



# **Morgan Hinges, Inc.**

## **Quality Manual**

**Revision 11**

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**1. SCOPE.** This Quality Manual (QMAN) endeavors to define the scope of the Quality Management System (QMS) utilized by Morgan Hinges, Inc. (MH). It is designed to comply with established industry standards and as much as possible, those requirements requested by our customers.

**2. REFERENCES.** Our QMS is based upon AS 9100, Revision D (2016) and should comply with the requirements contained therein.

### **3. TERMS and DEFINITIONS.**

**3.1. WE.** At MH, there are three people who are knowledgeable and responsible for adherence to the company's QMS. Those three are the president, vice president for operations and the quality manager. When the term "we" is used, it refers to one or more of those three individuals.

**3.2. SHOP.** Shop refers to the location where hinges are assembled. As of this QMAN revision, the shop is located on Technology Street in Frisco, Texas.

**3.3. OFFICE.** Office refers to the location where orders are received, where finished product inventory is maintained, where orders are processed, and material shipped. As of this QMAN revision, the office is located at 12262 Genova Court in Frisco, Texas.

**3.4. COUNTERFEIT PARTS.** There are two possible counterfeit parts: 1). those manufactured by a company other than MH which are sold as hinges made by us, and 2). parts made by us that knowingly fail to meet our quality standards and do not meet product specifications.

**3.5. MANAGEMENT TEAM.** The team is the president, vice-president for operations (VP-Ops) and production manager/shop foreman/quality manager/engineer manager (PM/SFM/QM/EM).

### **4. CONTEXT OF THE ORGANIZATION.**

**4.1. UNDERSTANDING THE ORGANIZATION AND ITS CONTEXT.** MH exists in a market which is competitive and turbulent. Since end users of our product do not easily share information about contracts, it is difficult to forecast demands for our products. There is not a strong correlation between a robust national market and the volume of hinges we sell. While

slumps in the economy normally are felt as slowdowns for our business, advances in the US economy do not always mean advances in our sales. As foreign manufacturing increases, threats to our marketability increase.

**4.2. UNDERSTANDING THE NEEDS OF INTERESTED PARTIES.** The primary interested parties affecting our business are users of our products. Most are wanting a product that meets their hinge requirements. Some of those requirements are durability, strength, weight and cost. Often, they want the product quickly. Kloss Machine Company (KMC) is the machine shop in Arkansas that operates our machines. KMC must respond to our requirements for hinges and related products and adjusts its workload and personnel based upon our usage. We must keep them informed of our needs and projected usage.

**4.3. SCOPE OF THE QMS.** Our QMS applies to all products we manufacture, i.e., stainless steel and aluminum hinges, steel and aluminum leg mounts, knurled inserts, associated springs, pins and screws. It also applies to any of our products that have been returned for rework or modification. We do not accept user equipment other than previously purchased products which need to be addressed.

**4.4. QMS.** The details of our QMS are set forth within this manual and at Annex I. It addresses the interested parties, scope of the system, quality processes including sequences and interactions of personnel and management responsibilities pertaining to the system. All quality documents will be in English.

## **5. LEADERSHIP.**

**5.1. COMMITMENT.** We are committed to providing our customers with products that conform to product specifications, that meet customer needs and that are free from flaws created from machining or assembly. We do not want our products or company name associated with poor products. All our products are guaranteed to be free of manufactured defects and will be replaced if they fail, when properly installed and used, up to four years after being sold. Any serviceable product can be returned within sixty days or as deemed acceptable by the QM.

### **5.1.1. QUALITY GOALS.**

- a. On time deliveries: 95% or higher.
- b. Hinge returns: 0.5% or less return rate

- c. Knurled insert returns: 0.1% or less rate
- d. Leg mount returns: 0.1% or less
- e. Mis-shipments: 3% or less
- f. Assembler reject rate: less than 3%

#### 5.1.1.1. MANAGEMENT ACTIONS.

a. We will review performance against quality goals annually and record results of said review. For performance outside acceptable goals, adjustments to activities will be evaluated using the “plan-do-check-act” cycle. New plans will be developed to potentially improve performance; that plan will be implemented and evaluated monthly to see if it is accomplishing the intended improvements. If the plan does not produce the desired results, a new plan will be developed. The activities of the cycle will be recorded.

b. The SFM will ensure that adequate supplies are available so that assemblers can properly assemble hinges. He is responsible for coordinating with facilities management to ensure the work environment provided is suitable for assembling hinges.

c. We will review the QMS procedures with assemblers at least annually, or as needed, and will document the review.

d. All aspects of the QMS will be reviewed annually and results of the review documented.

e. We will maintain a customer complaint log capturing all problems, e.g., mis-shipments, discrepant parts, etc., reported to us by our customers and the corrective action taken. The log will be reviewed annually to determine if the corrective action was successful. That review will be documented.

f. Several of our major customers maintain statistics on our performance. Annually, we will review those metrics with B/E, Rockwell Collins, Bombardier, Textron and any other company that maintains data on our performance. We will determine what if any actions should be taken to improve our performance (above 95%) with any company that has us as under-performers. That review and any actions to improve performance will be recorded.

**5.2. POLICY.** The management of MH is committed to maintaining the highest quality standards, to comply with the requirements of AS 9100, Rev D, to ensure customer satisfaction, to maintain a work environment conducive to producing high quality hinges and other products and to be responsive to our customers’ needs and desires. Our QMS documents will be reviewed with employees annually. Those reviews will be documented.

**5.3. RESPONSIBILITIES.** The SFM shall be the Quality Manager (QM) and shall be responsible for insuring that the QMS is compliant with AS 9100, Rev D. As QM, he shall take the lead to

ensure the system achieves its intended results. He shall organize reviews of the QMS and make suggestions for improvements with a focus on customer satisfaction. The QM has unfettered access to the president and Vice president for operations and can implement quality improvements at his discretion—to be reviewed later by the management team. The QM can and should work directly with our major vendors and customers to address and resolve quality issues.

