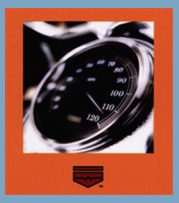
The Westland Corporation

PROCESSOR

Westland Corporation
1735 S. Maize Rd.
Wichita, KS 67209
800-247-1144
316-721-1144
316-721-1495 FAX
www.westlandusa.com
westland@westlandusa.com

Volume 4 Issue 2



WHEN THE HEAT IS ON

Dave Larson
President


Dave Larson

Having recently attended an NHRA racing event I have a new thought process for the phrase “A Smooth Ride When The Heat Is On”!

I’m not sure how smooth the ride is for the drivers, but the heat is definitely on when those top fuel dragsters leave the starting line. The NHRA web site states the force is nearly five times that of gravity, the same force of the space shuttle when it leaves the launching pad at Cape Canaveral. It takes just 15/100ths of a second for all 7,000 horsepower of an NHRA Top Fuel dragster engine to reach the rear wheels.

...the force is nearly five times that of gravity

One can only imagine the technology that goes into producing an engine of this magnitude. In the competitive world of dragster racing that technology can make the difference between winning and losing.

Of course maintaining one of these dragsters is a never ending process. It takes constant attention to keep everything running correctly. One part out of sync can cause time loss, which is not acceptable when competing at this level. That makes maintenance a top priority, not only for efficiency but also driver safety.

In drag racing, having a smooth ride when the heat is on is a true challenge.

Processing plastic can present some of the same challenges. Using the right technology for the resins being processed can make the difference between losing and making money on a job. Lower residence times, better color mixing and faster cycles are just some of the achievements to be made with the correct technology. One of Westland’s strengths is the processing experience we possess. Our processing assistance brings the latest technology to your floor for increased productivity.

Having the right screw and barrel combination can make the difference between mediocre output and high performance processing. Westland studies your application, including research on the resin if necessary, in order to provide the right components for your process.

Literally having the correct barrel heat settings is one of the most important aspects of any application, yet it is the least understood. Not only is it important in the melting of the plastic, but also aids in maintaining your components by reducing premature wear. The article inside this issue will help demystify this all important aspect of molding plastic.

Whether you are behind the wheel of a NHRA Top Fuel dragster or the controls of an injection or extrusion molding machine, the goal is to obtain a smooth ride when the heat is on. The people of Westland Corporation are here to help you reach your goal with our quality screws, barrels and processing assistance. Why not call us today?

DO YOU KNOW?

The supercharged, fuel-injected nitromethane-burning engines in Top Fuel dragsters produce an estimated 7,000 horsepower. Nitromethane does not burn as quickly as gasoline. In fact, there is not enough time to burn all of the nitromethane between when the spark plug fires and the exhaust valve opens. So the engine is pumping still-burning nitromethane into the exhaust pipe. That’s why you see flames shooting out of the exhaust of a drag-racing car.

Do you know what the fuel-line pressure is for a NHRA Top Fuel dragster?

Answer found inside this issue.

Dave Larson, Terry Williams, Dan Johnson

Terry Williams Recognized for 10 Years of Service

Terry Williams is Westland's Senior Process and Sales Engineer. His wealth of processing experience has been a true asset to Westland and our customers.

Terry spends much of his time analyzing processes in order to make suggestions for improvement. Many companies are experiencing increased production due to his thoughtful analysis.

If you haven't taken the opportunity to discuss with Terry any challenges you may be facing in your process, we encourage you to do so. Terry is another reason we can confidently state ... "Our People Make The Difference".

Use Plant Down Time To Your Advantage

Plant shut-downs are an excellent time to send Westland your worn screws and cylinders.

Ship them with your instructions for evaluation and/or printing to:

Westland Corporation
1735 S. Maize Rd.
Wichita KS 67209

CALL US FOR MORE INFORMATION:
800-247-1144

BARREL HEAT PROFILES SIMPLIFIED

Controlling Heat In Your Barrel Is Essential to Profitable Production

Barrel temperature is still one of the least understood dimensions of injection molding. Obtaining the right amount of heat from the proper source helps prevent burning, splay or streaks in your parts. Molding with an incorrect heat profile will most likely cause rejects and low production rates … not to mention premature wear on your barrels and screws.

