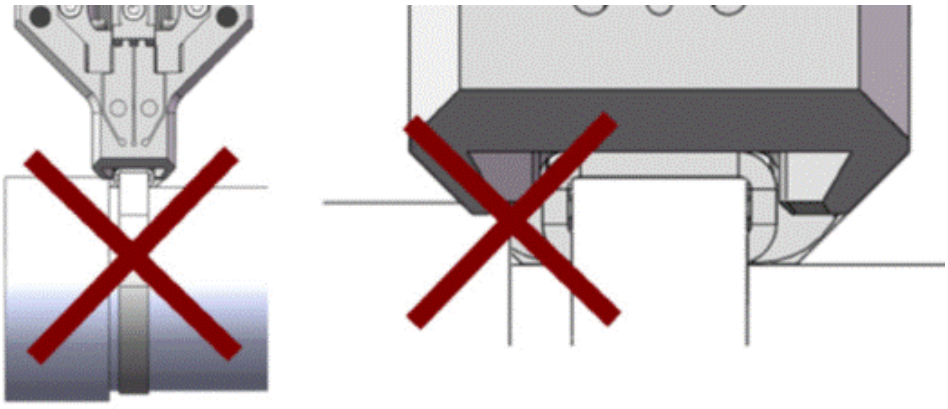

*Figure 2: The crimp head collides with the application. Impermissible application. The same applies if two WingGuard® strap clamps are mounted too close to each other.*

| | |
|---|---|
| ☐ | In order to obtain the full benefit of the WingGuard® strap clamp, the WingGuard®-housing must be supported by the application. |

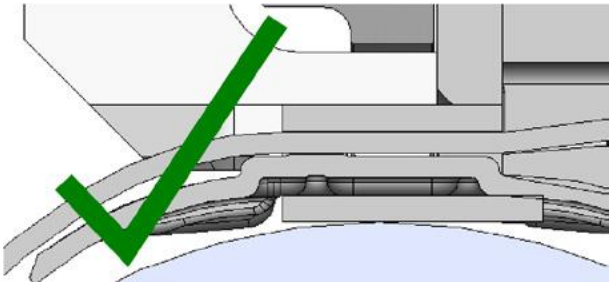

*Figure 3: Proper support of the WingGuard®-housing*

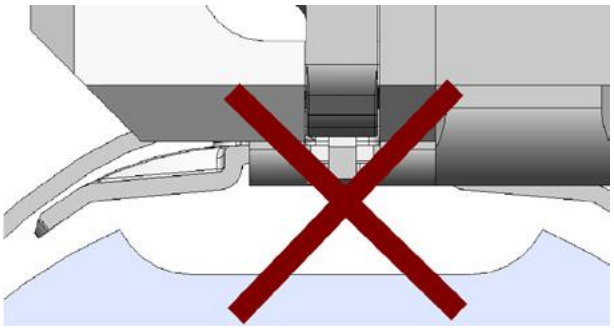

*Figure 4: Impermissible positioning of the WingGuard® housing on a location which does not support the WingGuard® housing.*

| | |
|---|---|
| ☐ | The WingGuard® strap clamp must not be mounted on a conical surface. |

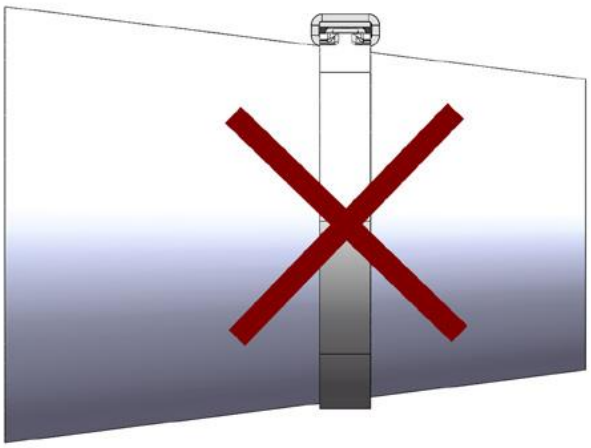

*Figure 5: Impermissible application of the WingGuard® strap clamp on a conical surface*

| | |
|---|---|
| ☐ | The WingGuard® strap housing and its surrounding parts of the band should not be mounted on cushion wrinkles or seems. Fabric underneath the WingGuard® strap housing and its surrounding area shall be as equally thick as possible.<br>Following some examples of application which are likely to cause troubles: |

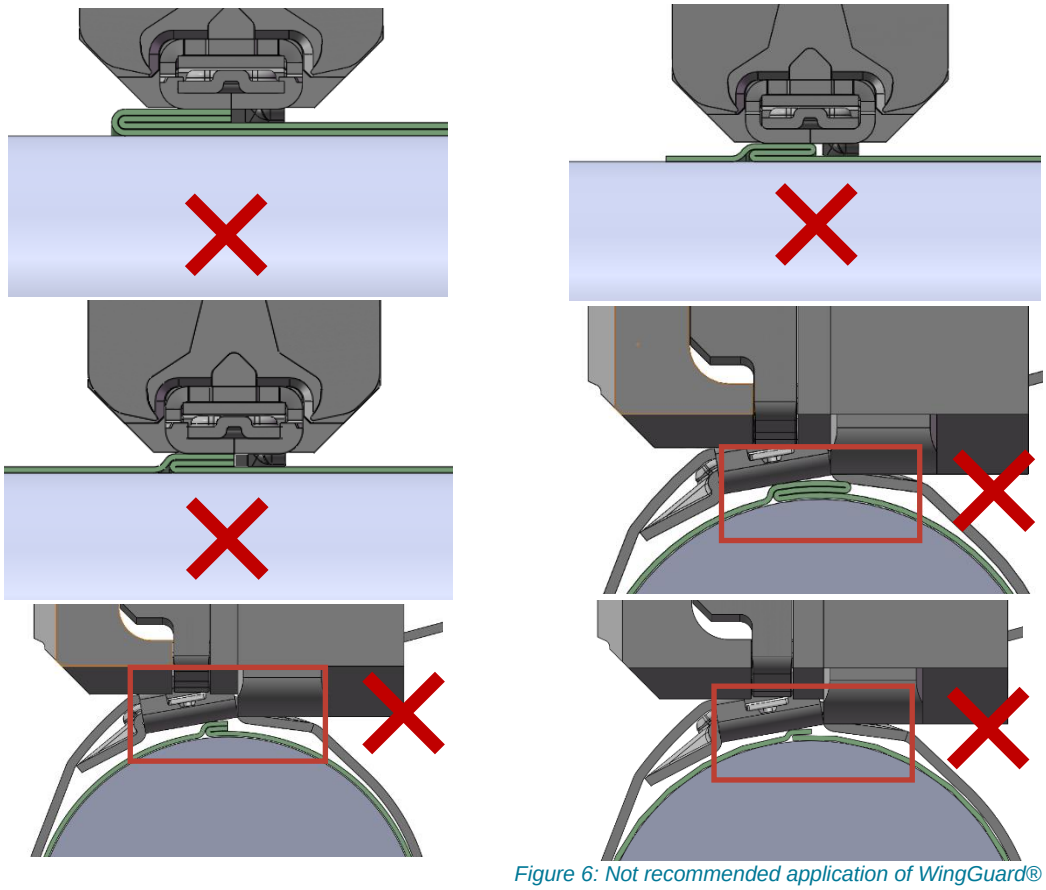

*Figure 6: Not recommended application of WingGuard® strap clamps on folded, not equally layered cushion or on seams.*

| | |
|---|---|
| ☐ | Do not mount the WingGuard® strap clamp on a stepped application.<br>This can lead to tilting of the clamp housing. |

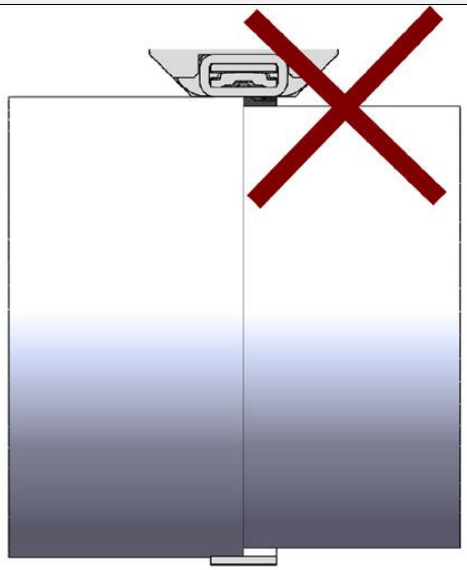

*Figure 7: Do not mount the WingGuard® strap clamp on a stepped application.*

| | |
|---|---|
| ☐ | Avoid contact between the end face of the strap and the goods being strapped. |

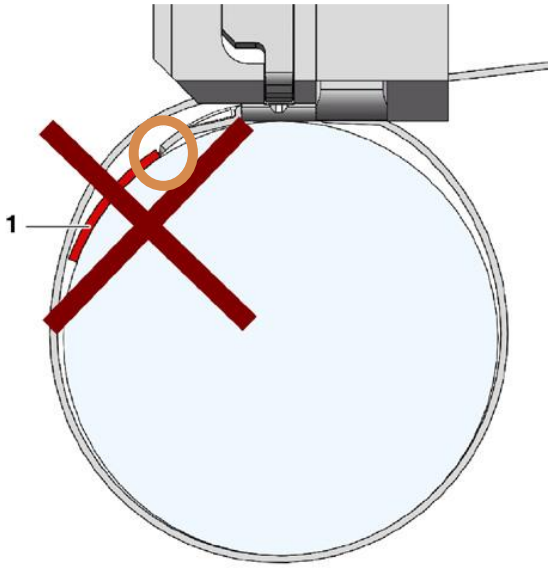


*Figure 8: Avoid contact between the end face of the strap and the goods being strapped. (Example: bracket highlighted in red, critical area encircled orange.)*

| | |
|---|---|
| ☐ | The WingGuard®-housing needs to be on a 12 o'clock position on the application. |