## 6. PLANNING.

### 6.1. RISK MANAGEMENT.

a. Loss of production capacity. Kloss Machine Company, Inc. (KMC) operates our machines in Beebe, Arkansas and has been doing so since 1997. Since Beebe is occasionally subject to tornadoes, there is a risk that a tornado could destroy the KMC facility and our machines. That would be a SOL situation. To mitigate that risk, we shall maintain insurance through KMC for our machines. During the period between KMC's facility being damaged and restored, we will use TWH Enterprises as a producer of our products. That will increase our costs dramatically and may have an adverse effect on our performance since TWH has never made any of our products.

b. Loss of market share. Should other producers of products comparable to ours enter the market from overseas and sell comparable items at a dramatically reduced price, we will have to lower our prices to be competitive. That may not be feasible. We may have to examine new products to supplement our market.

c. Production of nonconforming material. Even though our QMS outlines provisions and procedures for producing conforming products, there is a possibility of nonconforming items being accepted.

**6.2. QUALITY OBJECTIVES AND PLANS TO ACHIEVE THEM.** Our major quality goals are listed at 5.1.1. These goals are measurable and will be evaluated at least annually. As previously mentioned, these goals will be published and posted so employees are aware of them. The details of our QMS are discussed in Annex I and outline responsibilities and procedures to be followed to achieve our goals. Changes to our quality goals and the QMS will be implemented after being considered by the management team.

## 7. SUPPORT

## 7.1. RESOURCES.

**7.1.2. PEOPLE.** The core of MH, the management team, is three people: the president, vice-president for operations and the production manager/shop foreman/quality manager. They have been with the firm for 22, 19 and 11 years respectively. They have the experience to execute the QMS and to perform all tasks associated with the business. New production personnel will be selected based upon their background and familiarity with use of hand files. They will be given an initial two weeks of orientation and basic training to assess the likelihood of their succeeding as a hinge assembler. They will be shown how to assemble a hinge by a trained assembler. The qualified assembler will review the steps of the process worksheet and ensure that the new assembler understands each step. The qualified assembler will then observe the trainee assemble five or more hinges and ensure that the trainee is following the worksheet and understands each step. The trained assembler will ensure that the trainee's hinges are acceptable. The qualified assembler will then inspect batches of five hinges until the trainee can produce five acceptable hinges with no faults. After the trainee makes a batch of five acceptable hinges, the qualified assembler will be available for consultation. At the end of each work day, the QM will inspect each hinge and discuss discrepancies with the trainee. If after ten work days, the trainee is unable to assemble 90% of his hinges in an acceptable manner, he will be moved to another hinge or dismissed. We pay our assemblers a good wage which will encourage them to stay with us.

**7.1.3. INFRASTRUCTURE.** The shop is leased from Cube Smart, is heated and air conditioned, accommodates up to six assemblers, is generally free from outside contamination, and has adequate power to facilitate assembly of hinges. The grinding room is equipped with noise mitigation material and blowers to reduce pollution. An adequate supply of tools and equipment is maintained to facilitate assembly. The only tools needed for assembling are a hand-held drill motor, needle nose pliers, a variety of files, a vice, straight edge and a work board. The shop has adequate power to run the drill motors and maintain a suitable and stable environment. We are committed to maintain such an environment with adequate tools and equipment to make the assembly process as easy and convenient as possible while contributing to repeatedly producing a product that conforms to specifications.

**7.1.4. ENVIRONMENT.** As mentioned above, a suitable work environment shall be maintained to facilitate assembly of hinges. MH will not discriminate based upon race, color, ethnic background or sexual preferences. Employees may be allowed to work during hours of their choice, with a start time any time before 9:30 am. Since assemblers are paid per hinge, they can work at their own pace. Ear buds are encouraged. Hearing protection and use of safety glasses is required when grinding or drilling. Respirator masks, in addition to hearing protection

and safety glasses, are required when grinding or buffing. Each work station has its own light. Hand cleaner is available to aid in keeping assemblers' hands clean.

**7.1.5. MEASURING RESOURCES (including CALIBRATION).** To ensure products conform to standards, inspectors and assemblers have a straight edge and calipers available. Those are the only measuring devices needed to ensure conformance to standards. A straight edge is used to measure flatness and rotation. A caliper is used to measure lengths and depths of hinge pieces. Since calipers are the only devices used by assemblers and inspectors, they shall be calibrated using a known standard (traceable to NIST) and shall be ISO 10012 compliant. The known standard is a 3-inch block. A log will be maintained showing the number of each caliper, its location, its next calibration due date and the results of previous tests. Calipers will be calibrated annually, and results recorded. Each caliper will have its next calibration due date written on the back of the caliper. Results of calibration tests will be recorded.

**7.1.6. ORGANIZATIONAL KNOWLEDGE.** Our business is a simple one that does not require a lot of memory to figure out how to do things. However, to ensure that procedures are repeated and readily available to someone who might not normally perform some tasks, we have established several simple tools to retain organizational knowledge. First, there are process cards available to assist with assembling hinges. Those cards provide directions for assembling. Second, there is a book in the office that walks someone through various processes associated with QuickBooks and to process orders. Third, we have a contact list and an Approved Supplier List that aids in contacting suppliers and other sources. We weekly back-up QuickBooks so our history of transactions and other records are maintained.

**7.2. COMPETENCE.** MH is a small business and only three people will be trained to perform quality inspections. Periodically, each quality inspector will review quality inspection procedures and ensure that agreement continues to exist on quality procedures. Results of that review will be recorded. The hiring and training of new production personnel is covered in 7.1.2. Each assembler will have a qualification file showing which hinges he is qualified to assemble.

**7.3. AWARENESS.** At least annually, we will review with each assembler our Quality Goals and our QMS as it affects an assembler. That review will emphasize the importance of maintaining quality standards so that uniformity of product is maintained. We expect our employees to be law-abiding and treat each other with civility and facilitate a drug-free, non-discriminatory environment. Results of these reviews will be recorded.

**7.4. COMMUNICATION.** Generally, we will communicate with customers and vendors via email or telephone. Such communications will discuss products or supplies to be purchased, quality issues and other pertinent matters pertaining to our products. Any member of the management team may engage in discussions, but other members should be kept informed of significant discussions. Emails are the preferred method of discussion since emails are maintained on file.

