www.ams-plasticextrusions.com
5700 Colombia Circle
West Palm Beach, FL 33407

AMS EXTRUDER

USER GUIDE

MODELS 1/2" TO 1.5"

Disclaimer

If you do not know what you are doing,

do not operate the machinery.

This machinery contains high voltages, high speed moving parts, numerous crush points, nip points, pinch points, open gears, and sharp blades.

Do make any repairs to this machine while it is under power.

Do not tamper with safety switches or lock out devices.

This manual serves as a guide. The information contained may or may not be accurate and AMS is not held liable for any information contained.

Automated Manufacturing Systems shall not be liable for errors contained in this User guide or for incidental, consequential damages in connection with the furnishing, performance or use of this information. Automated Manufacturing Systems makes no warranty of any kind with regard to this information, including, but not limited to the implied warranties of merchantability and fitness for a particular purpose.

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1.1 Introduction

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i. SAFETY

AMS designs equipment with user safety in mind. Please take the time to read the User Guide and all other associated manuals to avoid the potential hazards associated with machinery.

WARNING: Voltage Hazard / High Voltage

This equipment is powered by three-phase AC electricity. A properly sized ground wire must be connected from the incoming power supply to the chassis of the machine. Improper grounding can result in severe injury or death, and erratic system operation.

Always disconnect and lockout the incoming power supply to the machine prior to opening the electrical panel of the machine, prior to maintenance, or any other non standard operating procedure. Only qualified personnel should perform troubleshooting procedures.

WARNING: Improper installation, operation, or servicing may result in equipment damage, personal injury, or death.

This equipment must be installed, adjusted, and serviced by qualified technicians who are familiar with the construction, operation, and hazards associated with this type of machinery. All wiring must be in accordance with your local electrical codes. Always maintain a safe ground to the chassis of the machine. Do not exceed the power levels that are marked on the machine data tag.

WARNING: Pinch / Cut Hazard

Never disable or remove safety devices while operating, or to maintain operation, on this machinery. Operating this machinery without safety devices in place can result in serious injury or death.

1.1 Introduction

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Stop Buttons and Safety

The 'E-Stop' or 'Stop' button is located on the control panel, above the barrel assembly, towards the upstream end of the extruder.

The barrel features a rupture disc a.k.a. 'blow out plug' which is a mechanical safety for too high of pressure within the barrel assembly. The device will rupture when pressure exceeds the rating of the plug, allowing material to dispense to atmosphere from the barrel..

The 'Stop' button on the control panel will stop the motor turning the screw .

Read the entire User Guide prior to operation!

The primary purpose in the operation of any machinery is safety and proper maintenance. Do no operate this machinery until all personnel involved in the installation, operation, maintenance, and supervision have read and fully understand the instructions in this manual and the accompanying manuals.

Important:

Do NOT perform maintenance until power is completely disconnected.

Do NOT operate machine without guards in place.

Do NOT wear loose clothing around machine.

Do NOT operate machine unless long hair is tied back and safely secured.

Automated Manufacturing Systems is NOT

responsible for any injury incurred while operating its products.

1.1 Introduction

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ii. User Guide Setup

AMS has designed the user guide to be used in conjunction with the AMS Extruder-Machines. This guide describes proper installation, operation, maintenance and troubleshooting of the equipment.

Please take the time to read the **entire** user guide prior to installation, paying particular attention to the previous safety section. Understanding the machine and how to operate it properly will help ensure a smooth integration with your current equipment.

iii. Unpacking

The AMS Extruder comes nearly completely assembled in a single crate. Pressure transducer, screws and light stacks may need to be installed.

CAUTION: Lifting

DO NOT LIFT THE MACHINE WITHOUT A HOIST OR FORKLIFT.

To uncrate the AMS Extruder:

1. **Carefully uncrate the machine** and associated components.
2. **Remove packing materials** surrounding the extruder.
3. **Inspect all components** to ensure no damage occurred during shipping. Confirm all parts are included by comparing to the shipping documents.
4. **Record serial numbers** (if any) in the box below for future reference:

   Serial # _____

5. **You are now ready to install the extruder.**

iv. Responsibilities as an Operator

AMS has designed the user guide to be used in conjunction with the AMS Extruder. This guide describes proper installation, operation, maintenance and troubleshooting of the equipment.

