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1.0 Executive Summary

This document is a final report for the 2010 Alliance Senior Design Project. The 2010 Alliance Senior Design Project was performed by the Alliance Senior Design Team from Gonzaga University for Alliance Machine Systems International, LLC (AMSI). This project encompassed a redesign of the tamper system on the Extendo product manufactured by AMSI.

The tamper assembly is mounted on the Extendo end of the FeedMax machine. The FeedMax machine feeds corrugated sheets, from a stack, to a hopper on the converting machine in the converting line. The Extendo end is a conveyor belt that transfers the corrugated sheets to the hopper. The tamper system aligns the corrugated sheets after they have left the Extendo end of the FeedMax machine and dropped into the hopper. The corrugated sheets are leaving the hopper at the same rate they are entering. The tamper assembly only aligns the side of the corrugated sheets that are on the FeedMax end of the sheets. The aligning is currently achieved by pneumatic cylinders that tamp the back and both sides of the corrugated sheets.

The current tamper system manufactured by AMSI tends to perform poorly with smaller sheets of corrugated material. This can be resolved by reducing the overall height of the drop that the pieces of corrugated sheets encounter created by the tamper assembly. Also, the pneumatic cylinders on the current tamper system have a product life of 6 to 12 months due to corrugated dust and torque applied to the cylinders. The Design Team redesigned the tamper assembly to lengthen the life cycle of all of parts on the tamper assembly.

The Design Team utilized a set of guides with an attached vibration motor to address the issues with AMSI’s current product. This allowed for a reduced drop height and longer part life. A prototype was built and tested to prove the merits of this design. This report reviews the work completed by the Design Team. It outlines how the product works and was tested. The test report concludes that this design can work well and although further testing and design work must be done, it is worth investigating.
2.0 Vision Statement
By May of 2010 the Alliance Senior Design Team from Gonzaga University will create an improved design for the tamper used on the Extendo product manufactured by the project sponsor, AMSI.

The sponsor has three primary design goals:

1. Reduced height of the assembly
2. Increased life of the components
3. Meet items 1 and 2 without increasing the overall assembly cost.

3.0 Deliverables
The 2010 Alliance Senior Design Team will deliver the following items to AMSI. These deliverables have been updated from the Project Plan:

<table>
<thead>
<tr>
<th>Deliverable</th>
<th>Required Format</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final Test Report</td>
<td>Design team discretion</td>
</tr>
<tr>
<td>Theory of Operation</td>
<td>Design team discretion</td>
</tr>
<tr>
<td>Design Recommendations</td>
<td>Design team discretion</td>
</tr>
<tr>
<td>Part and Assembly Drawings</td>
<td>Specified by AMSI. Must be created / editable in SolidWorks</td>
</tr>
<tr>
<td>Safety Risk Assessment</td>
<td>Specified by AMSI</td>
</tr>
<tr>
<td>Patent Search Results</td>
<td>Design team discretion</td>
</tr>
</tbody>
</table>

Table 1: Project Deliverables

Deliverables should be created in one of the following preferred software programs:

- MS Access
- MS Excel
- MS PowerPoint
- MS Project
- MS Publisher
- MS Visio
- MS Word
- Adobe Acrobat
- SolidWorks

Other formats are acceptable but require written approval by the Project Sponsor and Project Advisor.
4.0 Target Design Specification

The following information has been provided to the design team and is incorporated into this document by reference:

- Extendo Tamper Design Project; Alliance Machine Systems International, LLC; dated July 2009

Additionally, the Alliance Senior Design Team’s redesign of the tamper assembly will comply with the following specifications outlined in Table 2: Target Design Specification. If a conflict arises between information in Table 2 and the documents provided by AMSI, the documents provided by AMSI will take precedence.