**7.5. DOCUMENTED INFORMATION.** Results of reviews and other documented information will be retained as mentioned throughout this QM. Generally, a member of the management team will prepare, date and sign in ink all documented information. Hard copies of retained information will be filed in the office or shop, as appropriate. Electronic copies will be retained on computers. Since only the management team has access to our computers, improper access should not occur. Quality records will be retained for 10 years. Obsolete records will be destroyed. Since that information is not classified, there is no requirement to document destruction.

## **8. OPERATION.**

### **8.1. OPERATIONAL PLANNING AND CONTROL.**

a. MH manufactures and sells between 20,000 and 30,000 hinges annually. The hinges are made with rounded edges so that users will not be injured during operation of the hinge. KMC uses vertical machine centers to cut the metal into hinge pieces. Hinge runs vary in size from 200 to 1000 typically. Accordingly, the hinge pieces are easily produced in a consistent manner. Assembled hinges are easily inspected using a straight edge, calipers, and feel. Most of our hinges are made with stainless steel and should not fail. Their reliability has been proven through years of use. They are always ready to be used and easily maintained in that there is no maintenance requirement for them other than keeping debris away from the inside of the hinge. The aluminum hinges provide a lightweight solution to cabinet door installations. Those hinges have been tested and provide adequate strength for their intended use. We warrant our hinges for four years; however, the hinges last much longer than that. They are a simple solution to hinging requirements and seemingly have been suitable and will continue to be suitable for years to come. When assembled, our hinges are packed in small plastic bags as individual hinges and placed into inventory. They are stored in an environment where the temperature is maintained at 72 degrees plus or minus. The hinges have no shelf life and can last indefinitely in storage or in use. When users desire to replace a hinge because they are scratched or otherwise unserviceable, they merely discard them, or they can recycle them at local recycling points.

b. MH obtains all its hinge products from KMC and requires KMC to be compliant with AS 9100. Accordingly, KMC must establish systems and controls to ensure hinge pieces provided to us conform to established drawings, specifications and requirements. Since these hinge pieces are relatively simple to produce and since KMC has demonstrated its ability to provide compliant hinge pieces on a recurrent basis, we see no need to establish a sophisticated process control system. We expect KMC to use established computer programs to produce and reproduce the same product over and over. They perform in-process inspections of pieces before accepting them and shipping them to us. We likewise follow our procedures as outlined in the QMS to confirm conformity to standards and requirements. Procedures to manage the production process, to order material from KMC, to ensure non-delivery of nonconforming material and to ensure the on-time delivery of material that conforms to specifications are outlined in the QMS. MH currently has no plans to transfer production of its hinges to an outside source. Customers would be consulted should consideration be given to foreign production of our hinges.

**8.1.1. OPERATIONAL RISK MANAGEMENT.** The QM shall have primary responsibility for managing the risk of producing nonconforming products. While the likelihood of producing and selling nonconforming products is low, the consequences of doing so are significant, especially if the fault goes undetected for several months of production. To preclude this from occurring, the QM will ensure the QMS procedures are implemented and that acceptance, in-process and final inspections are performed and documented. If nonconforming pieces are received from KMC and are not detected during our initial random acceptance inspections, then 100% inspections of material will have to be implemented.

**8.1.2. CONFIGURATION MANAGEMENT.** The Engineering Manager (EM) will prepare and maintain all production drawings which contain the specifications for manufacturing all hinges, knurled inserts, leg mounts and mount blocks. No changes will be made to these drawings without his approval. Approval/revision dates will be shown on each drawing and will be used by the supplier to manufacture hinge and other piece parts. The EM will make and record changes to drawings. Any changes which affect form, fit or function will be coordinated with users and assemblers of the product. The QM or EM shall review accuracy and currency of all drawings at least every two years. The results for the review will be recorded and maintained until the next review occurs. Approved drawings will be stored in a book or online for safekeeping. The online files will be password protected. When a customer requests changes to a design, the management team will review those requests and coordinate with the customer to effect the changes as appropriate.

**8.1.3. PRODUCT SAFETY.** For almost thirty years, there has not been a reported accident at MH. Should an accident occur the details will be recorded. The biggest threats to bodily harm for an assembler are getting a gloved hand rubbed by the belt sander or grinding wheel or having a spring stick someone assembling the hinge. While these rarely occur, the consequences can be reduced by training on proper machine use and the installation of a spring. This is an acceptable risk. The hinge pieces present no safety issue to assemblers or to users. They are simply small pieces of metal. If a safety event ever occurs involving our products, we will notify all users of the problem and appropriate corrective action.

**8.1.4. PREVENTION OF COUNTERFEIT PARTS.** Counterfeit parts made by another company and sold as ours will be difficult to monitor since we have no visibility over other companies. We will be wary of machine centers wanting to buy our product and reverse engineering them. By design, our drawings reflect the machining requirements for our parts; however, our machined pieces do not automatically go together. The hinge pieces require filing, buffing and other adjustments that a normal machine shop would not accomplish. This serves as a deterrent to making our hinges by other companies. Since our hinges are all subject to three inspections, by two different people, the likelihood of knowingly making counterfeit parts is slim. We only have a few assemblers and we have reasons to trust them to make parts in accordance with specifications. Our current SFM has served with us for over ten years and is a part owner of the business. He is a relative and has no motive to produce counterfeit parts. He is the final inspector of assembled hinges, is also the configuration manager and is knowledgeable of current hinge designs. He is trained and capable of spotting and correcting hinges that do not meet our specifications. He follows the QMS instructions to preclude the building of nonconforming parts. Since we do not acquire our product from other sources, there is no need to establish a system to track product made from other sources. Any counterfeit, or nonconforming parts that cannot be brought into conformity will be initially placed in our nonconforming parts bin, recorded and eventually reevaluated and destroyed.