Your responsibilities as an operator, are first and foremost, safety. This includes the safety of yourself and all of those around you. Pay particular attention to all warnings and labels on the machinery. Make sure you are familiar with all safety procedures, local laws, and regulations. Maintenance and proper operation of the machine is also critical for safety and trouble free machine operation.

v. Contact Info

Automated Manufacturing Systems

5700 Colombia Circle

West Palm Beach, FL 33407

1.561.833.9898

www.ams-plasticextrusions.com

2.1 Specifications

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2.1 Specifications

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i. MACHINE SPECS

All dimensions are approximate and for New AMS Machinery Only

Models 1" thru 1.5"

Approximate Dimensions and Weight:

Base & Height - 42" to 56" by 25" and 42½" centerline

Approx. Weight - 1,200 to 1,700 lbs

Main Components (some items optional)

3 hp, 5 hp, 7.5 hp or 10 hp motor

Gearbox assembly

Feed Section

Screw

Barrel Cover & Blowers

Barrel Leveling Bolts

Operator Controls

Rupture Disc

Electrical Enclosures

Thermocouples

Auxiliary Heaters

Barrel Heaters

2.1 Specifications

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ii. System Limitations

All system limitations are an approximation and will vary from machine to machine, depending on customer requests and exact polymers. Rebuilt or retrofitted machines do not apply to this page and have a unique set of limitations and specifications.

AMS Extruder

Screw Speed	0—87 RPM or 0-150 RPM
RPM Increments	+/- .1 RPM
Extruder Motor Speed	1740 RPM
Pressure Increments	+/- .1 PSI
Rupture Disc	5,500, 7,500 or 9,500 PSI
1.5” Output	Approx 65 - 75 lbs per hour
1.25” Output	Approx 25-35 lbs per hour
1” Output	Approx 9-13 lbs per hour
Hopper Capacity	Varies, 10 lbs up to 150 lbs
Standard Heaters	Approximately 500 F
High Temp Heaters	Approximately 800 F
Pressure Transducer	3,000, 5,000 or 10,000 PSI

iii. DRAWINGS

Please contact AMS for any required drawings. Not all drawings to the machine are released to customers. Machinery design is proprietary.

iv. Optional Accessories

1. Full system integration
2. Several Touch Screens Available
3. Closed Loop Pressure Control
4. Clamp on barrel / tooling attachment
5. Yaskawa Motors and Drives or Allen Bradely
6. Special Screw Geometries
7. High Temperature Machine for Fluoropolymers
8. Custom Electronics
9. Special requirement guarding