<table>
<thead>
<tr>
<th>Target Design Specification</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Dimensions</td>
<td></td>
</tr>
<tr>
<td>Minimum Side Tamper Distance</td>
<td>10”</td>
</tr>
<tr>
<td>Maximum Side Tamper Distance</td>
<td>135”</td>
</tr>
<tr>
<td>Weight</td>
<td>&lt; 300 lb</td>
</tr>
<tr>
<td>Operating Parameters</td>
<td></td>
</tr>
<tr>
<td>Cycle Time</td>
<td>200 ms</td>
</tr>
<tr>
<td>Side Clamp Time</td>
<td>115 ms</td>
</tr>
<tr>
<td>Back Clamp Time</td>
<td>50 ms</td>
</tr>
<tr>
<td>Cardboard Tamped/Cycle</td>
<td>1 sheet</td>
</tr>
<tr>
<td>Drop Height</td>
<td>&lt; 6”</td>
</tr>
<tr>
<td>Tamping Range</td>
<td>3”</td>
</tr>
<tr>
<td>Force to Overcome Friction</td>
<td>7.23 lb</td>
</tr>
<tr>
<td>Durability</td>
<td></td>
</tr>
<tr>
<td>Cylinder Life</td>
<td>&gt; 6-12 Months</td>
</tr>
<tr>
<td>Bearing Life</td>
<td>&gt; 12 Months</td>
</tr>
<tr>
<td>Air Supply</td>
<td></td>
</tr>
<tr>
<td>Air Supply Rate</td>
<td>15 cfm</td>
</tr>
<tr>
<td>Air Pressure</td>
<td>80 psi</td>
</tr>
<tr>
<td>Supply Air Quality</td>
<td>Water Vapor 2550 ppm @ 82°F Dew Point</td>
</tr>
<tr>
<td>Environmental Parameters</td>
<td></td>
</tr>
<tr>
<td>Ambient Temperature</td>
<td>41°F to 122°F</td>
</tr>
<tr>
<td>Variation in Stacked Corrugated Sheets</td>
<td>± 1/16” in all directions</td>
</tr>
<tr>
<td>Corrugated Sheet Stack Height</td>
<td>1’’ - 20’’</td>
</tr>
<tr>
<td>Amplitude of Hopper (Max)</td>
<td>0.01’’</td>
</tr>
</tbody>
</table>
5.0 Theory of Operation

The following section outlines how the product operates. This includes an overview of how it works, how to operate the machine, and general maintenance for the machine.

5.1 Concept Overview

The concept we have tested in this project uses a simple guide system to stack the corrugated sheets. A vibration motor is attached to the guide system to help ensure the sheets consistently stack in the guides. The corrugated sheets flow in the x-direction and the velocity of the sheets cause them to hit the backstop. This aligns the sheets in the x-direction. The vibration motor vibrates the guides in the y-direction. This helps to align the sheets in the y-direction.

![Figure 1: Top View of Concept](image)

After the sheets flow into the guides and are shifted into place from the combination of the vibration and the angled flanges, they fall to the bottom of the mechanism. The weight of the
sheets on the top of the stack pushes the stack down to the bottom of the mechanism. The guides are built to be within 1/16” tolerance on all sides of where the corrugated sheets need to be placed. This ensures that as long as the sheets are inside the mechanism, they are properly aligned.

5.2 Operation

The operation of the mechanism is very straightforward. First the screw mechanism is used to adjust side guides to the correct width for the corrugated sheet. Second, adjust the air pressure regulator to provide the correct air pressure to the vibration motor. Then turn the ball valve to “open”, allowing the air to drive the motor. Finally turn on the conveyor to provide the corrugated sheets.

When a sheet becomes jammed in the mechanism the ball valve that provides air to the vibration needs to immediately be turned to “closed”. The sheets may then be re-aligned and the mechanism restarted.

5.3 Maintenance

There are only several maintenance tasks that must be completed to keep the mechanism in good working order. The manufacturer’s maintenance requirements should be followed for all of the parts including the motor, air regulator, air dryer, ball valves, and vibration isolators.

6.0 Final Test Report

6.4 Introduction

The goal of this testing was to determine whether or not the concept of a vibrating apparatus would reliably stack corrugated sheets with 1/16” tolerance. When proposing our test plan, our team came up with three main goals for the testing. These goals were: find a good combination for frequency and amplitude of the vibration, better understand the gap height between the two mechanisms, and compare different types of vibration isolation.

In order to test the three goals we decided upon several variables to test that would ultimately give us data on what we deemed most important. We chose these based upon what we estimated would be the most extreme conditions this apparatus could face, so that we could get an idea of how it performs in the worst conditions. This would allow us to decide whether or not this idea was worth the further effort of prototyping and eventually delivering a final design. The variables selected were:

- Air Pressure (which directly effects frequency, force, and cfm).
- Feed Speed (in sheets per second).
- Variance (between sheets).
- Drop Height.
• Sheet Offset.
• Isolators.