## **8.2. REQUIREMENTS FOR PRODUCTS AND SERVICES.**

### **8.2.1. CUSTOMER COMMUNICATION.**

a. We will maintain a website, [morganhinges.com](http://morganhinges.com), which will provide current information about our line of products, about specifications, uses and our terms and conditions. We will make available there our cover pages for technical drawings. Customers interested in more details can contact us via telephone or email and ask for complete technical drawings. We also will readily answer questions over the phone or via email.

b. We will accept verbal orders and formal purchase orders. We do not sign formal contracts with customers. We will accept purchase orders or verbal orders via email or phone. We do not use fax.

c. When an order is received, the purchase order will be reviewed for accuracy, evaluated to ensure material requirements can be met and a ship date will be established based upon the customer's required delivery date (RDD). All shipments generally will arrive to any destination within seven calendar days. Accordingly, the ship date will normally be seven days prior to the RDD. For items not being shipped the day of order receipt, the PO will be annotated with a ship date and placed on a bulletin board for incorporation into next week's ship list. Shipping an order or annotating it with a ship date constitutes acceptance of the order. Earlier ship dates may be established depending upon holidays and customer requests. If the item is not available, a new RDD will be established with the customer. Acceptance of a purchase order by MH from the customer acknowledges that the review is complete, and the requested terms can be met.

d. Items to be shipped will be removed from inventory, placed on a table near the shipping box, counted and either a picture taken of the items to be shipped (to confirm count) or the counting process will be recorded. All items will be packed using a cardboard box with load capacities sufficient to handle the weight of the shipment. Boxes will be sealed with industrial tape. Items to be shipped will be counted again as they are placed into the shipping box. At least one copy of the invoice (which contains the certificate of conformity) will be placed inside each box. Additional copies of invoices/certificates requested by specific customers will be used based upon their requirements. Shipping labels will be prepared based upon requirements contained in QuickBooks data base.

e. Items will be placed in inventory and grouped according to assembly date. When an item is picked for shipment, the ones that have been in inventory the longest are selected first. Items in inventory are stacked with the oldest items being stacked on top. This facilitates a first in-first out system.

f. If a shipment is going to arrive after the customer's RDD, MH will notify the buyer via email or telephone.

g. The invoice will normally contain a certificate of conformance statement. The invoice will contain the part number, quantity, ship-to address, lot number, invoice number, PO number, and other pertinent information. The shipper shall sign the invoice and approve the shipment.

h. When a customer submits an order, the receiver will review the order to see the customer's quality requirements. Often this will require going to a customer website. Before final acceptance of an order, the receiver will confirm MH's capability to comply with the customer's quality standards. If no formal purchase order is submitted, then the buyer will be

questioned to obtain customer quality requirements. MH does not use customer-provided tools or equipment.

#### 8.2.2. DETERMINING REQUIREMENTS FOR PRODUCTS AND SERVICES.

a. The use and capacities of our products are shown at our website. We have tested the hinges to confirm their strength ratings. When potential customers ask about using our products in specific applications, we will provide guidance about using our hinges. For example, we will advise customers against using aluminum hinges in drop-leaf tables because of weight issues. For customers using our hinges in furniture, we confirm that the application will work, especially since furniture builders often are looking for hinges that allow a leaf to drop down rather than fold over as our hinges do. We will also advise customers of our lead times and while we will try to meet short delivery times, we will advise them of realistic lead times for delivery.

b. All our products are guaranteed to be free of manufactured defects and will be replaced if they fail, when properly installed and used, up to four years after being sold. Any serviceable product can be returned within sixty days or as deemed acceptable by the QM.

8.2.3. REVIEW OF THE REQUIREMENTS FOR PRODUCTS AND SERVICES. Our products are almost always off-the-shelf items. Customers order specific items by our part number. They know what they are ordering when they order material. We will either respond to an order via email confirming the order or will ship to meet the requirements. When we determine we cannot meet the customers RDD, we will notify them and work to establish a mutually satisfactory new RDD. By either shipping the product or annotating a PO with an RDD, we have acknowledged the order and that constitutes our documented review. If a change is made to a purchase request by a customer, the PO will be either formally modified by the customer or annotated with the agreed to change. We comply with statutory requirements such as the following:

a. Our products do not contain any material identified as “conflict material.” Our subcontractors do not use “conflict material” in products delivered to us.

b. Our products comply with the REACH program and do not contain any “very high concern substances.”

c. We do not use any form of slavery or human trafficking in the production of our products or in our supply chain.

d. We are an equal opportunity employer and do not nor will not discriminate based upon race, religion, creed or sexual preference.

e. Our products are not defense items and comply with export laws.

f. Our employees will be paid a wage above the current market value for comparable skills. Generally, our employees will earn more than \$ 25 an hour and will have no education prerequisites for the job.

g. Our quality system will comply with AS 9100, Revision D.

h. We will maintain a workman's compensation policy and adequate product liability insurance.

### 8.3. DESIGN AND DEVELOPMENT OF PRODUCTS AND SERVICES.

#### 8.3.1. OUR DESIGN PROCESS.

a. Prior to developing a new product, the EM will review with the QM and VP-Ops the nature of the proposed product and specifically evaluate the ability of the company to produce a consistent product that meets the customers' needs. These reviews will be informal and although the standard requires for the review process to be thoroughly documented, that seems excessive for most design changes. For example, will the proposed item have enough strength to meet stated needs? Can suitable springs be installed? Will the product operate smoothly? Will the item meet cosmetic requirements? Requests for change to a product from a customer will be retained on file along with any additional exchanges pertinent to the change's development.

b. When customers request that MH produce a new product that either conforms to their specifications or that solves a customer problem, the request will be evaluated in a timely manner, preferably within a week. If the design effort is more difficult, the customer will be notified of a target design completion date.

c. Once a design is completed, the EM will develop and provide the customer with a draft drawing, and the cost and lead time associated with producing the new product. If the customer desires MH to proceed, a buyer will provide us with a confirmation of design acceptance and a purchase order ordering the item.

d. For each new item, MH will conduct a First Article Inspection Report (FAIR) on the item to confirm it was manufactured to specifications. The FAIR will comply with AS9102 standards. Copies of FAIR's will be retained on file and provided to customers as requested. FAIs will be redone after each revision to a drawing or every two years. Exceptions to these guidelines can be granted by the QM.

e. Once a change has been tested for conformity to design, the management team will test the produced change to see if it accomplishes the intended result. The testing will be based upon written test requirements which will be recorded and maintained on file. A summary of the test results will likewise be documented. After the newly designed item has

passed a FAI and passed the test criteria established to confirm success of design, the product will be sent to the customer for review and approval.

f. Essentially the same process will be used for new products initiated by MH.

g. NOTE: The hinge products we make are simple and do not require exhaustive management. The management team will be responsible for developing new designs and testing them. We have ample internal resources to make design changes to our products.