v. Part Numbers

Motors: _____

Drive: _____

Controller: _____

Operator Interface: _____

3.1 Installation

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3.1 Installation

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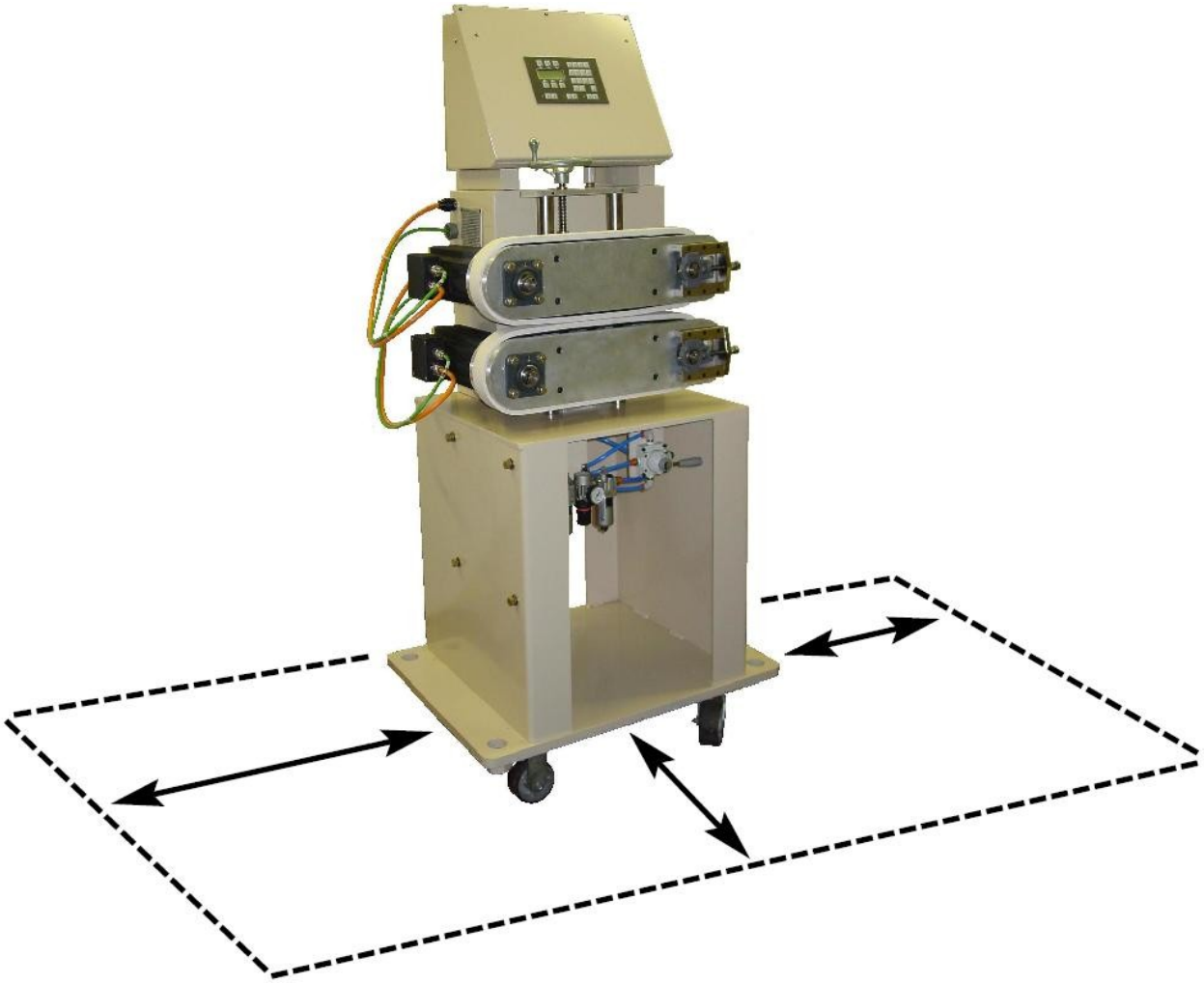
i. PREPARATION & REQUIREMENTS

ii. POSITIONING

1. **Place the AMS Extruder into position,** upstream in an area with full access around the machine.

2. **Align the AMS Extruder with the other equipment. Use a laser and a level to insure proper alignment with associated extruder center-line & downstream equipment. (Puller Shown Below)**



ii. POSITIONING (CONT.)

3. **Adjust all equipment to the centerline height of the extrusion.**

4. **Adjust the AMS Extruder floor jacks** until the weight is off of the casters.

WARNING: NEVER LEAVE THE EXTRUDER SOLELY ON CASTERS!

5. **Use a level, laser and/or plumb line** to ensure all machines are lined up.

3.1 Installation

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iii. Electrical Connections

WARNING: Voltage Hazard / High Voltage

This equipment is powered by three-phase AC electricity. A properly sized ground wire must be connected from the incoming power supply to the chassis of the machine. Improper grounding can result in severe injury or death, and erratic system operation.

Always disconnect and lockout the incoming power supply to the machine prior to opening the electrical panel of the machine, prior to maintenance, or any other non standard operating procedure. Only qualified personnel should perform troubleshooting procedures.

1. **Open the electrical enclosure on the AMS Extruder. Unpack boxed items.**
2. **Gently tug on each power wire and ground wire** to ensure cables did not come loose during shipment. If a wire is loose, insure proper connection, and tighten the terminal with a screwdriver.
3. **Connect and wire an appropriate plug to the exposed power cable.**

iv. HOPPER INSTALLATION

1. Turn off the main power and disconnect power to the machine.
2. Make sure the feed section is clear of debris from shipment & handling.
3. Install the aluminum machine assembly to the feed throat with set screws. The aluminum machine assembly is the material shut off.
4. Attach the hopper to the aluminum machine assembly with provided hardware.