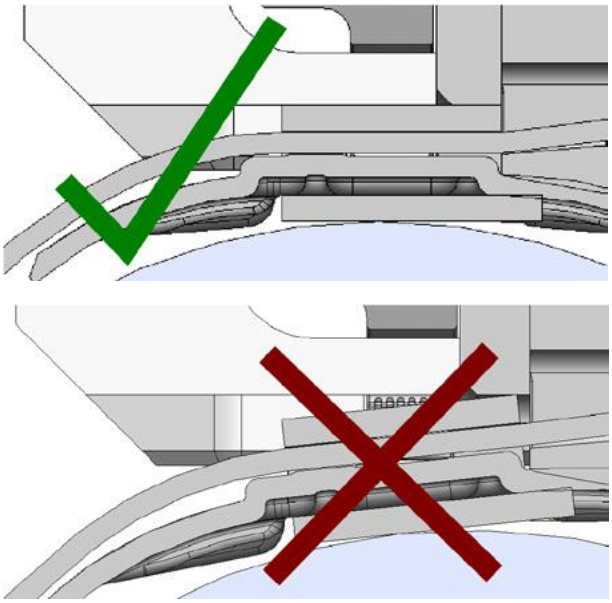

*Figure 9:*
*Left side: Good example of a correctly, 12 o'clock aligned application.*
*Right side: Bad example of a tilted WingGuard®-housing.*

| | |
|---|---|
| ☐ | Brackets need to be rounded or chamfered where the WingGuard® strap clamp band is pulled over edges: |

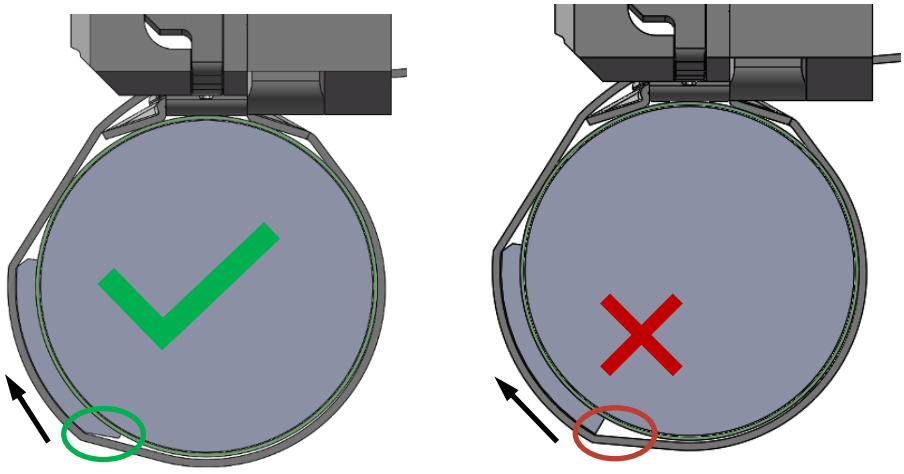

*Figure 10:*
*Left side: good example of a rounded or chamfered bracket.*
*Right side: Bad example of a not rounded or chamfered bracket.*

| | |
|---|---|
| ☐ | The band of the WingGuard® strap clamp must always be supported on the whole bandwidth. Brackets shall be designed accordingly: |

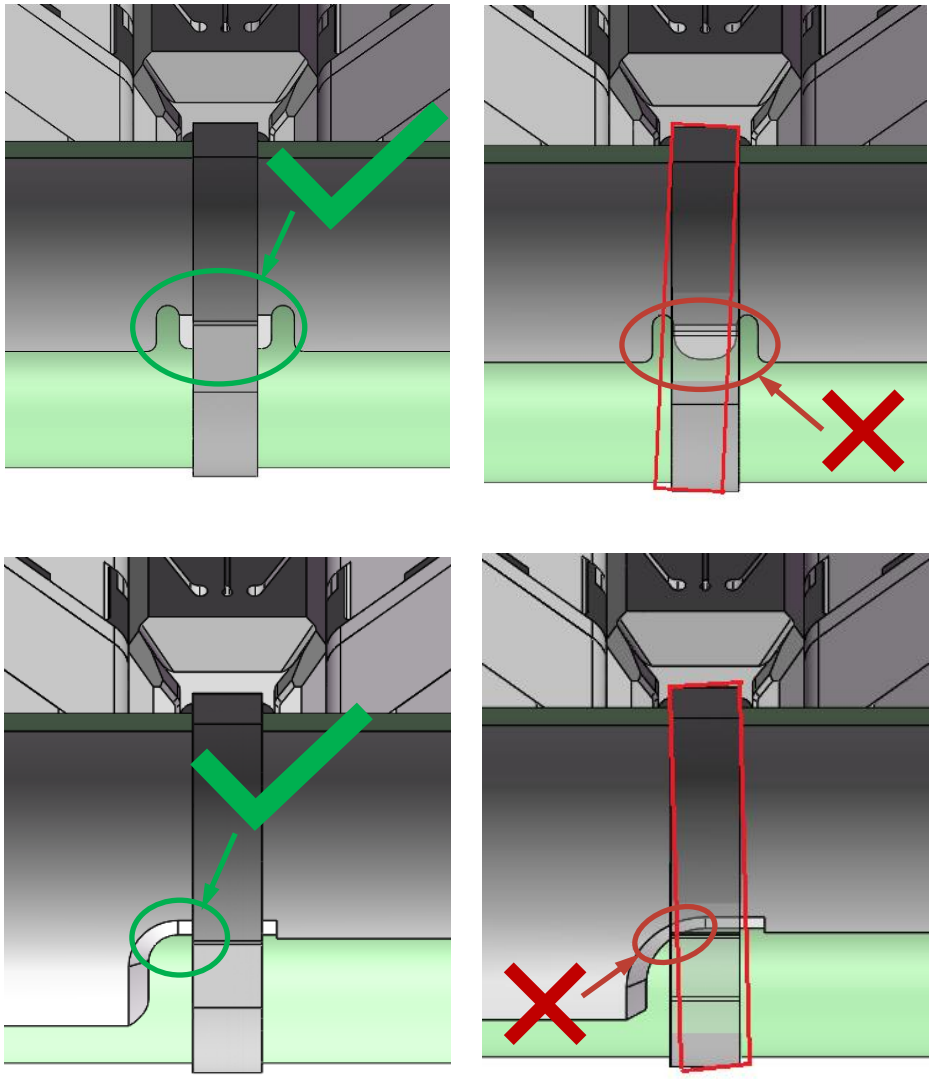

*Figure 11:*
*Left side: Examples of the clamp band being supported on the whole band width.*
*Right side: Examples of an insufficient support of the clamp band.*

## 3.1. Approvals

| | Name | Date | Signature |
|---|---|---|---|
| Customer Approval: Application Design OK according to check list of chapter 3 | | | |
| Oetiker Approval: Application Design OK according to check list of chapter 3 | | | |

# 4. Check list for design of the assembly cell

## 4.1. Mechanical Integration

### 4.1.1. Check list for all types of assembly cells

| | |
|---|---|
| ☐ | Occupational safety risk evaluation performed, and assembly cell in accordance with the risk evaluation? |
| ☐ | If the Oetiker two-hand control desk is used: Make sure there is a minimum distance of 210 mm between the two-hand control desk and the FAST 3000 mechanics. |
| ☐ | Are all components of the assembly cell, which are relevant for the correct positioning of the FAST 3000 and the application, pinned? |
| ☐ | The horizontal and tilting movement of the FAST 3000 must not be obstructed by contact to the assembly cell. The FAST 3000 shall only be in contact with the WingGuard® strap clamp during the clamp closure. No interferences. |
| ☐ | During the closure process, the crimp head of the FAST 3000 must not touch any parts other than the WingGuard® clamp that is being closed. |
| ☐ | Position for the closing force verification available? No interference of the Verification Unit PG135 with the assembly cell allowed during closing force verification. |
| ☐ | Position for the crimp force verification available? No interference of the Crimp Force Verification Unit PG135 with the assembly cell allowed during crimp force verification. |
| ☐ | When closing a WingGuard® clamp, the crimp head must press gently against the parts to be connected. This can be achieved for example by:<br>• Laying the connecting cable so that the Crimp-Cuthead tilts downwards by itself.<br>• Or preferably install a pneumatic cylinder which presses the crimp head downwards. (Called Z-Force cylinder) Make sure the installation of the cylinder is in accordance with the next bullet point. |
| ☐ | Variants with Z-Force cylinder: The Crimp head shall press downwards on the WingGuard® clamp housing with a force of 50 +/-10 N |

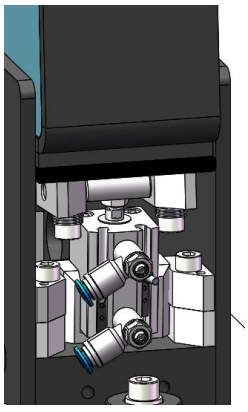

*Figure 12: Proposal for the installation of a Z-Force Cylinder.*

| | |
|---|---|
| ☐ | Use the original rubber bumpers or another appropriate stopper / shock absorber, which is comparable in its function with the bumper delivered with the FAST 3000.<br>A stopper with a metal-to-metal contact without any shock damping function is often not sufficient: Due to the hard impact very high decelerations and forces will result. Components of the FAST 3000 or the assembly cell can be damaged.<br><br>Information on the selection of the shock absorber:<br>Moving mass of the FAST 3000: 25 kg<br>Maximum deceleration: 5 m/s2: |