**8.3.2. TESTING AND EVALUATING.** After a design change has been formulated and the prototype has been inspected to ensure it is built to new specifications, a rudimentary test plan will be developed by the management team. These plans will generally be simple. For example, if a restrainer needed to be lengthened to properly time hinge rotation, the test would be to install the restrainer and observe how well it times the hinge rotation. It could and normally would be a one or two step test. With our products being so simple in design, verification and validation testing will generally be simple and require little more than a common-sense approach. The test plan and results of the testing will be documented. The test plan will be approved by QM.

**8.3.3. CUSTOMER NOTIFICATION AND/OR APPROVAL.** For design changes requested by customers to meet a need, we will obtain customer approval for the proposed design change and after the change has been implemented in a prototype and passes our evaluative tests, a prototype will be sent to the customer for review and approval. Customer approvals of design and final prototype will be documented. For design changes implemented by us or in response to a specific customer, other customers affected by the change will be notified of the change and as appropriate given the option to approve the new design for them or to stay with the old design. No substitutions for required raw material will be made without customer approval.

**8.3.4. DESIGN CHANGES AND CONFIGURATION MANAGEMENT.** Approved design changes will be incorporated into our drawings and the drawing files updated to reflect the changes. Affected customers and KMC will be notified of the changes and provided a copy of the current drawing, as appropriate.

#### **8.4. CONTROL OF EXTERNALLY PROVIDED PROCESSES.**

a. MH uses only two externally provided processes: heat treating of stainless steel and anodizing of selected aluminum hinges. Coleman Heat Treating of Jacksonville, Arkansas and TWH Enterprises of Batesville, Arkansas are our approved suppliers for those processes, respectively. Both have been AS 9100 certified and we will continue to use them only if they continue to be certified. We will consider that certification as evidence that they implement

the provisions of that standard and pass it down to their subcontractors, as appropriate. Accordingly, they will be placed on our Approved Supplier List (ASL) until they merit removal. Additionally, since we use their services often, we will review their performance to confirm renewal of placement on the ASL. That review will be documented. If either TWH or Coleman fails to perform satisfactorily, i.e., two quality complaints within a six-month period, we will discuss the issue with them and inform them that another quality issue within the next six months will motivate us to seek an alternate supplier of the special process.

b. Applying controls to TWH for anodizing and to Coleman for heat treating is virtually impossible other than inspecting the product when we receive it. Examining anodized pieces is a simple matter of performing a visual inspection. Those results are recorded on the packing slip and retained. If discrepancies are found, we will notify TWH via email, at a minimum. Coleman provides a certificate that confirms heat treatment. Those certificates become part of the retention package for heat treated material. As assemblers file on hinge pieces, they can informally confirm that the pieces have been heat treated as stated. If they note “softer” material, they will notify the SFM and pieces will be returned to Coleman for confirmation of heat treatment.

c. No hinges will be released to customers without first having special process procedures being confirmed. Annually we will ask KMC to visit Coleman and observe confirmation of hardness. That observation will be annotated on an applicable packing slip.

d. Both TWH and Coleman provide “off the shelf” services. Anodizing of aluminum hinge pieces and heat treating of stainless steel hinge pieces have been accomplished by these two entities for us for over 25 years. The processes have been repeated countless times. There is no need to redefine the requirements for these processes to either company.

## 8.5. PRODUCTION AND SERVICE PROVISION.

### 8.5.1. CONTROL OF PRODUCTION.

a. Current drawings of hinges will be available to assemblers if needed to verify conformity of product to assembly. Moreover, process cards will be available providing detailed instructions for assembly and for acceptance criteria.

b. Calibrated calipers and straight edges will be available for assemblers to measure hinges during production.

c. Each assembler will perform two in-process inspections on EVERY hinge to confirm conformity. Process cards will detail inspection points, acceptance and rejection criteria, and use of straight edges and calipers.

d. Assemblers will use provided noise reduction devices to adjust hinge side frames as appropriate. They will also use the grinders in an environmentally controlled room to mitigate

noise and dust accumulation. They are required to wear respirator masks while grinding and hearing protection while grinding, buffing or using any power tools. That applies to safety glasses as well. No mobile devices are used in these areas, except to listen to audio with headphones.

e. Assemblers must be trained and certified on a hinge before being able to assemble hinges for final acceptance.

f. The SFM will perform a final inspection on every hinge. This will confirm conformity of hinge to specifications and revalidate assembler's ability to assemble. When the SFM finds more than 4% of hinges initially rejected, he will counsel assembler. Repeated counseling will lead to termination of assembler.

g. The SFM will provide instructions for correctly assembling hinges when counseling occurs.

h. Accepted hinges will be labeled, bagged and taken to the office for introduction into inventory.

i. The process cards will tell assemblers the acceptance criteria and samples of acceptable hinges will be provided to assemblers, if requested. Cards will be updated as needed and the review dates will be recorded.

j. The SFM will keep track of hinge pieces by maintaining totals on cards in hinge bins.

k. Assemblers will be trained on use of straight edges to achieve acceptable final rotation of hinges.

l. Process cards will provide instructions for in-process inspections.

m. Evidence of final inspections will be recorded on assemblers' time sheets.

n. Each assembler will use a small brush to keep area free from foreign objects.

o. The electrical systems and other shop environmental characteristics do not affect the conformity of hinges to specifications and do not need to be monitored or adjusted.

**8.5.1.1. CONTROL OF EQUIPMENT AND TOOLS.** The only tools or measuring devices used by assemblers and inspectors are files, straight edges, and calipers. New files will be available for replacement at the assemblers' discretion. Calipers will comply with the MH calibration system. Straight edges must be straight.

**8.5.1.2. VALIDATION AND CONTROL OF SPECIAL PROCESSES.** MH performs no special processes. Special processes performed by suppliers have been previously addressed at 8.4.