3.1 Installation

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v. Pressure Transducer

Installing and uninstalling the pressure transducer must be done with heat. The entire barrel does not have to be above polymer melting point, but atleast zone 4 which locates the transducer port.

1. **Power up the machine and turn on zone 4 to above polymer melting point.**
2. **Use a wrench to install or uninstall the transducer. Do not over torque the pressure transducer. Once the seat becomes tight only an additional 1/16 of a turn should be applied to tighten. USE NEVER SEIZE or similar anti corrosion compound.**

vi. Extrusion Screw & Tooling

1. With the entire barrel at polymer process temperature, the extrusion screw can be installed and uninstalled.

2. Installing the extrusion screw should be easy and effortless, if it is difficult please contact AMS for assistance and troubleshooting

3. Uninstalling of the extrusion screw can sometimes be difficult especially if polymer is left in the machine. Sometimes a purge compound will make this much, much easier. Uninstalling the extrusion screw requires pushing out of the rear of the machine or hitting if large hammer and 3/4" rod. Brass is recommended when possible. Rod should be able 36" in length.

3.1 Installation

vi. TOOLING

WARNING: Tooling is installed and uninstalled by the customer at their own discretion. Improper handling or installation of the tooling may result in damage or injury.

1. Inspect the tooling and make sure it is cleaned and polish.
2. Use anti-corrosion compound when installing bolts
3. If there is a bolt pattern apply torque in an even consistent fashion
4. All tooling is unique, it is advised you discuss exact needs with tooling manufacturer.
5. If storing your tooling, it is advised that you place a coating of oil over all components.

4.1 Operation

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4.1 Operation

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i. Machine Overview

The AMS Extruder is similar to most other extruders available. Primary components include the gearbox assembly, feed section, barrel and screw, heaters, barrel cover and blowers, hopper, and operator controls. Basic extruder design and theory is covered in many books or publications. This overview will cover the basics very briefly.

The gearbox used can have different ratios, typically a 20:1 reduction is used with a motor of 1740 RPM rating resulting in about 87 RPM maximum at 60 HZ on the motor control. Options for increasing screw speed include a 15: 1 gearbox instead of 20 : 1 and/or increasing motor control frequency maximum from 60 hz up to 75 hz. Depending on the polymer, high speed can be good or bad. Contact AMS for additional details.

The gearbox drives the extrusion screw typically with 1 or 2 keyways. The extrusion screw is seated inside the gearbox within a machine part called the 'quill' which has the matching male or female key pattern. It is important to inspect the key surfaces to make sure they are free from nicks and burs when installed or uninstalling the screw. Never seize should always be used on the key area to help aide in screw installation or removal.

The feed section bolts to the gearbox assembly. The feed section is comprised of stainless steel parts welded together and features a 'jacket' which allows water to flow. The jacket encompasses the entire diameter which surrounds the screw and helps maintain a warm or cool to the touch temperature on the feed section. This aides in processing and is often a requirement for some processes.

The barrel and screw assembly are purchased from common industry OEM's which specialize in their design and fabrication. These assemblies and their design are vital to the extruder and the process. Typical clearances between the majority of the screw and barrel are about .002" on each side. The screw is inside the barrel and the two pieces work together to convey and mix the polymer from raw pellet form into a molten state to make an extruder shape. Surrounding the barrel are the heaters and barrel cover assembly. The blowers correlate to the number of temperature zones, with zone 1 being closest to the feed section.

The operator controls consist of start and stop buttons, potentiometer, on/off

i. Machine Overview Cont…

switches and temperature controllers. Additional accessories may include audible alarms, closed loop pressure control and other items to control melt pumps or valves.

ii. Operator Controls

AMS Extruders are relatively simple to use. There is a green start button, a red stop button, a small knob to a 10—turn potentiometer for speed control, digital displays for amps and screw RPM and lastly temperature controllers.