Previously in the test plan we had determined other variables to test, but after seeing the mechanism operate, the above variables were the most applicable to determining whether or not the vibration concept was a pursuable option.

In the test plan proposal we had also determined several pieces of data to collect. Once the test mechanism had been built, however, our team decided the best way to measure the data. The test data was: Reliability of Stacking (now called Number of Failures), Stack Tolerance, Input Speed (now called Feed Speed), and Transmitted Vibration. We determined that Stack Tolerance was determined by Number of Failures. This is because the test mechanism had a tolerance of 1/16” so that any sheet that stacked properly within the mechanism was within the desired tolerance. Thus, only sheets that didn’t stack were outside of the given tolerance. We decided not to collect data on the Transmitted Vibration since the isolators that we used were not effective at damping the vibration.

6.4.1 Description of Variables

6.4.1.1 Air Pressure

Air pressure was varied using the air pressure regulator supplied in the Junior Design Lab. Data for the CFM, Frequency, and Force were interpolated from tables given by the manufacturer for the specific vibrating motor that we used.

6.4.1.2 Feed Speed

The feed speed was varied manually in each test by the operator. Depending on the speed of rotation of the conveyor handle, more or less sheets were delivered per second. In Tests 1-11 an average feed speed of 10 sheets/second was used. This time was attained by measuring the time between when the first sheet’s front edge left the surface of the conveyor to when the final sheet’s front edge left the surface of the conveyor. We then divided the time by the amount of sheets that passed through in that time period. In later tests, when we were testing the feed speed; we varied, timed, and recorded the feed time for each test.

6.4.1.3 Variance

Variance between sheets was defined by our team as the estimated left-to-right difference between sheets. A low variance would have little to no variation from one sheet to the next. A medium variance would have a +/- 1” left-to-right difference from sheet to sheet. A high variance would have a +/- 2.5” left-to-right difference from sheet to sheet.
6.4.1.4 Drop Height

The drop height was defined as the distance from the top of the back guide to the top of the stacking surface. This was varied from 7” to 10-5/16” during our testing.

6.4.1.5 Sheet Offset

During discussions with Alliance LLC, it was told to us that often the sheets vary only to one side rather than left-to-right from sheet to sheet. A low offset would be a set that is well centered on the conveyor. A medium offset would reach a total distance of 1” from the center sheet, and a high offset would reach a total distance of 2.5”.
6.4.1.6 Isolators

Our team purchased three different vibration isolators in order to test their ability to dampen the vibration from the motor. We labeled them small, medium, and large; however, after running the machine with each isolator, no change was noticed in their ability to dampen. Thus, we used only the small dampers during all of our testing.

6.4.2 Test Procedure

For each set of tests we followed the same procedure:

- At the beginning of each test we either changed or verified the PSI level before beginning our test.
- Next, one team member would load corrugated sheets onto the conveyor making sure to use the proper variance.
- A team member would turn the motor on. This was followed by one team member rotating the conveyor while another timed the feed speed as well as the time it took for the sheets to settle.
- Data was recorded, notes were taken, and the process was repeated 4 times for a specific variable set.

6.4.3 Data Recorded

6.4.3.1 Number of Failures

During each test, the amount of sheets that did not stack was recorded.
6.4.3.2 Alignment Time
This was the time between the first sheet entering the apparatus and the last sheet settling into a stacked position. If there was a failure, this was the time it took between the first sheet entering and the last sheet before the failure settling into a stacked position.

6.4.3.3 Did Not Stack
This lists the number of the sheets that did not stack.

6.4.3.4 Feed Speed
This was recorded as the time between the front of the first sheet leaving the surface of the conveyor and the front of the final sheet leaving the surface of the conveyor.

6.4.3.5 Total Time
Total Time was the time recorded from when the front edge of the first sheet leaves the surface of the conveyor to when the last sheet settles into a stacked position.

6.5 Data
All data is included in Appendix A: Test Report Data.

6.6 Conclusions

6.6.1 General Notes
Based on our testing, we were able to come to several general conclusions regarding our test mechanism and this concept. These general conclusions are just observations that were made during testing that may be useful in a later design.