**8.5.1.3. PRODUCTION PROCESS VERIFICATION.** Producing our hinges so that they conform to specifications is a simple deal. An assembler can assemble 10-15 hinges in an hour. We will use cameras within the shop to record assembly actions of employees. If an assembler is generating too many unacceptable hinges, we will review the "tapes" to help determine what

the assembler is doing to not produce conforming hinges. Typically, problems occur because the files need to be replaced, the assembler did not take the appropriate amount off the center link when grinding, the assembler filed too much off the side frame or off the stop tabs, or the side frames are bent too much. Occasionally hole location may be off by a few thousandths and require filing adjustments. If the assembler cannot figure out what the problem is, the SFM will determine the cause and give instructions. MH will perform First Article Inspections as required by current standards.

**8.5.2. IDENTIFICATION AND TRACEABILITY.** Identification and traceability shall be maintained by following the procedures outlined at Annex I, 1.a.1-9.

**8.5.3. CUSTOMER PROPERTY.** We do not use customer property.

**8.5.4. PRESERVATION.** Hinges that pass final inspection shall be bagged in accordance with the procedures in Annex I, 1.a.6-9. Our hinges products do not require special handling. They have no shelf-life limitations and contain no hazardous material.

**8.5.5. POST-DELIVERY ACTIVITIES.**

a. Once our hinges are sold to customers, we have little visibility over their use unless they cause a problem in the field. Through experience we know that our hinges typically last well beyond the four-year warranty period because occasionally end users have asked questions about installing new springs or have asked us to re-spring old hinges that appear to be over 10 years old. We will ask customers to periodically complete a survey; however, experience has shown that users typically do not complete the surveys. Our assumption then becomes: no complaints mean no problems.

b. When problems are reported from users, we will immediately take steps to identify the root cause of the problem, determine the extent to which the problem affects hinges already sold and those in inventory, develop possible solutions to the problem, test fixes to find a solution to the problem, implement the fix and apply it to new production and retrofit it to previously produced stock, notify affected customers and implement a recall as appropriate. The final solution will be introduced into drawings and new production after originally complaining customer has confirmed that the solution meets their needs.

**8.5.6. CONTROL OF CHANGES.** Changes to any drawings will be affected by the EM (SFM) and approved by QM and President or VP-Ops. Those approvals will be documented. Changes to process cards or any other element of the QMS will be approved by the SFM/QM and documented.

**8.6. RELEASE OF PRODUCTS.** Changes to hinge designs will only be introduced into production after the hinge, with changes, has passed a First Article Inspection. For each new item, MH will conduct a First Article Inspection (FAI) on the item to confirm it was manufactured to specifications. The FAIR will comply with AS9102 standards. Copies of FAIR's will be retained on file and provided to customers as requested. FAIs will be redone after each revision to a drawing or every two years. FAIRs will be provided along with applicable certifications to requesting customers. FAIRs and certifications will be retained for ten years. The QM and President or VP-Ops will approve FAIRs.

### **8.7. CONTROL OF NONCONFORMING PARTS.**

**8.7.1. NONCONFORMING MATERIAL IDENTIFICATION.** Nonconforming material can be identified at different stages. First, all incoming material, e.g., hinge pieces, inserts, leg mounts, anodized items, will be inspected for conformity to established specifications for that item. Any nonconformities will be identified. For hinge pieces, a log in the shop will be used to note the nonconformity and the number of items affected. Since occasionally a machining operation may be missed, a very small number of nonconforming material (e.g., 2 pieces out of 3000) is acceptable and no corrective action will be initiated. If the nonconformity exceeds 1%, we will notify KMC of the problem and discuss solutions. Those conversations and actions will be documented. As appropriate, KMC will be asked to adjust future productions. For inserts and leg mounts, a comparable inspection log will be maintained indicating any nonconformities. Corrective actions pertaining to leg mounts and inserts will also be documented. Second, assemblers can generate nonconforming material through misjudgments in grinding or filing. Those errors will be recorded on the shop's nonconforming log and the material placed in the nonconforming bin. Those items will be discarded at least quarterly. The QM, president or vp-ops can perform incoming inspections and final inspections. Accordingly, they are authorized to identify nonconforming material and dispose of it. If nonconformities are discovered after the product has been sent to customers, the affected customers will be notified of the problem and corrective actions forwarded to them. These notifications will be documented. Items that have been reworked to eliminate a nonconformity will be given a special lot number and customers told of the rework. They will be given an opportunity to approve of the reworked material.

**8.7.2. NONCONFORMITY DOCUMENTATION.** As mentioned above, documentation shall be retained which identifies the nonconformity, corrective action taken, impact of the nonconformity on previously shipped material, recall instructions as applicable, and any

concessions given to customers. A member of the management team will approve these actions.

## 9. PERFORMANCE EVALUATION.

### 9.1. GENERAL.

a. MH will monitor its performance of the following: on-time deliveries, returns, receipt of nonconforming material, and assembler reject rates.

b. On time deliveries will be informally monitored by the VP-Ops. We will monitor delivery metrics maintained by major customers who have monitoring programs (Dassault Falcon Jet, Rockwell Collins, Gulfstream, Textron) and maintain a 95% rating based upon their data. For mis-shipments, we will record all mis-shipment info in the customer complaint log and review those against total shipments. Assembler reject rates will be recorded on assembler time cards. Nonconformities will be recorded on logs as discussed above. Reviews of these performance elements will be analyzed and evaluated at least annually and documented. This shall be part of the review of the entire QMS.

**9.1.2. CUSTOMER SATISFACTION.** Any shortfalls in our QMS that affect our customers will be documented in a customer complaint log. That information will be used as part of the annual review of the QMS to help determine the level of customer satisfaction. Likewise, we will send out at least one quality survey to each major customer annually and evaluate whatever feedback is received (which has previously been next to nothing.) Based upon the review, we will develop plans to improved customer satisfaction.

**9.1.3. ANALYSIS AND EVALUATION.** The annual review will assess data to evaluate and assess overall conformity of products to specifications, customer satisfaction, the effectiveness of the QMS, the effectiveness of any changes or improvements implemented, and the need for additional improvements to the QMS. These discussions, conclusions and recommendations shall be documented.