The screw is controlled with the green and red buttons in addition to the 10—turn potentiometer. There are typically two digital displays which allow the operator to monitor screw RPM and motor amps applied to the screw. Sometimes there is also a melt pressure controller which can control screw speed when accompanying selector switch is in 'auto' position. These details are covered in a separate manual.

The temperature controllers on the AMS Extruders utilize PID control and fuzzy logic. They are digital auto-tuneable controllers and AMS has been using them for over a decade on many, many applications. The actual use of the temperature controller is detailed in the hardware manual. It is important for the user to know how to change temperature. The red number is the actual temperature reading PV. The yellow number is the setpoint, SV. To change the SV, push the side ways arrow ' < ' then use the up and down arrows to change the SV value. Once the desired value is found, press 'Set'. To autotune the controllers, press set and using the up/down arrows select 'Yes'. Consult AMS when performing an autotune for additional guidance.

iii. Start Up and Shut Down

Possibly one of the most critical times during an extrusion process aside from achieving desired product, is the start up and shut down. This is a time when mistakes can be made resulting in personal injury and machinery damage. It is critical for the operator to understand what to look for and what not to do, such that damage can be avoided and safety is kept a priority.

To perform a startup on the extruder will be defined as getting material flowing through the machine. The die will not be discussed here because all tooling varies. First, make sure the shut off is in the off position and there are no pellets sitting in the feed section area. Failure to check this may result in molted plastic in the feed section and this will require typically removal of the screw for complete cleaning. The screw geometry typically does not function properly with molten material in the feed section; the pellets need to remain in pellet form in the feed section.

Knowing that the feed throat is clear of any and all things and the shut off is in the off position, fill the hopper with plastic. Turn the machine on and set temperature controllers to desired setpoint. *Be sure that thermocouples are properly installed. Failure to do so will result in heaters running at maximum temperature and will create extremely high temperatures.* Once the desired temperatures have been reached, the machine must sit or 'heat soak' for typically 10-15 minutes on extruders up to 1.5". This allows the heat to stabilize in all of the components.

With the machine up to temperature, make sure the speed knob for the screw is turned counter clockwise to the minimum setting. Pressure the green start button and turn the knob so the RPM's show approximately 5—10. Notice the amps display and record the number. This is the power draw with no material in the machine. Pull the shut off to the open position allowing material to enter the feed throat. At 10 RPM's, it will take roughly 3 minutes or so for material to reach the end of the barrel and enter the tooling. If there is a pressure display, pressure will begin to climb when material reaches the location of the transducer. During the 3 minutes it is important to monitor the machine amps display and make sure it does not climb more than 25% of rating. It is even

iii. START UP & SHUT DOWN CONTINUED

more important to press the Red Stop button if amps approach the maximum rating on the motor nameplate. Increase temperatures 20F and consult with AMS if this occurs. While monitoring AMPs, keep an eye on the pressure display. The pressure will climb as material reaches the pressure transducer. If pressure spikes very rapidly and surpasses typical operating pressures, press the red stop button immediately. Monitor pressure after pressing stop to see if it begins to decline. Consult with AMS for assistance.

*** **Extruders are capable of generating tremendous amounts of pressure well in excess of 10,000 psi. It is crucial to understand and monitor amperages and pressures upon start up. Once material is seen discharging from the machine the operator can begin to setup the rest of the extrusion line to make product.** ***

To shut down the extruder, first it is common to 'break' the line and allow the plastic to fall from the extruder to the floor. Next, close the shut off. If the screw speed is greater than 25% of max, it is a good idea to reduce to about 20 RPM to run the machine 'empty'. Once empty, material no longer exiting the machine and pressure has dropped, lower the screw speed to zero and press the red stop button. Turn off the temperature controllers with optional on/off switches or turn the main breaker off. Shut down is complete.

Do not run empty for extended periods of time damage will occur to the barrel and screw not covered under warranty.

iv. OPERATION

Operation of the extruder will be discussed briefly and generically in this section. All extrusion processes can vary and will require specific operator instructions which need to be developed in house by the personal running the extruder.