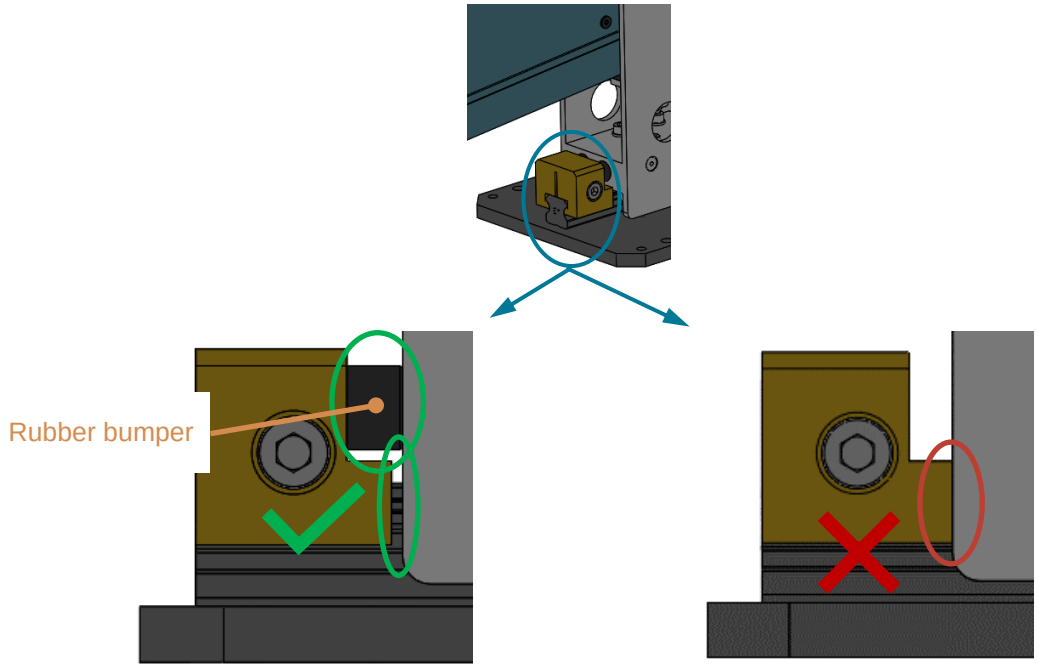


*Figure 13: Stopper*

| | |
|---|---|
| ☐ | Anti-rotation protection for the inflator and the bracket available? |

| | |
|---|---|
| ☐ | Dedicated nests available for inflator, bracket, and clamp? |

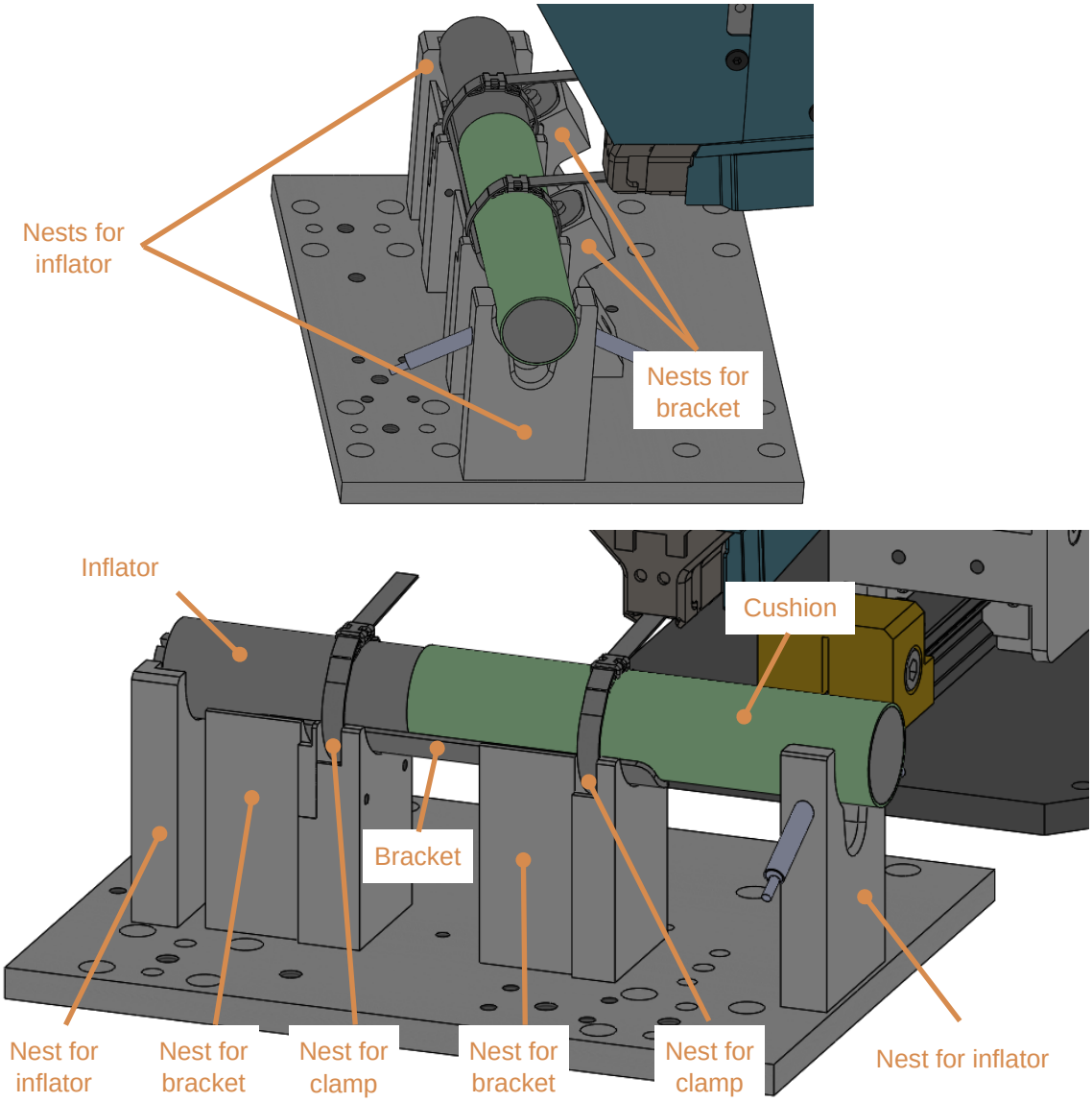


*Figure 14: Inflator, bracket and clamps and their dedicated nests.*

| | |
|---|---|
| ☐ | Is the position of the component (mostly the inflator), on which the WingGuard® housing is located, defined directly by its nest? This means this component shall be supported by the nest of the assembly directly, and not via the bracket of the airbag application. The bracket needs to have a little bit of play, otherwise the proper position of the inflator cannot be guaranteed! |

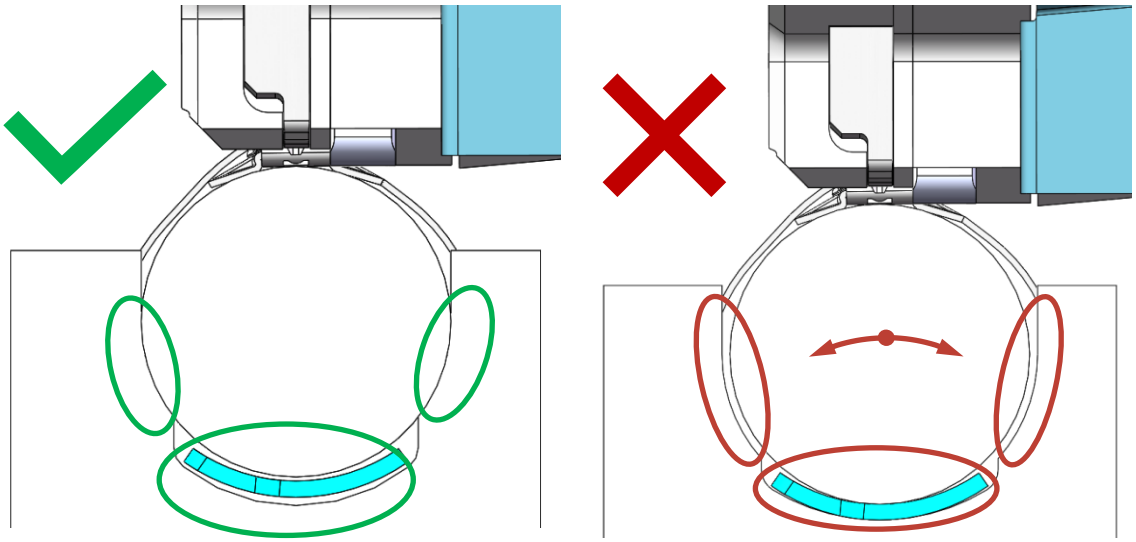

*Figure 15: Left side: Proper support of the component (inflator), on which the WingGuard® housing is located. The example on the right side is not suitable, as the position of the inflator is not sufficiently defined.*

| | |
|---|---|
| ☐ | Proper horizontal support for the application available? |

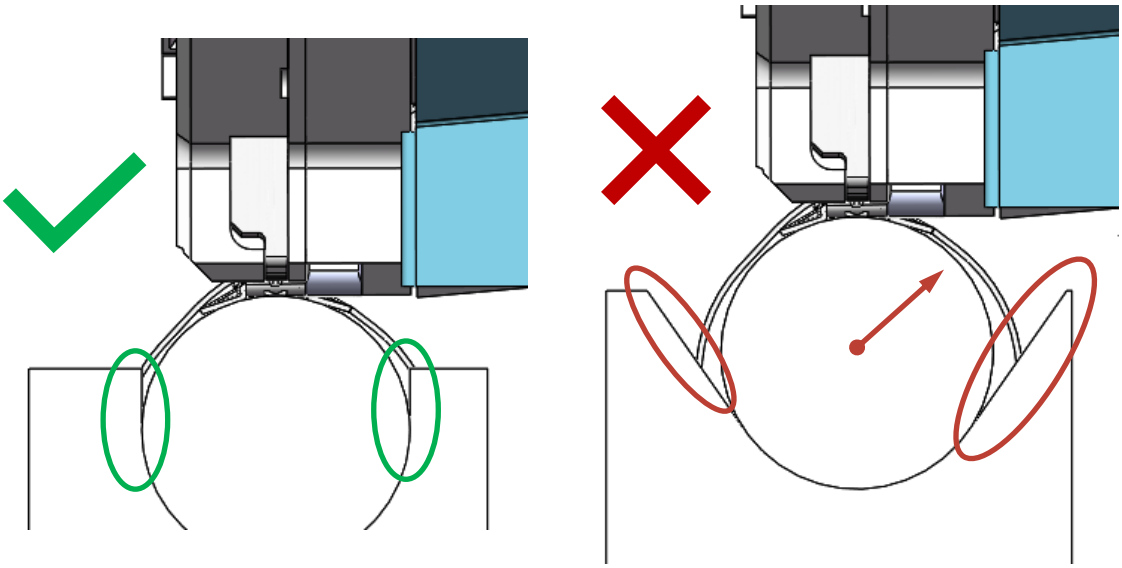

*Figure 16: Nest for the inflator needs to have vertical support surfaces. Otherwise, the application can slip out of its correct position due to the closing force of the FAST 3000.*