### 9.2. INTERNAL AUDIT.

**9.2.1. INTERNAL AUDIT FREQUENCY.** Internal audits will be completed on a random, but frequent basis as we complete quality surveys submitted by customers to ensure we are AS 9100 compliant. Those completed surveys will be retained on file and constitute documented proof of the audit and its extent. The audits will be performed by a member of the management team. Unfortunately, we are such a small organization that finding a totally

impartial auditor seems unrealistic. We occasionally have outside auditors visit and audit our activities. They provide total impartiality.

**9.2.2. AUDIT CRITERIA.** The audit criteria shall be in compliance with AS 9100, Revision D. When we find we are not complying with a questioned area, we will discuss the noncompliance with the management team and adjust our QMS as appropriate. The audit results will be retained for ten years.

### **9.3. MANAGEMENT REVIEW.**

**9.3.1. GENERAL.** The management team will conduct its management review at least annually to ensure the effectiveness of the QMS and its alignment with strategic objectives of the company.

#### **9.3.2. REVIEW INPUTS.**

- a. Reviews will evaluate previous management reviews.
- b. Changes that have affected or that will affect the QMS.
- c. Performance information including customer satisfaction, quality objectives, nonconformities, corrective actions, monitoring and measurement activities, audit results, the performance of KMC and TWH, on-time delivery performance, personnel, shop adequacy, risk mitigation and opportunities for improvement.

**9.3.3. MANAGEMENT REVIEW OUTPUTS.** A documented summary of the review will address each of the above areas and discuss any future risks affecting the company.

## **10. IMPROVEMENT.**

**10.1. GENERAL.** Actions to improve operations and achievement of performance goals shall be implemented as soon as practical, i.e., using photos to capture quantities of material to be shipped to customers. The focus of improvements will be to correct, prevent and reduce undesirable effects and to improve the QMS.

### **10.2. NONCONFORMITY AND CORRECTIVE ACTION.**

**10.2.1. NONCONFORMITY AND CORRECTIVE ACTION PLAN.** When a nonconformity occurs, we shall immediately evaluate the problem and determine its cause. If it is a production issue, we shall take action to identify a solution which solves the problem. We will then implement the

solution after confirming that it works and meets the customers' needs. We will examine inventory and previously shipped comparable items to see if they are affected and if so issue a recall and/or correct affected products. We will determine if the problem could be affecting other hinges or products and if so, apply solutions there. If the problem stems from KMC or TWH, we will contact them and develop a corrective action plan. Affected customers will be notified of our actions and progress. Products which have the solution affixed will be sent to affected customers for their approval. We will ensure that a solution is achieved as quickly as possible.

**10.2.2. NONCONFORMITY DOCUMENTATION.** We will maintain documentation addressing the entire process.

**10.3. CONTINUAL IMPROVEMENT.** MH is committed to providing quality products, to satisfying customers, and to improving our QMS to achieve those results. We will annually review lessons learned, problem resolutions and performance metrics to learn from our past efforts and improve in the future.

## ANNEX I. QMS PROCEDURES

1. **PROCESSING INCOMING MATERIAL AND PREPARING FOR SHIPMENT.** MH, Inc. will follow the procedures listed below to implement its QMS as pertaining to processing incoming material and preparing items for shipment:
  - a. **HINGES.**
    1. When any shipment of machined hinge pieces arrives, the shop foreman (SFM) will first examine the accompanying documentation (packing slip and material CERTS) to confirm or assign an appropriate lot number for the shipment based on material CERTS/date. Packing slip contains part numbers of items shipped and the corresponding material CERTS for each. Parts will be segregated until inspection is complete. He will record the lot number on the shipping documents, place a tag indicating the lot number on the pieces, and file the documentation. This information will be recorded in the Received Shipment Log.
    2. After separating the incoming hinge pieces, foreign objects will be removed and the SFM will inspect 1% of them to ensure they conform to acceptable acceptance dimensions and standards. The results of the inspections for at least one representative set of hinge pieces will be recorded and filed. If any discrepancies are discovered, nonconforming pieces will be segregated and placed in the nonconforming parts bin. Additionally, the receiving inspection will be expanded to include 10% of received material. If additional discrepant material is found, it will be segregated, and a 100% inspection will be performed. Results of either a 10% or 100% inspection will be recorded. If more than 0.5% of inspected material is found, Kloss Machine Company (KMC) will be notified and a plan to correct the problem will be developed.
    3. If no discrepant material is found, the SFM will label each set of hinge pieces with a label that identifies the lot number for the pieces. Those boxes of material will be stored until needed for assembly. *NOTE: Since all hinges are made from either stainless steel or aluminum, there is no shelf life on the pieces and no additional storage precautions need to be taken other than keeping the material free from debris.*
    4. When it is time to use “new” hinge pieces, the assembler will write the lot number of the pieces on their individual display board so that the assembler and the SFM will know the lot number of the material being assembled. Additionally,

the assembler will be given a “process card” which outlines the step by step requirements for assembling the specific hinge he is working on. Since our veteran assemblers have assembled literally thousands of the same hinge, the SFM may waive that requirement.

5. During the assembly process, the assembler will conduct at least two in-process inspections of each assembled hinge. As each hinge is assembled, the assembler will check it for smooth rotation, proper rotation, proper flatness, and for appearance. At the end of the day, the assembler will recheck all hinges assembled during the day and make any adjustments to achieve hinge acceptability. These two in-process inspections need not be recorded.
6. After an assembler completes the second in-process inspection, the SFM will perform a final inspection of each hinge. The results will be recorded on the assembler’s time sheet. Those hinges that do not pass “final” inspection will be set aside with a note describing the reason for rejection and the assembler will be required to correct the problem before a second final inspection is performed. Hinges that cannot be corrected will be placed in the nonconforming material bin. If the SFM discovers more than 3% of the hinges to fail final inspection, the assembler will be informally counseled. If that failure rates persists, the assembler will be formally counseled with the results of the counseling recorded. After a third counseling session, the assembler will be placed on probation and future unacceptable completion rates will lead to dismissal.
7. Hinges that pass final inspection will be placed in a box for bagging, segregated and clean of any debris. A small label will accompany accepted hinges indicating the quantity to be bagged, the part number of the hinge and the lot number of the hinge. During the bagging process, each hinge will have its part number and lot number written on it with a permanent marker. The hinge, along with a quality INSPECT and a part number label, will be placed in bag in preparation for the hinge to be placed in inventory.
8. Some hinges may be stored in the shop without being bagged nor labeled because the final configuration of the hinge (based upon springing) has not been determined or for other reasons. Those hinges remaining in the shop awaiting final bagging will be grossly labeled and segregated based upon generic part number and lot number.
9. Hinges that have been bagged will be taken to the office and introduced into inventory. There they will be separated by lot number, entered into QuickBooks inventory and the current inventory count posted on the inventory card.

b. KNURLED INSERTS.