When running the extruder and making product it is important to make only one change at a time if a change needs to be made. It is important to document each of the changes and the resulting affect it has on the product. Typically once a product is dialed in, the operation of the extruder is very hands off. The extruder is essentially a pump and once temperature profile and RPM's have been determined, the extruder will just run. It is important to monitor material level in the hopper so it does not run empty. For some components with critical tolerances, a hopper with little material (less weight) compared to a full hopper (more weight) can have some impact on the ability of the machine to feed material.

During operation it is important for the operator to monitor all the displays and be familiar with where they should be. Similar to the dashboard of a car, there are different displays for different things and each is crucial to safe operation of the machine.

v. CALIBRATION

Machine Calibration

There are typically 2 digital displays on the AMS extruder. One is for Screw RPM and the other is for Motor Amps. An optional Pressure Display is a common third. Each of these gauges is calibrated at AMS.

To calibrate the Red Lion displays for Screw RPM and Amps, there is a small scaling potentiometer on the backside of the instrument. Turning this will change the number on the display. Refer to the Red Lion hardware manual for complete details.

To span or calibrate the Gefran Pressure Displays, consult with the Gefran Hardware manual.

vi. Inputs and Outputs

AMS Extruders are often times outfitted with a pressure display. The pressure display typically has different input and output capability, most importantly are the hi pressure alarms. It is recommended that a 1st warning alarm is set for a pressure above typical and a 2nd shut down alarm set for high pressure. This is offered as an option from AMS and also often times done at the factory. Some prefer to use audible alarms, others utilize light stacks for visual reference. The wire the automatic shut down of the extruder, consult with the hardware manuals for the Gefran display and the Yaskawa Motor control. Contact AMS for assistance or pricing and options.

Thermocouples for the additional temperature controllers are typically located on the downstream side of the electrical enclosure. These are common inputs and required when utilizing the additional temperature controllers for the adapter and die zones. (Type J)

vii. Cleaning and Maintenace

With the entire barrel at polymer process temperature, the extrusion screw can be installed and uninstalled. Installing the extrusion screw should be easy and effortless, if it is difficult please contact AMS for assistance and troubleshooting. Uninstalling of the extrusion screw can sometimes be difficult especially if polymer is left in the machine. Sometimes a purge compound will make this much, much easier. Uninstalling the extrusion screw requires pushing out of the rear of the machine or hitting with large hammer and 3/4" rod. Brass is recommended when possible. Rod should be able 36" in length. For purge compound Purge-X is a recommended compound AMS has had good success with on polymers such as PE, PP and ABS.

5.1 Running the Line

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5.1 Running the Line

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i. Stringing The Line

Prior to starting the extruder RPM's, be 100% certain that temperature zones are up to the proper temperature for the respective material. Once temperature zones are up to temperature, wait 5 minutes, then start the extruder RPM's slowly, 5-10 RPM's, until material flow is seen from the barrel exit/die. ***Monitor pressure and motor amps closely.*** Once flow is achieved, monitor Pressure Displays and Amp displays, and slowly turn up the RPM's to a manageable level. Once at a manageable output, cut the extrusion that has exit the die, and take the newly extruded material (just emerging from the die) and 'string' the material down the extrusion line, and into the puller. Once in the puller, check for stability on all equipment and if there are now problems, the line is strung.

ii. Basic Pulling and Cutting

Basic Pulling occurs as soon as material is strung into the puller. Keep the puller at a constant speed and make the necessary adjustments to bring the profile into spec. Slowing the puller down will fill out tolerances. Speeding the puller up will shrink some tolerances. When trying to zero in on all required tolerances for a profile, only small (less than 1 FPM) speed changes are required.

Basic Cutting can begin once material is successfully strung and system stability is reached. Cutting on Demand will allow the operator to enter a desired cut length. This is limited by the ratio of line speed and the length of the cut. (Cuts per minute). An upper limit of 150 cuts/minute is common. If more cuts per minute are required, the user should run in 'Continuous' mode. To begin cutting, the operator must cut the profile exiting from the puller, so a smaller, more manageable length is now exiting. The material is then inserted in the cutter bushing until all slack is removed. The cutter is then slid into place, almost touching the cutter bushings to the puller belts on the exit end. Select the cut mode, enter the required parameters, and begin cutting.

iii. RUNNING BUMP MODE

To run Bump Tubing, first tooling must be cut. The tooling should be cut for the larger diameter tube, in most cases. The tube should then be run to desired specifications and FPM / Air levels recorded. The tube should then be drawn down to the smaller diameter by increasing the puller FPM. This is all done with the AMS Servo Machine in standard 'Puller Cutter Mode'.