| | |
|---|---|
| ☐ | Guide for the WingGuard® strap clamp existing? |

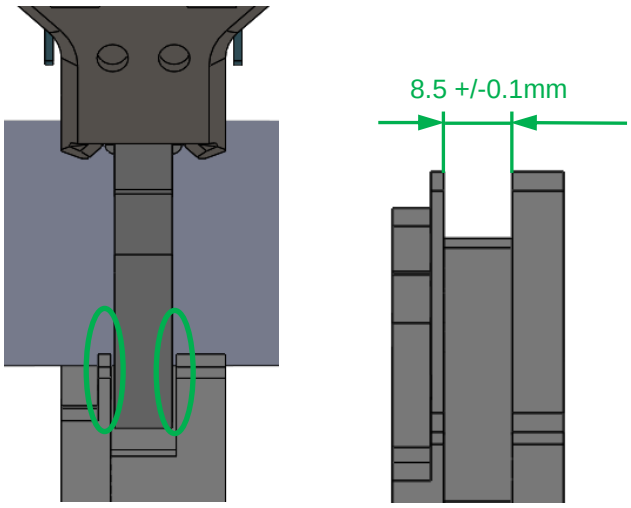


*Figure 17: Band guide.*

| | |
|---|---|
| ☐ | Is the FAST 3000 centered to the WingGuard® strap clamp? For the maximum deviation, refer to Figure 18 |

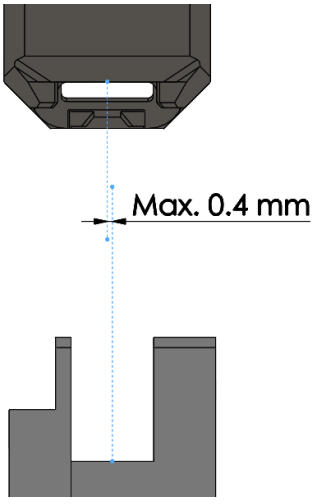


*Figure 18: Maximum asymmetry of the band guide and the Crimp-Cuthead.*

| | |
|---|---|
| ☐ | No offset of clamp and application nest in horizontal direction allowed! |

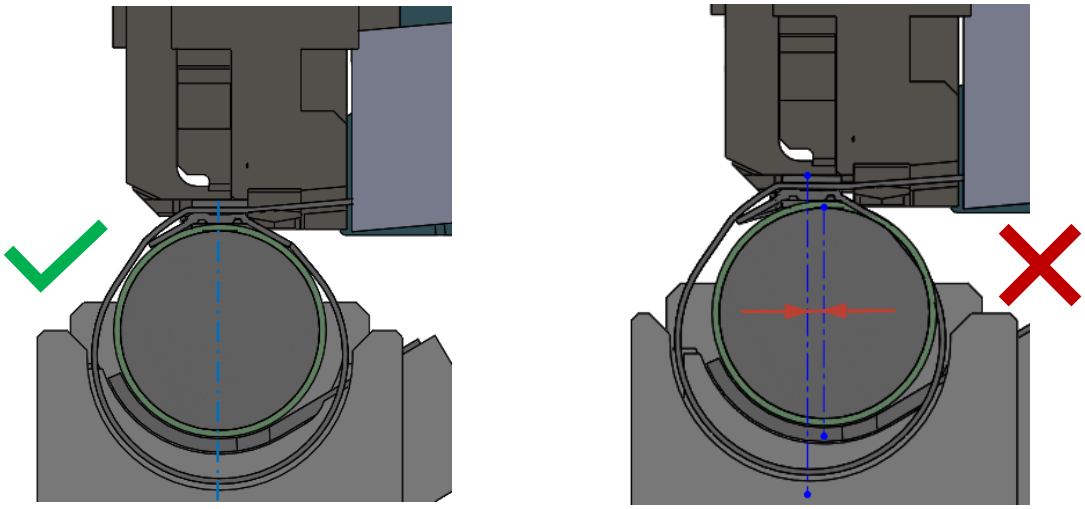

*Figure 19: No offset of clamp and application nest in horizontal direction allowed!*

| | |
|---|---|
| ☐ | Nest for WingGuard® strap clamp deep enough? |

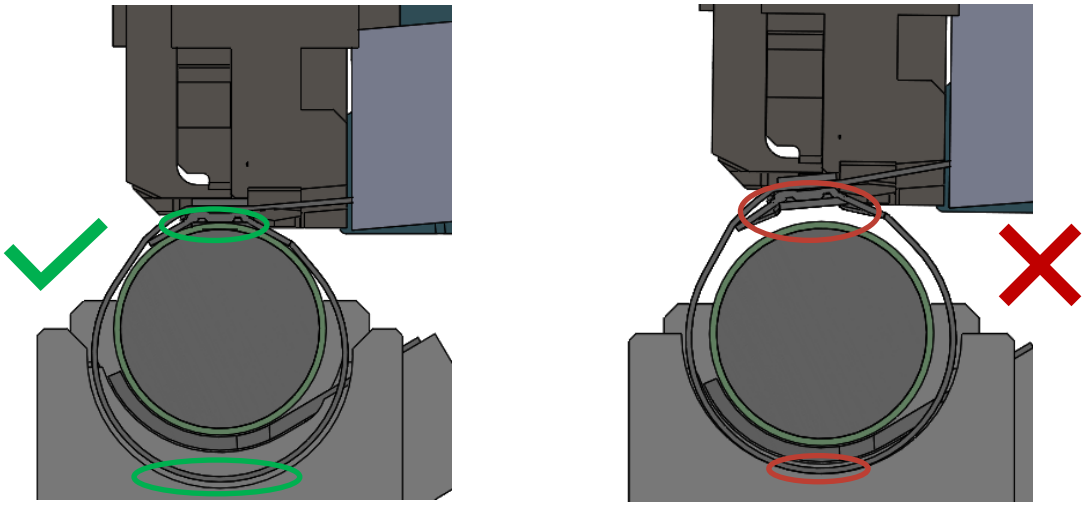

*Figure 20: Nest for WingGuard® strap clamp deep enough?*

| | |
|---|---|
| ☐ | Nest diameter OK? |

Ø X: Nest diameter

Ø X = Clamp inner - Ø in delivery condition + 5.5 +/- 0.5 mm

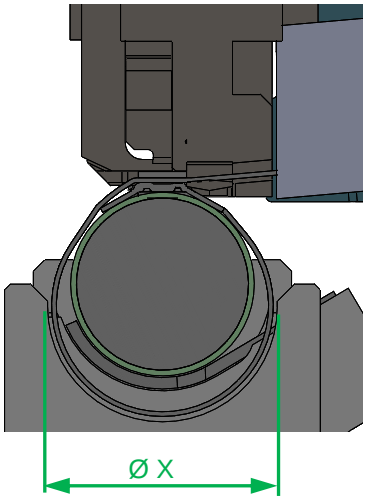


*Figure 21: Clamp nest diameter.*

| | |
|---|---|
| ☐ | Folds and seams shall have dedicated cutouts.<br>Use inductive proximity switches in order to detect not properly positioned applications. |

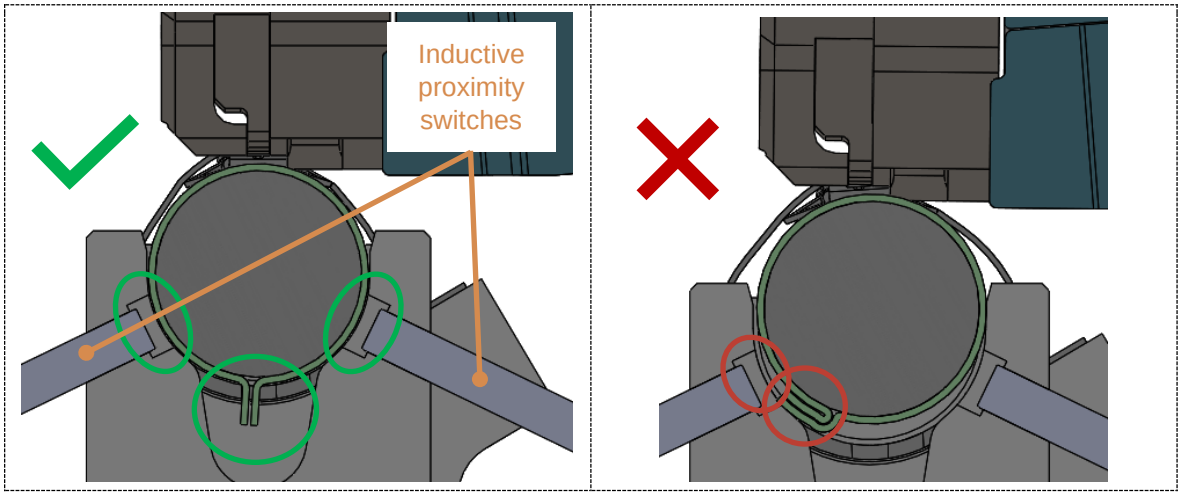


*Figure 22: Space for seems and fold detection with inductive proximity switches. Right picture shows an application with a badly positioned seem.*

| | |
|---|---|
| ☐ | If feasible, fold- and seam detection available for the WingGuard® housing area? |