1. When a shipment of knurled inserts arrives, the receiver will examine the accompanying documents to determine heat number for the shipment. He will assign a lot number to the shipment which will correlate with the heat treatment number.
2. The receiver will inspect 1% of incoming inserts for the following: length of insert (within +/- 0.10"), outer diameter of insert (within 0.15"), proper thread and proper thread depth (more than half the length of the insert), plus appearance. If all inspected inserts are within tolerance, a check will be placed on the receiving document indicating the inserts passed the inspected criteria.
3. The receiver will update the Receiving Log indicating the number of inserts received by part number and lot number. Any discrepancies will be listed.
4. If any discrepancies are found during this incoming inspection, a 100% inspection of all inserts focusing on the failed criterion will be conducted. Discrepant inserts will be reported to KMC before being returned or discarded.
5. Accepted inserts will be bagged in multiple quantities of 100. The bags will be labeled with part number, quantity and lot number and placed into inventory. The inventory card for the container will be updated as well as QuickBooks.

c. LEG MOUNTS.

1. Leg mounts will not be assigned lot numbers. Receiver will check for length, outer dimension and appropriate indentations. Thread will be confirmed as screws are installed. Results of inspection will be recorded on the shipping document. Discrepancies will be reported to KMC.

2. APPROVED SUPPLIER LIST (ASL).

a. APPROVED SUPPLIERS. MH will develop and maintain an Approved Suppliers List (ASL). The QM will approve suppliers to be added or retained on the ASL. Approved suppliers will comply with MH quality requirements and will be evaluated for retention on the ASL at least every three years. A set of requirements for each supplier will be sent to the supplier for acceptance and used for audits. Those suppliers who have a current certificate indicating

conformance to an applicable national quality standard will not be required to complete our survey but will be accepted as a suitable supplier based upon their certificate of compliance.

b. **KLOSS MACHINE COMPANY.** Since Kloss Machine Company, Inc. (KMC) operates vertical and horizontal machine centers owned by MH, KMC will be the supplier of choice for hinge parts and related products. KMC will maintain its own quality management system, produce material in compliance with drawings supplied by MH and according to the agreed upon manufacturing schedule. The QM for MH will periodically meet with the KMC QM to review quality issues pertaining to related products. Records of these discussions will be retained for ten years.

c. **SUPPLIER QMS.** KMC and other suppliers of hinges and hinge related machined parts will have their own quality management systems and provide evidence of compliance to flow-down requirements via completion of a supplier survey. Suppliers will be approved for three years. Extensions without re-auditing can be approved at the QM's discretion, based upon the supplier's performance. Records of these audits will be retained on file for ten years. Vendors who are ISO 9001 certified will not be audited by MH, but a copy of their certification will be retained.

d. **DEVIANT MATERIAL.** KMC will be expected to provide material that conforms to specifications provided to them, along with raw material certs. Material that deviates from specifications may be accepted if the deviation can be overcome through filing and assembling procedures. Deviant material that cannot be accepted will be returned to KMC for correction or other disposition. If two deviant batches of material in a row are obtained from KMC, the QM may conduct an on-site audit of KMC's quality program. Should improvements not occur, MH will initiate actions to find a new supplier.

e. **PURCHASE ORDERS.** Purchase orders to our suppliers will be forwarded via e-mail and will specify quantity and part number to be delivered.

f. **DOWEL PINS AND SCREWS.** Our dowel pins and screws will be sourced from domestic (USA) companies, unless our customer specifically asks us to use a foreign-produced item. We will require that they certify their products meet applicable ANSI or AMSE standards. We give preference to domestic materials but will purchase those that have the greatest strength and reliability. During the hinge assembly process, the diameter and length of the pins and fit of screws will be validated by the assemblers. Since the hinges will not assemble correctly with pins or screws that are out of tolerance, no inspection records will need to be maintained. Pins or screws that do not "work" will be placed in the reject parts box and disposed.

### 3. REWORK PROCEDURES.

a. **CUSTOMER COMPLAINT LOG.** When products are returned for “rework”, first record the request, if not already recorded, in the customer complaint log.

b. **ITEM COUNT.** Complete the MH Product Return Form. Confirm the count of items returned. If possible have a witness present when counting or use a recording device. Label return material to ensure that it does not get comingled with other products.

c. **PRODUCT EXAMINATION.** Examine the product to confirm the fault or reason for return. Use the appropriate drawing, assembly instructions and calipers as necessary to confirm the “problem.”

d. **CAUSE OF PROBLEM.** Once the problem has been confirmed, examine product to determine the cause of the problem.

1. If the product was inappropriately machined and cannot be repaired, discuss with VP-Ops and prepare to scrap product.

2. If product was inappropriately assembled and is beyond repair, discuss with VP-Ops and prepare to scrap product.

3. If the product can be repaired, develop a repair plan. Write instructions for assemblers to use in the repair process. Once repair is accomplished, re-inspect for success of repair. Keep a separate checklist for these items and record re-inspection results. Once accepted, retain original lot number but add an “R” to it to reflect that the item has been repaired or reworked.

e. **ROOT CAUSE STUDY.** After repair of product, conduct a root cause study to determine how the fault occurred. Adjust assembly procedures as necessary or perform extra training for assemblers if needed. Re-evaluate inspection criteria to ensure that the fault is not missed on future inspections.

f. **RETURNS DEEMED WITHOUT DEFECT.** If upon inspection it is determined that there is no problem, label each returned item with its original lot number and add the “F” to indicate that the product has been inspected. Inform VP-Ops of the product’s status. He will confirm determination and notify owning customer of our determination and coordinate the return of the product.

ANNEX II. ORGANIZATION CHART



# Morgan Hinges, Inc.