- The motor needs to be hit to get started when running at lower PSI, but it starts reliably at higher PSI.
- Noise increases significantly with increased PSI.
- Since there was a 2-3” gap between the conveyor and the edge of the test mechanism, some sheets wouldn’t get pushed far enough in to be stacked. It is our conclusion that if the conveyor were placed closer, the sheets would stack properly.

6.6.2 PSI Variations Tests
Tests 1-8 only varied the PSI and kept to a low variance so that we could observe the relationship between PSI and Alignment Time. From our data and observations we have come to several conclusions. At lower PSI the vibration was not enough to get the final corrugated sheets into place. If the conveyor were closer, there might be a higher success rate, but nonetheless, the vibration wasn’t enough, and sheets got stuck on the beveled portion of the guide. At high PSI the violence of vibration was excessive and on one occasion ejected a sheet out of the mechanism. At medium-level PSI (40-50) the mechanism had its greatest success, and we found that 50 PSI had the lowest average Alignment Time.
This leads us to believe that even though a later design will be much different in terms of weight and size, the concept has a high level of flexibility by having the adjustable air pressure. It appears that a good level of air pressure can be found no matter the size of the final mechanism.

6.6.3 Drop Height Variation Tests

Three tests (9, 10, and 11) were performed with an increased drop height of 10-5/16” at a high, medium, and low PSI to see the effect drop height has on performance. From the data and our observations it appears that drop height causes more failures as a result of the increased likelihood of the sheets tipping too far in the vertical direction. The increased drop height also allowed the sheets to move past the gap between the stationary and vibrating portions of the mechanism. This caused problems with the stacking because the two portions weren’t perfectly aligned, which allowed some sheets to get sandwiched in between the two portions. At the higher PSI, the failures were fewer, which leads us to believe that the greater amplitude of the top portion kept sheets from getting sandwiched. Further testing would be needed in order to fully understand that specific issue, but there is no doubt from the data that the increased drop height causes more failures than the lower one.

6.6.4 Feed Speed Variation Tests

From the three tests that were performed in order to observe the stacking reliability of the mechanism at lower feed speeds (12, 13, and 14), we were able to confirm our suspicions that medium-level PSI performs the best. However, it was also apparent when comparing to our results from higher feed speeds that the average alignment time at lower feed speeds was higher. Thus, lower feed speeds have an adverse effect on alignment time, but the best PSI is between 20 and 60 PSI.

6.6.5 Variance Variation Tests

From the six tests performed testing the effects of medium and high variance on the alignment time (tests 15-20) we were able to see what air pressure worked the best. With a medium variance it was found that 50 PSI delivered the lowest average alignment time, but it also had several failures. 40 PSI seemed to be the best option since it only had a slightly higher average alignment time and had no failures. Once again, the trend shows that there is a medium level PSI for any situation that will provide the lowest alignment time.

At high variance similar results were found. 40 PSI worked much more reliably than 20 or 60 PSI and had lower alignment times. On trial number two at 40 PSI, a failure occurred, but this was more than likely a result of a higher variance that was used.

6.6.6 Offset Variation Tests

Performing the offset variation tests offered new ideas as far as how to possibly understand and improve upon the initial concept. Once again, the testing, both at medium and high
offsets, showed that there is a medium level PSI that will provide the lowest amount of failures and alignment time. We saw this through the number of failures at 20, 40, and 60 PSI.

An interesting observation that occurred, however, was that at the large offset, the sheets would be pushed along the corner of the apparatus, and then drop in from the side rather than the back, which had happened in all the other tests. We noted that it appeared that the left-to-right movement of the apparatus seemed to work better while sheets dropped in from the side in preventing failures (mostly from getting stuck on the beveled edge) than it did when sheets dropped in from the back. Varying the orientation of the motor in further testing would allow us to understand this better.

Another observation was that some of the sheets were getting scuffed from contact with the corners of the apparatus. We suggest that in future designs the corners be rounded so that they don’t cut the sheets.

### 6.6.7 Sources of Error

After concluding our testing, there were several areas which attributed to errors in our data collection.

#### 6.6.7.1 Timing

Timing is a source of error because there is always a time difference between when an action began or ended and when the timer button was hit. This is random error.

#### 6.6.7.2 Variance

The variance between sheets was never measured but rather done by eyesight. Sometimes the resulting variance was higher or lower than the one prescribed for that specific test.