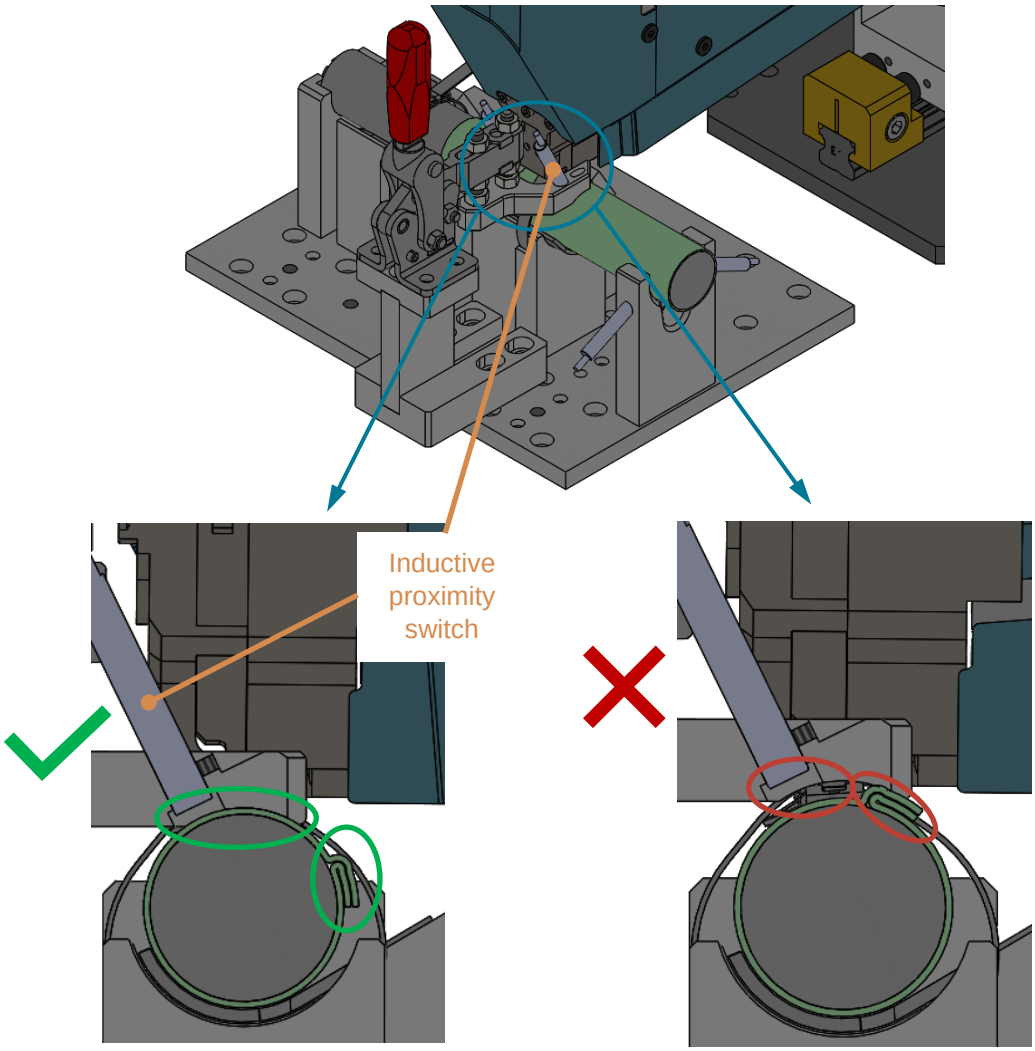


*Figure 23: Fold detection with inductive proximity switches at the WingGuard® housing area. The picture on the right shows an example where the seam is at the wrong location.*

| | |
|---|---|
| ☐ | Alignment of the FAST 3000 within the tolerances defined below? (Or positions adjustable in order to get the alignment within the tolerances during commissioning of the FAST 3000) |

X: Not relevant
Y: 0 to + 2mm
Z: 0 +/- 2mm
Rotation around A: 0 +/-0.5°
Rotation around B: 0 +/-0.5°

**Definitions:**
Deviations of the FAST 3000 alignment to its theoretical perfect aligned position. Crimp Head perfectly aligned in reference to the PG 270 housing. PG 270 housing perfectly aligned in a 12 o'clock position on the application.

The FAST 3000 has to be in the defined positions during crimping the band.

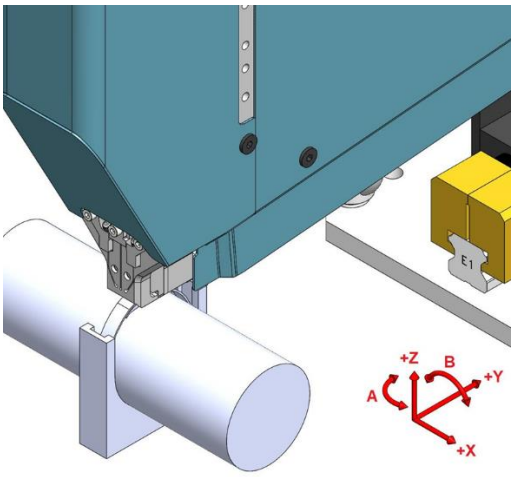


*Figure 24: Allowable deviations of the FAST 3000 positioning from its perfect alignment.*

| | |
|---|---|
| ☐ | If the FAST 3000 closes two clamps on the same application, for example one with and one without fabric, or with deviating application diameters, make sure that the setup still complies with the tolerances defined under the bullet point above. Otherwise, the X- and Y- positions need to be quick adjustable.<br>It needs to be pointed out, that due to the flexibility of the whole system, the Y-position of the WingGuard® housing can vary between applications with and without fabric. This due to different friction coefficients. Make sure that in such cases, the X- and Y-positions can be quick adjusted for each clamp separately!<br>The same must be obeyed for assembly cells which are used to assemble left and right variants of an application. If two clamps are closed in such applications, one on fabric and the other not, the assembly cell needs to have quick adjustable X- and Y-positions. |
| ☐ | Recommendation for the minimum down holder force: 600 N. If there is the risk to damage components of the customers application, reduce the down holder force. |
| ☐ | Down holder aligned with nest or adjustable? |

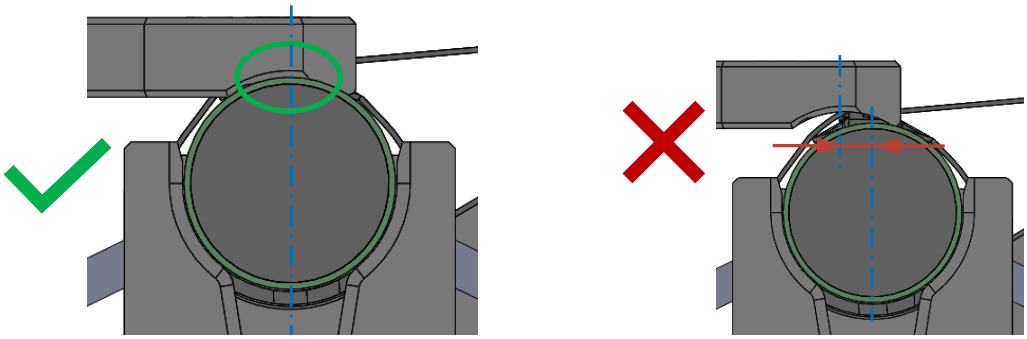

*Figure 25: Left side: correct alignment of downholder, right side NOK alignment of downholder.*

| | |
|---|---|
| ☐ | Assembly cell structure stiffness sufficient? Maximum deformation of the assembly cell shall be less than 1 mm in total if it is loaded with a closing force of 2 x 1850 N. |

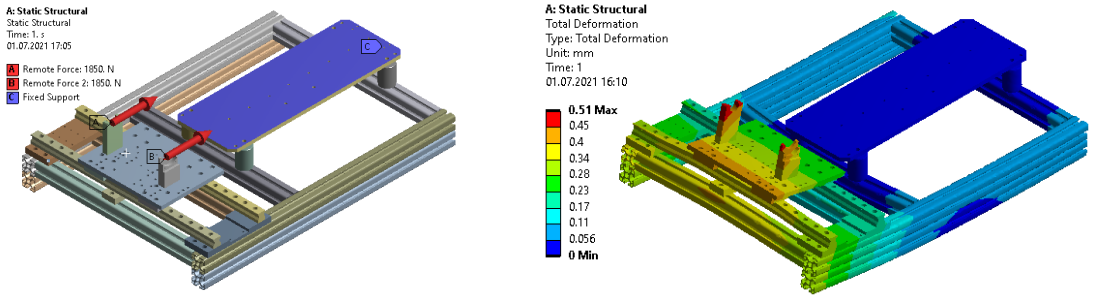


*Figure 26: Example of a FEA deformation analysis*

| | |
|---|---|
| ☐ | Sensors available to check the proper position of all closure-critical components of the customer application (Inflator, bracket, clamp, cushion) before closure starts? |
| ☐ | Waste channel design according to proposal of Figure 27 |

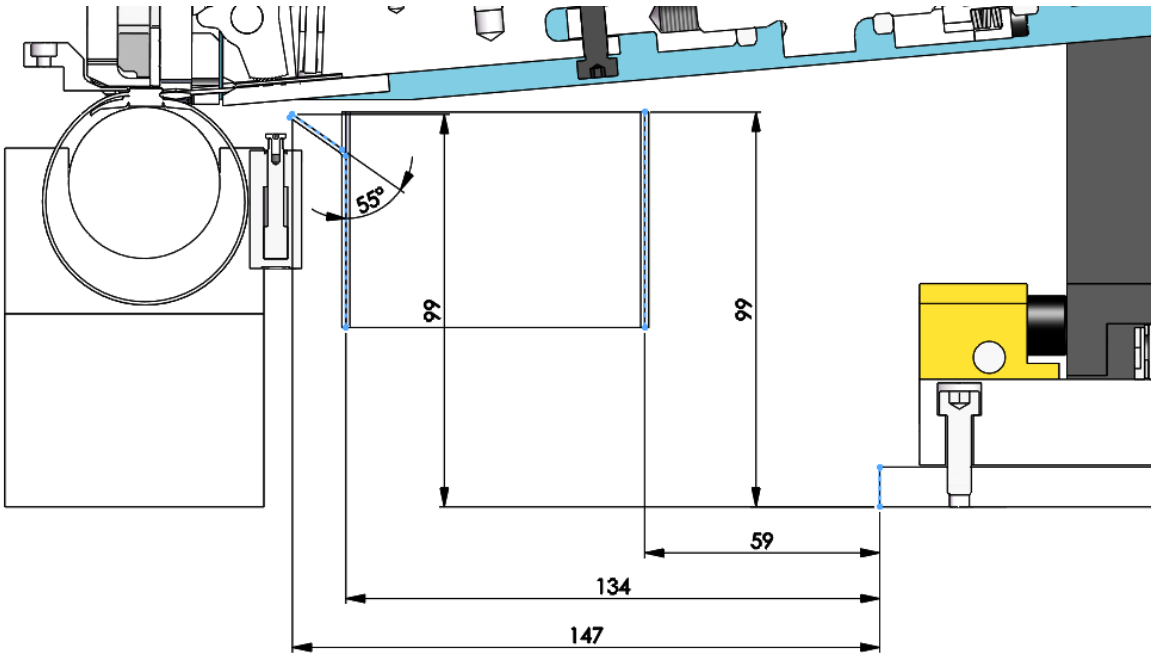


*Figure 27: Proposal for the dimensions and position of the waste channel.*

| | |
|---|---|
| ☐ | Waste channel cutout design according to proposal of Figure 28?<br>It must be ensured that no foreign parts have contact with the clamping unit in order to exclude any falsification of the measured closing force.<br>This concerns among other things, the waste channel provided by the customer. |