By following these three steps, you can optimize the amount and type of heat you need for your molding process.

FIRST – Understanding The Two Heat Sources

Melting plastic requires creating heat from two sources. Conductive heat is generated by the heater bands and shear heat is generated from the shear of the plastic against itself, the screw and the barrel wall. Conductive heat can be controlled; however, there are no settings for shear heat.

The best molding results from heat being generated in approximately equal amounts from the two heat sources.

If you experience a temperature override in a particular barrel zone but that zone's heater bands are not cycling, you most likely are processing with excessive shear heat. It might be that your only heat source is shear heat. The first reaction may be to reduce the screw speed but this solution is flawed. A lower RPM can result in lower production rates.

A better way to counteract the effects of shear heat is adjustments to the heater band settings. However, these adjustments are not what one might normally think. Instead of turning down the heater band settings, increase the temperature of the heater bands that are behind the zone that is overriding.

Given enough time for all the heater bands to start cycling, the melt temperature will actually go down. This is because you have changed the source of heat energy from shear to conductive heat, which can be controlled. This may also result in less hydraulic pressure required by the screw drive motor and a reduction in backpressure for a better recovery rate.

SECOND – Balancing The Heat Sources

Our experience dictates that the best molding results from heat being generated in approximately equal amounts from the two heat sources.

Now that all the heater bands are cycling, evaluate the Screw Rotate Pressure (SRP) in order to optimize the balance between the two heat sources. The Screw Rotate Pressure is the hydraulic pressure required to turn the screw. (If a molding machine does not have the capability to measure SRP on a consistent basis, a gauge can be put on the hydraulic system. This is a relatively inexpensive fix.)

Balancing the conductive and shear heat is achieved by adjusting the heater-band settings so that the SRP measures between 800 and

(continued on next page)

1200 psi in a 2000-psi system. A reading in that range indicates the heat produced from shear energy is between 40% and 60% of the maximum available energy. If the pressure reading is greater than 1200 psi, the screw is working very hard and creating an opportunity for wear.

A reading under 800 psi indicates too little shear energy is being generated which can translate into longer residence times and cycles or unusually high melt temperatures.

THIRD – Heat Profile Selection

Once a proper balance between the conductive and shear heat has been obtained, the correct heat profile must be established to complete the process and achieve the correct melt temperature. Needed information is the rear-zone temperature settings recommended by the resin supplier and the desired melt temperature of the melt being injected.

Many resin suppliers recommend an ascending heat profile. This has worked well in some instances, however our research shows that using a “hump” or “reverse” heat profile provides the optimum melt quality at the lowest cost and minimal component wear.

Following are Westland’s recommendations when selecting a heat profile:

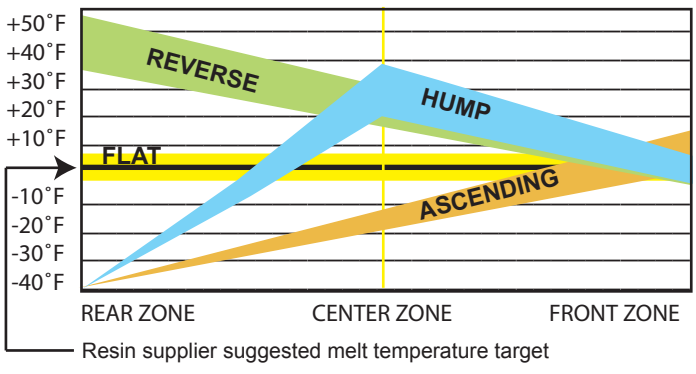
An **ascending profile** is the preferred profile for processing with a long residence time (more than 5 minutes) or when a very small percentage of the shot capacity is used. This profile should not be used when processing reinforced or heavily filled materials or when short-to-medium residence times are involved.