#### 6.6.7.3 Conveyor

The conveyor was not supported in the middle and would sometimes bounce during the feeding, which would alter the way in which the sheets entered the mechanism. On the earlier tests, the feed speed was also averaged to be 10 sheets/second, so there is some error associated with that.

### 6.6.8 Final Conclusions

The trends shown by all of the various testing done with the mechanism display that in any given variable set, there is a “medium” level PSI that works the best. This shows that the concept has a lot of flexibility since by simply adjusting the PSI a user should be able to get the mechanism to function properly. We were also able to see that increasing the drop height, lowering the feed speed, and increasing the variance all have an adverse effect on alignment time, but the test mechanism still was able to perform the required task of stacking the corrugated sheets properly. Overall, it can be shown that the concept is one worth pursuing further since it has the capability to reduce drop height, part count, and cycle time while operating correctly.
7.0 Design Recommendations

The prototype that we built and tested proved to be a working design, but in order to incorporate it into the Extendo corrugated sheet stacking process, some changes would have to be made.

The problems that occurred while testing are:

1. Isolators were did not effectively reduce the vibratory motion caused by the motor.
2. Motor noise was above acceptable an decibel level for working inside of an open factory.

Possible fixes for these problems:

1. Increase the stiffness of the material. We used 0.063 thick, Aluminum 5052-H32.
2. Enclose the motor in order to isolate noise inside a container

Besides the problems that occurred during testing there will have to be some other changes in order allow this product to meet the design requirements.

Missing features of the prototype:

1. Adjustable side guides
2. The drop height would still need to be further reduced

Possible recommendations:

1. For the adjustable side guides, Alliance can use the adjustable screw thread setup they currently have and attach corners and a back guide as shown in the solid models depicting the Reconfigure of Top Level.
2. Reduce angle of guides to 60 degrees in order to lower the drop height.

Refer to the Appendix B: Assembly and Part Drawings for more clarity on the design recommendations.

8.0 Assembly and Part Drawings

Refer to Appendix B: Assembly and Part Drawings.

9.0 Safety Risk Assessment

9.1 Potential Mishaps

1. Fingers get caught in pinch point between back and side guides during the adjustment of the device width, which causes injury to an employee.
2. Body parts or clothing caught in threaded rod that controls the position of the side guides during adjustment.
3. Cyclical stress on the mounting brackets and supports to the guides cause failure, resulting in injury to employees and damage to the machine.
4. Body parts come into contact with vibrating corners on the guides, and the force and sharp corners cause injury.
5. Fingers get caught between vibrating and non-vibrating portions of the machine, causing injury.
6. Motor or actuator leaks lubricants, causing slippery surface on floor and thus, an employee slips.

9.2 Description Category: Environmental, Safety, and Health Result Criteria:

Catastrophic I: Could result in death, permanent total disability, loss exceeding $1M, or irreversible severe environmental damage that violates law or regulation.

Critical II: Could result in permanent partial disability, injuries or occupational illness that may result in hospitalization of at least three personnel, loss exceeding $200K but less than $1M, or reversible environmental damage causing a violation of law or regulation.

Marginal III: Could result in injury or occupational illness resulting in one or more lost work days(s), loss exceeding $10K but less than $200K, or mitigable environmental damage without violation of law or regulation where restoration activities can be accomplished.

Negligible IV: Could result in injury or illness not resulting in a lost work day, loss exceeding $2K but less than $10K, or minimal environmental damage not violating law or regulation.

9.3 Suggested Mishap Probability Levels:

Description* Level Specific Individual Item Fleet or Inventory**

Frequent A: Likely to occur often in the life of an item, with a probability of occurrence greater than $10^{-1}$ in that life. Continuously experienced.

Probable B: Will occur several times in the life of an item, with a probability of occurrence less than $10^{-1}$ but greater than $10^{-2}$ in that life. Will occur frequently.

Occasional C: Likely to occur some time in the life of an item, with a probability of occurrence less than $10^{-2}$ but greater than $10^{-3}$ in that life. Will occur several times.

Remote D: Unlikely but possible to occur in the life of an item, with a probability of occurrence less than $10^{-3}$ but greater than $10^{-6}$ in that life. Unlikely, but can reasonably be expected to occur.
Improbable E: So unlikely, it can be assumed occurrence may not be experienced, with a probability of occurrence less than 10^{-6} in that life. Unlikely to occur, but possible.