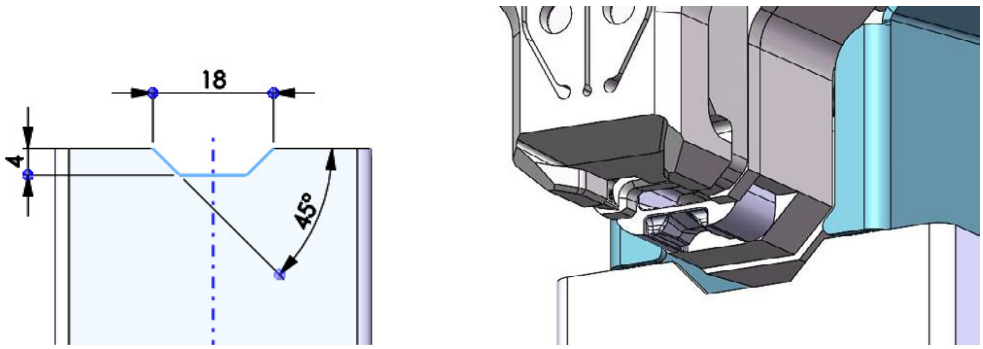


*Figure 28: Proposal for the cutout of the waste channel.*

## 4.1.2. Check list for automated clamp loading

| | |
|---|---|
| ☐ | All needed key elements available? (Shown in home position)<br>Refer to chapter 4.2 for information about the operation sequence of the components |

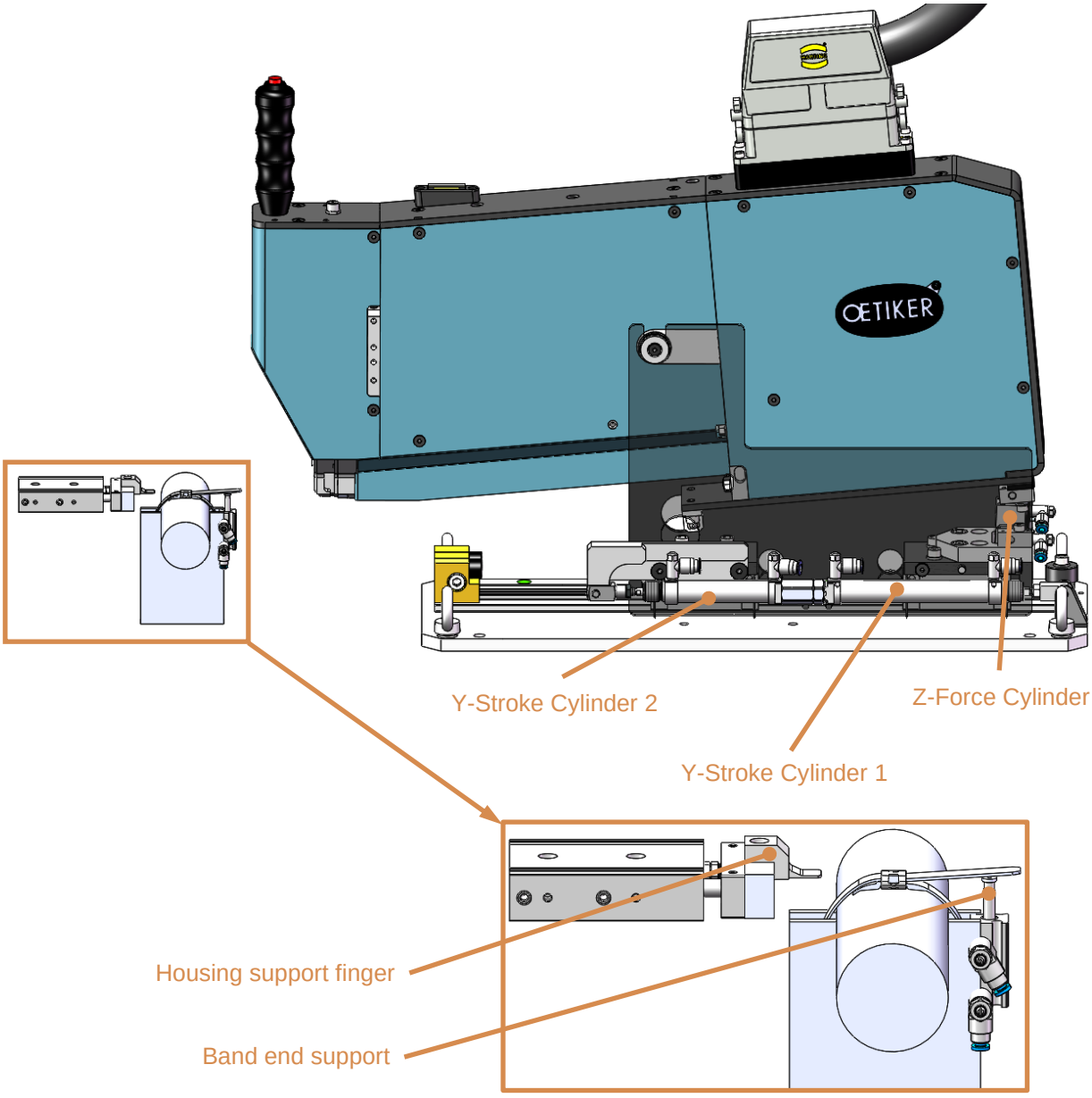


*Figure 29: Overview of components for automated clamp loading*

| | |
|---|---|
| ☐ | Stroke from the horizontal middle position to the position where the FAST 3000 closes the clamp: 35 mm |
| ☐ | Stroke of the band end support equal or bigger than 10 mm. |
| ☐ | Band end support, horizontal position 33 mm, refer to Figure 30: |

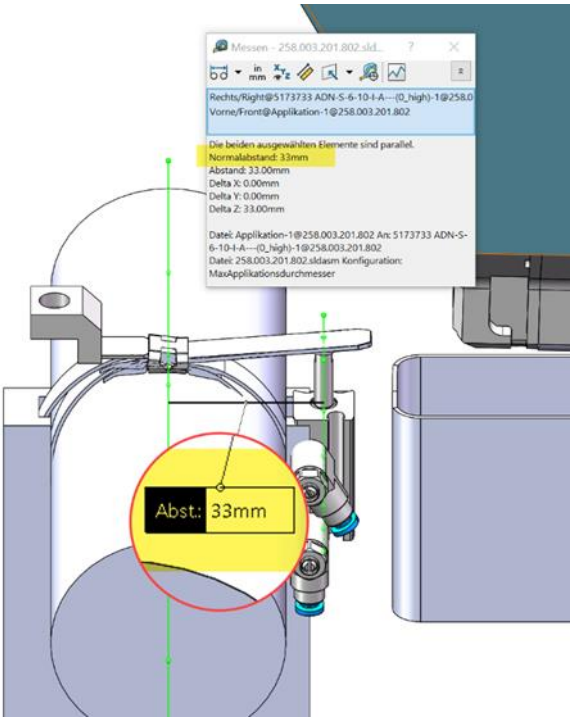


*Figure 30: Horizontal position of the band end support (33 mm). (Definition valid for piston rod Ø <= 5 mm)*

| | |
|---|---|
| ☐ | Band end support, vertical position 103.5 +/-0.3 mm |

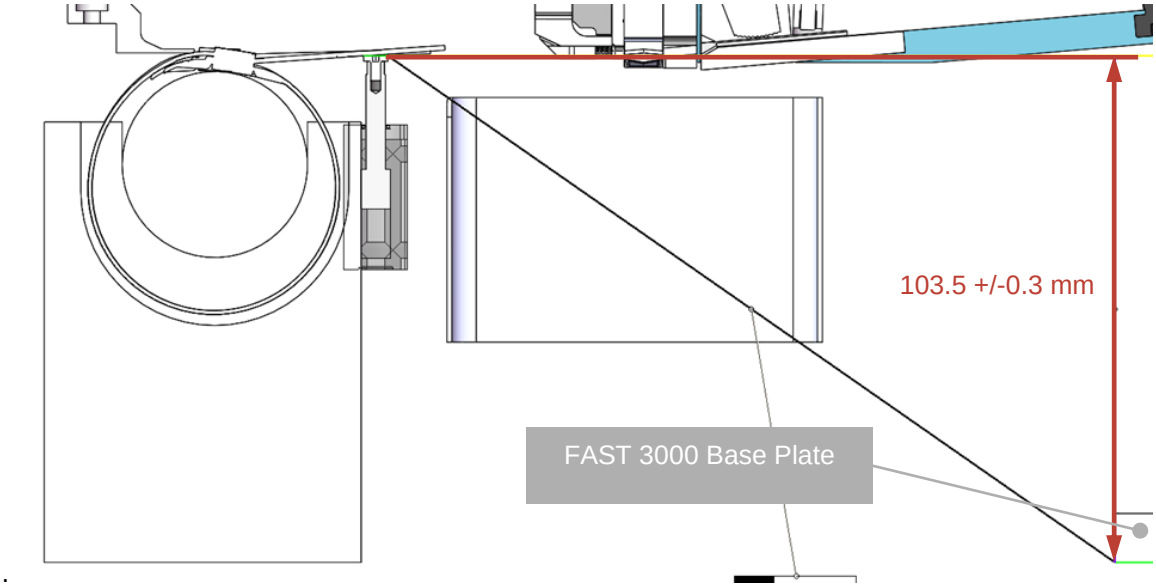


*Figure 31: Band end support in its upper most position of 103.5 +/-0.3 mm.*

| | |
|---|---|
| ☐ | Vertical position of Crimp-Cut head during band end insertion 105.5 +/-0.1 mm |