Once both diameters have successfully been run to desired specifications, the operator must begin to incorporate the levels and tapers. To do this, the operator must enter 'Bump Mode' on the machine. Major and Minor speeds have already been determined as described above. Desired levels can then be entered in. Accelerations and ramps can also be entered in. Accelerations of approximately 3—10 are recommended initially. Ramps of approximately 10 are recommended initially as well.

With all the necessary parameters entered into 'Bump Mode', the operator can then turn on the Bump routine. Allow the system to stabilize for a couple of cycles to make sure the line remains strung.

If the line remains strung, then levels can be adjusted accordingly. Air flow needs to be adjusted so that a minimum amount of air is used. Continue to watch the system run after changes are made and verify the changes on the part.

Tips:

- Small changes are usually better than big changes
- Adjust one parameter at a time, especially when 'dialing a part in to size'.
- Too much air is bad
- If the line is breaking in transition to higher speed, decrease the acceleration. If the line begins to drop or sag in transition to a higher speed, increase the acceleration.
- If the line begins to sag during transition to lower speed, decrease the deceleration.

6.1 Maintenance

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6.1 Maintenance

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i. WARNINGS & CAUTIONS

The following is an excerpt from the Safety section of the user manual:

WARNING: Voltage Hazard / High Voltage

Always disconnect and lockout the incoming power supply to the machine prior to opening the electrical panel of the machine, prior to maintenance, or any other non standard operating procedure. Only qualified personnel should perform troubleshooting procedures.

WARNING: Improper installation, operation, or servicing may result in equipment damage, personal injury, or death.

This equipment must be adjusted and serviced by qualified technicians who are familiar with the construction, operation, and hazards associated with this type of machinery. All wiring must be in accordance with your local electrical codes. Always maintain a safe ground to the chassis of the machine. Do not exceed the power levels that are marked on the machine data tag.

WARNING: Pinch / Cut Hazard

Never disable or remove safety devices while operating, or to maintain operation, on this machinery. Operating this machinery without safety devices in place can result in serious injury or death.

Always be sure to roll up long sleeves and tie back long hair prior to servicing the machine. Do not wear headphones during operation.

ii. MAINTENANCE SCHEDULE

Maintaining your AMS Extruder as directed will help to ensure trouble-free operation. Please follow the maintenance schedule below:

MAINTENANCE SCHEDULE						
	DAILY		WEEKLY		MONTHLY	
	Inspect	Lubricate	Inspect	Lubricate	Inspect	Lubricate
Tooling Heaters	•					
Tooling Plugs	•					
Press. Trans. Cable	•					
Hopper is clean	•					
Tooling Hardware	•					
Unit Alignment	•					
Pressure Transducer	•					
Keyways			•	•		
Lube Thrust Bearing			•	•		
Electrical Terminals					•	
Panel Lights					•	
Electrical Cables					•	

iii. INSPECTION PROCEDURES

WARNING: Turn off machine and disconnect power before inspecting moving parts!

Screw:

1. **Inspect belts for nicks and rough spots.**
2. **Using machinist measuring tools, it is important to check diameter from time to time.**

General:

1. **Lubricate shafts and grease fittings as needed, especially thrust bearing if applicable.**
2. **Inspect electrical cables/connections for wear** (frays, nicks, cuts) and replace as needed.
3. **Inspect control panel lights and terminals. Keep clean and free of dust. Use a vacuum cleaner not and air hose to clean. Air hoses will blow debris inside of electronics possibly causing damage.**

iv. SCREW REPLACEMENT

Please Contact AMS regarding any part replacement.

Phone: 561-833-9898

Email: info@ams-plasticextrusions.com

7.1 Troubleshooting

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7.1 Troubleshooting

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i. BEFORE TROUBLESHOOTING

Important: Most problems can be avoided by following proper installation, maintenance and operation as laid out in this user guide. If you do encounter a problem, the following section will assist in determining the cause.