<table>
<thead>
<tr>
<th>Mishap</th>
<th>Severity</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Marginal-III</td>
<td>Occasional-C</td>
</tr>
<tr>
<td>2</td>
<td>Critical-II</td>
<td>Occasional-C</td>
</tr>
<tr>
<td>3</td>
<td>Marginal-III</td>
<td>Remote-D</td>
</tr>
<tr>
<td>4</td>
<td>Negligible-IV</td>
<td>Occasional-C</td>
</tr>
<tr>
<td>5</td>
<td>Marginal-III</td>
<td>Remote-D</td>
</tr>
<tr>
<td>6</td>
<td>Negligible-IV</td>
<td>Occasional-C</td>
</tr>
</tbody>
</table>

Table 3: Mishap Categories

From the above table, we can arrange the mishaps into a list, with the top being the mishap that must be addressed first, and the bottom being the least worrisome hazard.

A. 2  
B. 1  
C. 4 & 6  
D. 3 & 5

9.4 Risk Mitigation Measures

In order to lower the frequency of Mishap 2, a cover should be placed over the threaded rod in order to prevent contact with the rod. Employees should be instructed not to wear loose clothing or dangling jewelry. If the cover is removed, the machine will not be able to start.

In order to lower the frequency of Mishap 1 the supporting frame, which connects the vibrating portion to the non-vibrating portion of the machine should be in place in order to reduce the ability for employees to come into contact with the point at which the two pieces come together. If objects are in the line of path of the closing pieces, a system shall be in place to stop the closing of the pieces immediately, similar to a garage door or elevator door.

In order to lower the frequency of Mishap 3, daily inspections of the machine shall be made before operations begin, noting any cyclical wear that could lead to failure. The supporting frame in place should also prevent the guides, if they were to come apart, from falling on any employees.
In order to lower the frequency of Mishap 5, the supporting frame will be in place so that access to the guides from behind will be impossible. The frame also makes access to the front side of the guides very difficult, and it would require a conscious effort to come into contact with the pinch point.

In order to prevent Mishap 4 from occurring, all corners of the device should be filleted so that, even if a body part comes into contact with a corner during operation, the corner will not cut the body part. Employees shall be trained and understand the risks associated with the device.

Mishap 6 has a low enough frequency and severity that they need only be mentioned to employees who are working the machine so that they are aware of the potential dangers. Employees should wear slip-resistant shoes and signage shall be put in place when and if a spill occurs.

### 10.0 Patent Search Results

The U.S. Patent database has patents on file that may conflict with the vibration design of the Alliance Design Team. The results are shown below by order of recency, along with a short description of relevant material in each patent.

#### 10.1 Results

Hofmann, et al., "Device for forming a sheet pile in a delivery of a sheet-fed printing press," U.S. Patent 5,890,713, April 6, 1999. It describes the use of jogging plates for jogging edges of a sheet, with oscillation exciter connected to each plate. The vibration is independent of the delivery cycle, and the oscillation exciter is connected via a solenoid magnet. Each jogging plate is elastically suspended, and the device supports adjustable guides as well.

Philipp, et al., “Method of and apparatus for the stacking of sheets,” U.S. Patent 5,368,288, November 29, 1994. It uses vibration on the stop board to align a desired number of sheets into place while a horizontal bar grate is set on top of stacked sheets to stop oncoming sheets from interfering with the completed stack. When the completed stack is removed, the bar grates moves out of the way, allowing the process to continue and repeat.

#### 10.2 Conclusions

This preliminary search did not reveal many potential conflicts for our design. The first result is the more relevant one, as the process and method is the most similar to ours. It also includes several references to previous patents that may also be of interest. The second result is notable only for its use of vibration in aligning sheets, as the location and method of vibration is different from our design.
Appendix A  Test Report Data

The test report data is attached in this section for reference. If using the original MS Word document, the file is embedded below.

In .pdf form, there is a separate file that should be available with this file.
Appendix B  Assembly and Part Drawings

The assembly and part drawing package is attached in this section for reference. If using the original MS Word document, the file is embedded below.

In .pdf form, there is a separate file that should be available with this file.