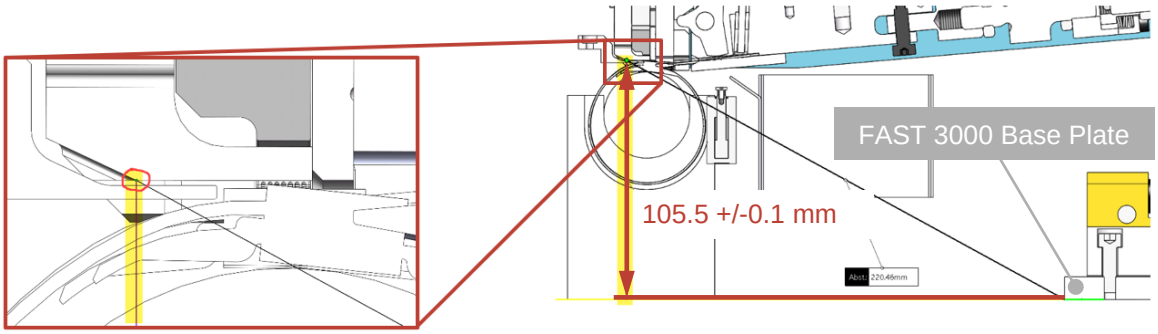


*Figure 32: Vertical position of Crimp-Cut head during band end insertion 105.5 +/-0.1 mm.*

| | |
|---|---|
| ☐ | Housing support finger, recommended thickness: 0.8 +/-0.05 mm |

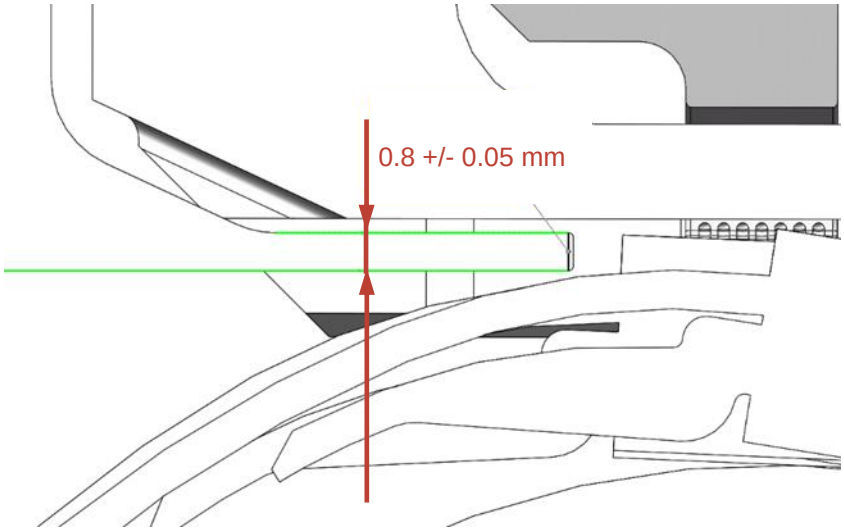


*Figure 33: Housing support finger, recommended thickness: 0.8 +/-0.05 mm*

| | |
|---|---|
| ☐ | Housing support finger, horizontal position to support PG 270 housing at 12 o'clock position. |
| ☐ | Housing support finger, vertical position 104.4 +/-0.1 mm<br>(measured to the bottom of the finger) |

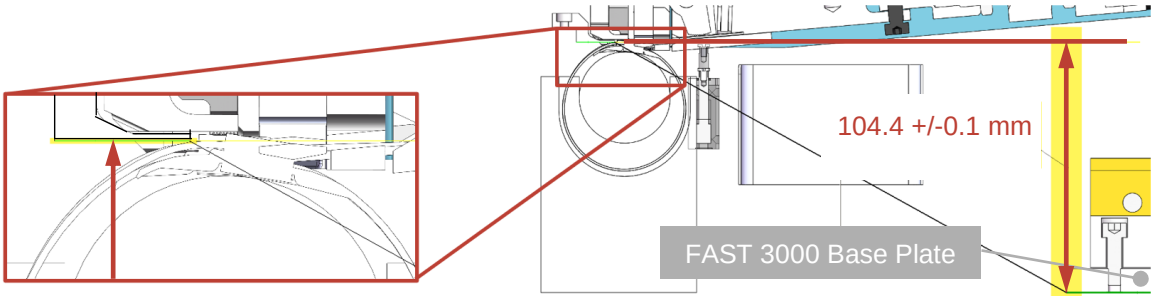


*Figure 34: Housing support finger, vertical position 104.4 +/-0.1 mm.*

### 4.1.3. Approvals

| | Name | Date | Signature |
|---|---|---|---|
| Customer Approval: Mechanical system Integration OK according to check list of chapter 4.1 | | | |
| Oetiker Approval: Mechanical system Integration OK according to check list of chapter 4.1 | | | |

## 4.2. PLC Integration

| | |
|---|---|
| ☐ | Occupational safety risk evaluation performed, and assembly cell in accordance with the risk evaluation? |
| ☐ | Make sure to use a 16 A delayed action fuse on the building side. |
| ☐ | Make sure the closing cycle cannot be started before all components of the application are positioned properly. use the signals of the corresponding detection sensors. |
| ☐ | Make sure the FAST 3000 does not move during the closing force plausibility check, timing see separate flow chart. |
| ☐ | Make sure to use the right field bus mapping list according to the software version used. |
| ☐ | Automated clamp loading: Operation sequence: |

**Operation sequence for automated clamp loading**

| Step | Action | Command from |
|---|---|---|
| 1. | Everything in Home Position<br>(Refer to Figure 29) | - |
| 2. | Operator prepares application and clamp | - |
| 3. | Housing Support Finger moves toward FAST 3000 (Cylinder extends) | Customer PLC |
| 4. | Horizontal move of FAST 3000 to middle position to catch the band end.<br>(Y-Stroke Cylinder 1 extends) | Customer PLC |
| 5. | Band end support retracts | Customer PLC |
| 6. | FAST 3000 moves last 35 mm to closing position<br>(Y-Stroke Cylinder 2 extends) | Customer PLC |
| 7. | FAST 3000 clamps the band end | Signal Customer PLC → FAST 3000 |
| 8. | Housing Support Finger retracts | Customer PLC |
| 9. | FAST 3000 Crimp-Cuthead pushes on the clamp housing (Z-Force Cylinder extends) | Customer PLC |
| 10. | FAST 3000 closing cycle | Signal Customer PLC → FAST 3000 |
| 11. | FAST 3000 Crimp-Cuthead lifted upwards<br>(Z-Force Cylinder retracts) | |
| 12. | FAST 3000 moves backwards to home position<br>(Y-Stroke Cylinders 1 and 2 retract) | Signal FAST 3000 → Customer PLC |
| 13. | Band end support moves to its upper position | Customer PLC) |

### 4.2.1. Z-Force Cylinder

For details about the mechanical setup, refer to chapter 4.1, Figure 12

| | |
|---|---|
| ☐ | The Z-Force shall be applied before the closure process starts and end before the FAST 3000 moves to the back. |
| ☐ | Is the air pressure controlled before and during the clamp closure by the PLC of the assembly cell? Range of the OK pressure according to the force tolerance. |
| ☐ | The Crimp-Cuthead must not be in its lowermost position before and during the WingGuard® clamp closure. The lowermost position is defined by the cylinder stroke. The PLC monitors that the lowermost position is **not reached** by means of a position sensor mounted on the cylinder. |

### 4.2.2. Approvals

| | Name | Date | Signature |
|---|---|---|---|
| Customer Approval: PLC system Integration OK according to check list of chapter 4.2. | | | |
| Oetiker Approval: PLC system Integration OK according to check list of chapter 4.2. | | | |

# 5. Checklist for the validation of the Assembly Cell

## 5.1. Set up of tool

| | |
|---|---|
| ☐ | Remove the transport protection |
| ☐ | Tool positioning with fixed application according to Manual 6.1 (Positioning of Fast 3000) |
| ☐ | Position & connect two-hand control unit (Min. distance Tool – Two Hand Control: 210mm) * |
| ☐ | Connect GUI* |
| ☐ | Connect CFM |
| ☐ | Connect Tool & Electrical Enclosure |
| ☐ | All covers assembled |
| ☐ | Check the supply voltage |
| ☐ | Check all cables (for damage) |
| ☐ | Connect to supply voltage |

| Check parameter | Target | Actual | Status |
|---|---|---|---|
| Distance two-hand control to tool | > 210 mm | | |
| Tool positioning | Application according to Operating Instructions | | |