Before Troubleshooting:

Gather all materials provided with the machine. This includes wiring, parts and assembly drawings, which can be indispensable when troubleshooting. The diagrams will also indicate any custom features not covered by this manual.

In addition, always follow the safety procedures outlined below.

WARNING: Voltage Hazard / High Voltage

This equipment is powered by three-phase AC electricity. A properly sized ground wire must be connected from the incoming power supply to the chassis of the machine. Improper grounding can result in severe injury or death, and erratic system operation.

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7.1 Troubleshooting

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i. BEFORE TROUBLESHOOTING

WARNING: Pinch / Cut Hazard

Never disable or remove safety devices while operating, or to maintain operation, on this machinery. Operating this machinery without safety devices in place can result in serious injury or death.

WARNING: Machined parts may be sharp. Parts may be hot!

Always disconnect power prior to working on the Extruder. NEVER place your bare hands near the electrical connections on the heaters or exposed portions of the barrel may be hot!

7.1 Troubleshooting

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ii. IDENTIFY THE PROBLEM

Please note: the user guide only provides troubleshooting steps for the AMS Extruder. Any issues regarding other equipment in the extrusion line need to be directed to their respective company.

Problems can most easily be broken down into three components:

1. **Extruder Operation,** relating to issues with the extruder electrical and/or mechanical systems.
2. **Temperatures,** relating to proper processing temperatures for the polymer.
3. **Product Quality,** relating to issues with the extrudate or materials. Possibly the tooling or process parameters.

ii. IDENTIFY THE PROBLEM

PULLER OPERATION PROBLEMS

SYMPTOM	CAUSE	SOLUTION
The extruder does not start.	Power is not connected.	Confirm power is properly connected and grounded.
	The screw speed knob is on zero.	Turn up the knob slowly until 5 RPM is displayed
The extruder is 'squeaking'.	The water is not flowing through the feed section	Flow water through the feed section
	The screw and barrel are dry.	Do not run the extruder without polymer!

ii. IDENTIFY THE PROBLEM

CUTTER OPERATION PROBLEMS

SYMPTOM	CAUSE	SOLUTION
The die pressure is not consistent.	Material issue.	Check with material provider.
	Processing issue.	Check proper feed of material. Consult with AMS.
	Extruder tuning	Retune Extruder Drive. Consult with AMS.
Need more output	Temperatures in zones 1 and 2 too low	Increase temps after consulting with AMS.
	Screw geometry not optimized	Check with material provider and AMS.

ii. IDENTIFY THE PROBLEM

PRODUCT QUALITY PROBLEMS

SYMPTOM	CAUSE	SOLUTION
Gels or blemishes in product	Un-melted plastic in part	Add screen packs to breaker plate. In-crease zone 4 temp.
	Different polymers mixed	Pull screw and clean extruder barrel and scrw.
Temperature erratic Or not changing	Thermocouple not fitted properly	Make sure there is pressure and good contact with the tip.
Breaker keeps trip-ping or Extruder not coming up to tem-perature	Heater is shorted out	Disconnect power. Inspect wiring. Con-sult AMS.
	Breaker worn out.	Replace breaker.

iii. AMS CONTACT INFO

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8.1 Appendix

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8.1 Appendix

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i. SCREW SELECTION

PE

ABS

PP

PLA

Urethanes

Nylons

PVC

Rigid PVC

PC

8.1 Appendix

8

ii. EXTRUDING TIPS

Make one change at a time and document, document, document!!

The extrusion equipment is a tool for the operator like an oven goes with a Chef. It is up to the Chef to bake the cake and perfect the recipe.

Material suppliers such as color concentrate providers want to sell you as much colorant as possible. In the case of colorant, too much can produce varying tolerances on product. Experiment with less.

Temperature changes of 5 degrees F will have an affect on the part.

Handle tooling with gloves and brass tools only.

Replace tooling bolts often. Replacing bolts is cheaper than reusing old ones and getting one stuck in the tooling.

When the line is up and running good product, keep it running!! Don't forget to fill the hopper.

Always have an eye on the process parameters and digital displays. Be comfortable with the numbers associated with the process.