A **flat profile** is sometimes used where the percentage of shot capacity is in the low to normal range (30% to 50%) and the resin is not reinforced or filled.

A **hump heat profile** is ideal for processing high to normal range of shot capacity (50% to 70%) and the residence times are in a normal range (2-5 minutes). This profile is good for processing most non-reinforced materials.

A **reverse profile** is excellent for reinforced, heavily filled or hard to melt materials. It is also recommended when screw recovery and/or residence times are short and the shot size is at least 50% of the maximum. This profile also works well for heat or shear sensitive materials.

Using the proper barrel heat profile is so important to profitability, not only in production rates but also barrel and screw wear. To learn more about heat profiles, contact any of the Westland sales engineers for help at 800-247-1144.



Even though an ascending profile is commonly recommended by resin makers, hump or reverse profiles have been found superior in most situations.

HOW TO INSTALL A THREAD ON END CAP

PROPER INSTALLATION EQUALS EASE OF REMOVAL

The proper installation of thread on end caps is essential, not only for the continual operation of the machine, but perhaps most importantly, the ease of removal when exchanging components or doing routine maintenance.

Improperly installing an end cap can cause it to seize on the barrel, making removal extremely difficult, impossible and/or hazardous.

Westland has been forced to machine end caps out of barrels sent in by our customers. We have also heard of incidences where maintenance workers have come close to injuring themselves with flying wrenches used trying to loosen an end cap.

The following procedures for the proper installation of thread-on end caps (barrel heads) will hopefully keep these scenarios to a minimum:

#1 - Make sure threads on the barrel and the end cap are clean and free of any damage.

#2 - Thread end cap into barrel by hand to insure the threads are free of any debris and that the fit is good.

#3 - Remove and apply anti-seize to the threads.

#4 – Thread the end cap ¾ of the way into the barrel.

#5 - Allow end cap and barrel to reach the same temperature (approximately 350° Fahrenheit)

(Continued on page 4)

Answer to Do You Know: The fuel-line pressure for a NHRA Top Fuel dragster is between 400 and 500 pounds, about 20 times greater than the pressure on passenger-car fuel pumps. (Taken from www.nhra.com)

How to Install - cont from page 3:
#6 - Continue threading end cap using standard end cap wrench until the seal faces engage.

#7 - Using a 3 pound hammer, strike the end cap wrench one time to seat the two seal faces. Good discretion must be used when seating the end cap.

Due to the thermal expansion of materials, failure to have the end cap and barrel at the same temperature when seating the two together can cause the end cap to seize to the barrel, making it difficult to remove it later.

The same can happen if the proper anti-seize is not used. A copper or nickel base anti-seize that has a temperature range exceeding 800° Fahrenheit is recommended.

IMPROPER BARREL HEAT PROFILE THE CAUSE OF WEAR

Imbalance Can Cause Unseen Damage

Have you ever driven a car with a wheel out of balance? The result is often vibration and shimmies. Imagine this scenario now hidden within the confines of your engine. Most cases of engine unbalance go unnoticed, causing untold damage.

The same is true for screws and barrels. Improper barrel heat profiles can result in an imbalance in your process, resulting in melt blockage and screw deflection.

Recently a Westland customer was experiencing pre-mature wear on Westland CPM9V screws running glass filled nylon.

Their wear was not the result of abrasion due to the glass filler, but was adhesive wear caused by the screw side loading against the barrel wall.

Westland suggested elevating the heat settings with a reverse heat profile (see inside article) which actually produced a lower melt temperature. The parts were also both cosmetically and functionally better.

After running overnight, the screw was pulled. There were no signs of galling or side loading.

Take the necessary steps to make sure your process is running correctly. The time used will pay for itself over and over with improved parts and longer component life.

Contact Westland at 800-247-1144
or westland@westlandusa.com
to request a copy, in a pocket-size form, of the 7 point (see article inside)
PROCEDURE FOR INSTALLING A THREAD ON END CAP

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