**Comments:**

| |
|---|
| |

** note: if other than Oetiker equipment is used*

## 5.2. Pre-start-up check

| | |
|---|---|
| ☐ | Check all I/O functions<br>• All I/O's of two hand control if used<br>• All I/O's of the FAST 3000 (Sensors, LED's and Clamping pushbutton)<br>• All I/O's of the external PLC |
| ☐ | Connection with F3K PLC for time synchronization & IP setting (with laptop) |
| ☐ | CFM control settings (measuring program) |
| ☐ | Z-Force at the Crimp-Cuthead within tolerance of 50 +/-10 N |
| ☐ | Check settings:<br>• CFM activated<br>• Closing parameter (Closing force: 1850 N / Closing force tolerance: 100 N / Closing force holding time: 500 ms / Switch point reduction: 500 N / Speed Phase 1: 80 mm/s Speed Phase 2: 2 mm/s)<br>• Setting / Parameter PTC / Max. force after cutting: 250 N<br>• Operating mode (two-hand release or BUS)<br>• Data storage (file name includes FAST 3000 Serial number) (Alternative: External control system, see chapter 10)<br>• Time zone |
| ☐ | Check the pulling force (1850 N +/- 100 N) |
| ☐ | Check zero point pulling force device (Offset: 0 +/- 20 N) |
| ☐ | Check crimping force sensors (1600 +/- 50 N)<br>(Use 1000 N if the maximum value is limited to 1000 N by the software) |
| ☐ | Band sensor check |
| ☐ | USB plugged in |
| ☐ | Check the software version |

| Check parameter | Target | Actual | Status |
|---|---|---|---|
| IP address | - | | |
| Subnet Mask | - | | |
| CFM Prog. Version | - | | |
| Crimp force value/tol. | 1600 +- 50 N | | |
| Pull force value/tol. | 1850 +- 100 N | | |
| Crimp jaw distance | 3 +- 0.1 mm | | |
| Firmware Version | - | | |

**Comments:**

| |
|---|
| |

## 5.3. Functionality check

| | |
|---|---|
| ☐ | Perform 20 closures (if possible, with application) incl. wing height measurement |
| ☐ | Check positioning of clamp housing on application. Make use of step-by-step mode of the FAST 3000 (Requires Software version 4.1.2 or later, for details refer to Operating Instructions) |
| ☐ | Save data |

| Check parameter | Target | Actual | Status |
|---|---|---|---|
| 20 closures (attached file) | 0 failures | | |

**Comments:**

| |
|---|
| |

## 5.4. Embed into network

| | |
|---|---|
| ☐ | Setting the IP address and the subnet mask IP (request company address) |
| ☐ | Select operation mode (embedded or not) |
| ☐ | External Emergency Off Channel 1 & 2 |
| ☐ | Light curtain Channel 1 & 2 |
| ☐ | Ensure tool movement not conflicting with force measurement time windows. |

| Check parameter | Target | Actual | Status |
|---|---|---|---|
| I/O Test | | | |

**Comments:**

| |
|---|
| |

## 5.5. Training of operators and maintenance personnel

Detailed check list see chapter 6.1.

Persons trained:

| *Name* | *Position* | *Responsibility* | *Date* | *Signature* |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

## 5.6. Run @ rate

| | |
|---|---|
| ☐ | Perform at least 100 closures or production for 2 h to consolidate operator experience & verify trouble free operation.<br>Make sure that the crimping data is stored on the crimp force monitoring devices. |
| ☐ | Perform a WingGuard application health check with the data generated in the previous check point.<br>Use the template "WingGuard-ApplicationHealthCheck.xlsm"<br>If the check gives an insufficient result, check the checkpoints of this checklist again and make improvements where necessary. Otherwise, there is a risk that the assembly cell will repeatedly produce NOK parts due to outliers. |

| *Check parameter* | *Target* | *Actual* | *Status* |
|---|---|---|---|
| NOK closures | 0 | | |
| WingGuard Health Check | OK | | |

**Comments:**

| |
|---|
| |

## 5.7. Approvals

| | Name | Date | Signature |
|---|---|---|---|
| Customer Approval: Validation of assembly process OK according to check list of chapter 5. | | | |
| Oetiker Approval: Validation of assembly process OK according to check list of chapter 5. | | | |

# 6. Appendix

## 6.1. Training checklists

### 6.1.1. Training checklist for operator

Estimated duration: 30 Minutes

| | |
|---|---|
| ☐ | Trained as part of the commissioning of the FAST 3000 Serial number:<br>_____ |

| Topic | Training Document | Trained |
|---|---|---|
| Only one-man operation permitted when using the two-hand control panel | Operating Instructions 2.6 | ☐ |
| Instruction about hazard locations in normal operation | Operating Instructions 6.6 | ☐ |
| Use normal operation | Operating Instructions 6.6 | ☐ |
| 2 hand control panel | Operating Instructions 4.3 | ☐ |
| Unlocking / Initialization | Operating Instructions 6.4 / 6.8.1 | ☐ |
| Error protocol | Operating Instructions 7.4.6 | ☐ |
| Error management | Operating Instructions 7.4.6 | ☐ |

### 6.1.2. Maintenance personnel

Estimated duration: 2 Days

| | |
|---|---|
| ☐ | Trained as part of the commissioning of the FAST 3000 Serial number:<br>_____ |

| Topic | Training Document | Trained |
|---|---|---|
| Only one-man operation permitted when using the two-hand control panel | Operating Instructions 2.6 | ☐ |
| Instruction about hazard locations in normal operation | Operating Instructions 6.6 | ☐ |

| Topic | Training Document | Trained |
|---|---|---|
| Instruction about hazard locations with removed covers | Operating Instructions 2.4 | ☐ |
| Magnetic fields (setup aid, jaw test mirror) | Operating Instructions 6.5.2 | ☐ |
| Realized security concept | Operating Instructions 2.2 | ☐ |
| Commissioning including positioning of the tool mechanism | Operating Instructions 6.1-6.5 | ☐ |
| Use normal operation | Operating Instructions 6.6 | ☐ |
| Component overview (incl. options) | Operating Instructions 3.1 | ☐ |
| Clamping unit | Service Instruction 6.2.1 | ☐ |
| Crimp-Cut head (without CFM) | Operating Instructions Service Instruction 6.2.2 | ☐ |
| 2 hand control panel | Operating Instructions 4.3 | ☐ |
| Basic cycle (tensioning, crimping, cutting, band end ejection) | - | ☐ |
| Step-by-step cycle | Service Instruction 6.12 | ☐ |
| Process Monitoring, Closing force | Operating Instructions 5.1 | ☐ |
| Process Monitoring, Crimping | Operating Instructions 5.2 | ☐ |
| Process Monitoring, Cutting | Operating Instructions 5.3 | ☐ |
| Process Monitoring, Band end ejection | | ☐ |
| Monitoring motor currents (crimping, cutting) | Service Instruction 6.13.2.2 / 6.13.3.2 | ☐ |
| Main view outline | Operating Instructions 7.3 | ☐ |
| Main view details | Operating Instructions 7.4 | ☐ |
| Unlocking / Initialization | Operating Instructions 6.4 / 6.8.1 | ☐ |
| Overview access authorization / passwords | Operating Instructions 7.4.10 Service Instruction 8.1 | ☐ |
| Operation Mode: Lab | Operating Instructions 6.7 | ☐ |
| Operation Mode: Manual | Operating Instructions 6.8.2 | ☐ |
| Operation Mode: Friction Test | Operating Instructions 7.4.4 | ☐ |
| Operation Mode: IO-Test | Operating Instructions 7.4.5 | ☐ |

| Topic | Training Document | Trained |
|---|---|---|
| Process protocol | Operating Instructions 7.4.6 | ☐ |
| Error protocol | Operating Instructions 7.4.6 | ☐ |
| Error management | Operating Instructions 7.4.6 | ☐ |
| Verification protocol | Operating Instructions 7.4.6 | ☐ |
| Service diary | Operating Instructions 7.4.6 | ☐ |
| Tool parameter | Operating Instructions 7.4.7 | ☐ |
| Zero of pulling force | Operating Instructions 6.8.3 | ☐ |
| Pulling force verification | Operating Instructions 6.8.4 | ☐ |
| Crimp force monitoring verification | Operating Instructions 6.8.5 | ☐ |
| Information | Operating Instructions 7.4.8 | ☐ |
| Error list | Operating Instructions 7.4.9 | ☐ |
| Check intervals (verifications) | Operating Instructions 9.2.3 | ☐ |
| Service Types | Operating Instructions 9.2.4 | ☐ |
| Service Tool List | Operating Instructions 9.7 | ☐ |
| Service Kit A | Operating Instructions 9.2.5 | ☐ |
| Service Kit B | Operating Instructions 9.2.6 | ☐ |
| Replace mechanics | Operating Instructions 9.6 | ☐ |
| Technical documentation | Operating Instructions printed | ☐ |
| CAL01 qualified | - | ☐ |
| xVal | Operating Instructions Xval | ☐ |
| Application Notes | | ☐ |
| Technical Information’s | | ☐ |
| Defective jaws | | ☐ |
| Too large clamps | | ☐ |
| Wrong pulling force setting | | ☐ |
| Worn Cut Off Punch | | ☐ |
| Wrong PLC/controller settings | | ☐ |

| Topic | Training Document | Trained |
|---|---|---|
| Wrong CFM settings | | ☐ |
| Error pulling force plausibility check | | ☐ |
| Set up Band sensor | Operating Instructions 9.4 | ☐ |
| Screw-in depth drives | Service Instruction 18.2 /18.3 | ☐ |
| Set the closing force measuring chain | Operating Instructions 9.5 / 9.5.1 / 9.5.2 | ☐ |
| Set up crimp force monitoring | Operating Instructions 6.8.6 | ☐ |
| Load settings on crimp force monitoring devices | Operating Instructions 6.8.7 | ☐ |
| Settings CFM Restore | Technical Information 7 | ☐ |
| Adjust Crimp Force Monitoring | Technical Information 8 | ☐ |
| Crimp Force Sensor preload | Technical Information 10 | ☐ |
| ESD - Protection | Service Instruction 4 | ☐ |
| Electrical Enclosure | Service Instruction 6.3 | ☐ |
| Interfaces at electrical enclosure | Operating Instructions 6.2 | ☐ |
| Connecting cables, Harting connectors | Service Instruction 6.5 | ☐ |
| Replace PLC/Controller | Service Instruction 11 | ☐ |
| Load settings on force amplifier | Service Instruction 9 | ☐ |
| Read CFM curves | Service Instruction 14.2 | ☐ |
| Software-Update | Service Instruction 13 | ☐ |
| Assign IP address, read out lost address from PLC | Operating Instructions 8<br>Service Instruction 12.3 | ☐ |
| Industrial Communication / GSDML - File | Operating Instructions 10.1.2 | ☐ |
| Fieldbus mapping | Operating Instructions 10.1.3 | ☐ |
| Light Curtain Introduction | Separate Manual 08904518 | ☐ |