



Lab Lessons

Lab 1 - Solving Burnmarks (Level 1)

Solving Burnmarks

For this challenge, you are molding a square cover. This customer's dimensional specifications for this rectangular cover part are 6.500" X 6.500" plus or minus 0.005". The plastic you are using is ABS on a 300 ton machine. Your part has a burnmark. The standard (quoted) cycle time for this job is 24 seconds. The part tolerance for this job is ± 0.005 .

In order to receive a score in any of our SimTech lab lessons, we require "3 good molding practices" to be in place. They are listed below. In this lesson, we have already set the machine up to include these criteria. In later lessons, you will be asked to achieve one or all of these criteria as part of the exercise.

- Cushion size must be less than 10% of the Screw Back Distance.
- Mold Full at VPT must be between 94% - 96%.
- Melt temp must be $\pm 2^{\circ}\text{F}$ of front zone barrel temperature

Instructions:

1. Log into your Virtual Lab Lessons site (www.paulsonskillbuilder.com)
2. Open lesson "Lab 1"
3. "Cycle" the machine.
4. After you cycle the machine you will see under Part Problems you have a Burnmark problem.
5. Begin to make machine control changes and Cycle the machine after each control adjustment to see how your machine control changes have affected your cycle/part.

Note: If you hover over the red block next to the part problem, you will see a number telling you the severity of your problem.

To complete this lesson:

Solve the burnmark problem two different ways.

1. Solve the burnmark by adjusting the Fill rate controls.
 - a. Once you have solved the burnmark with Fill Rate, click the "Reset Control" button and **Cycle** the machine. This will reset your controls to the original settings and you should see a burnmark again.
2. Solve the burnmark by using the clamp force.

NOTE: Only make one control change at a time and then click the "Cycle" button to see the effects of that particular control change. This is the best practice to follow when making any control changes whether it be in SimTech or on an actual molding machine. The exceptions are the 4 barrel temperatures and 5 fill rates.

Lab 2 - Solving Flash - (Level 1)

Solving Flash

For this challenge, you are molding a square cover. This customer's dimensional specifications for this rectangular cover part are 6.500" X 6.500" plus or minus 0.005". The plastic you are using is ABS on a 300 ton machine. Your part has flash. The standard (quoted) cycle time for this job is 24 seconds. The part tolerance for this job is ± 0.005 .

In order to receive a score in any of our SimTech lab lessons, we require "3 good molding practices" to be in place. They are listed below. In this lesson, we have already set the machine up to include these criteria. In later lessons, you will be asked to achieve one or all of these criteria as part of the exercise.

- Cushion size must be less than 10% of the Screw Back Distance.
- Mold Full at VPT must be between 94% - 96%.
- Melt temp must be $\pm 2^{\circ}\text{F}$ of front zone barrel temperature

Instructions:

1. Log into your Virtual Lab Lessons site (www.paulsonskillbuilder.com)
2. Open lesson "Lab 2"
3. "Cycle" the machine.
4. After you cycle the machine you will see under Part Problems you have a slight Flash problem.
5. Begin to make machine control changes and Cycle the machine after each control adjustment to see how your machine control changes have affected your cycle/part.

Note: If you hover over the red block next to the part problem, you will see a number telling you the severity of your problem.

To complete this lesson:

Solve the flash problem two different ways.

1. Solve flash by adjusting one of the Fill rate controls.
 - a. Once you have solved the flash with Fill Rate, click the "Reset Control" button and **Cycle** the machine. This will reset your controls to the original settings and you should see flash again.
2. Solve flash by using the least clamp force possible.

NOTE: Only make one control change at a time and then click the "Cycle" button to see the effects of that particular control change. This is the best practice to follow when making any control changes whether it be in SimTech or on an actual molding machine. The exceptions are the 4 barrel temperatures and 5 fill rates.

Lab 3 - Solving Sink Mark and Dimension Problems (Level 1)

Solving Sink Mark and Dimension Problems

For this challenge, you are molding a frame. This customer's dimensional specifications for the part are 12.00" X 4.00" with a tolerance of ± 0.005 ". The plastic you are using is ABS on a 300 ton machine. Your part has sink marks and is below the length specification. The standard (quoted) cycle time for this job is 65 seconds.

Just like in labs 1 & 2, we have already set the machine up to include the "3 good molding practice" criteria. In later lessons, you will be asked to achieve one or all of these criteria as part of the exercise.

- Cushion size must be less than 10% of the Screw Back Distance.
- Mold Full at VPT must be between 94% - 96%.
- Melt temp must be $\pm 2^{\circ}\text{F}$ of front zone barrel temperature

Instructions:

1. Log into your Virtual Lab Lessons site (www.paulsonskillbuilder.com)
2. Open lesson "Lab 3"
3. "Cycle" the machine.
4. After you cycle the machine you will see under Part Problems you have a sink mark problem and your part size is too small.
5. Begin to make machine control changes and Cycle the machine after each control adjustment to see how your machine control changes have affected your cycle/part.

To complete this lesson:

- Have no part problems or alarms
- Achieve a cycle time of 65 seconds or less

NOTE: Only make one control change at a time and then click the "Cycle" button to see the effects of that particular control change. This is the best practice to follow when making any control changes whether it be in SimTech or on an actual molding machine. The exceptions are the 4 barrel temperatures and 5 fill rates.

Lab 4 - Solve Burnmarks, Dimensional, Sink Mark Problems & Process Optimization (Level 3)

Solve Burnmarks, Dimensional, Sink Mark Problems & Process Optimization

You are molding the part called a bezel out of polystyrene using a 300 ton molding machine.

You will see under the **Cycle Results**, the “Mold Full at VPT” is 90.05%. This VPT setting is not optimized. You’ll have to correct this. The VPT should occur when the mold is between 94% - 96% full. The part has some problems. The part is burning and has a sink mark. The part is also out of specification. Notice for this part, the tolerance is only ± 0.002 ”.

Burning is a critical part problem and must be addressed first in the optimization process. This is because burning creates a high probability of tool damage. Once the burning problem has been corrected, then proceed to the sink mark, optimizing the VPT, cycle time and part dimensions.

Instructions:

1. Log into your Virtual Lab Lessons site (www.paulsonskillbuilder.com)
2. Open lesson “Lab 4”
3. “Cycle” the machine.
4. Begin changing machine controls one at a time to solve the part problems and get the cycle time to 23 seconds or below.

To complete this lesson:

- Have no part problems or alarms
- Achieve a cycle time of 23 seconds or less

In addition to solving all part problems and getting your cycle time to 23 seconds or below, you must also meet the below “good molding practices” criteria.

- Cushion size must be less than 10% of the Screw Back Distance.
- Mold Full at VPT must be between 94% - 96%.
- Melt temp must be $\pm 2^{\circ}\text{F}$ of front zone barrel temperature

NOTE: Only make one control change at a time and then click the “Cycle” button to see the effects of that particular control change. This is the best practice to follow when making any control changes whether it be in SimTech or on an actual molding machine. The exceptions are the 4 barrel temperatures and 5 fill rates.

Lab 5 - Solving Flash, Burnmarks, and Dimension Problems (Level 2)

Solving Flash, Burnmarks, and Dimension problems

We are molding a square cover. This customer's dimensional specifications for this rectangular cover part are 6.500" X 6.500". The plastic you are using is Polystyrene on a 300 ton machine. Your part has flash, burnmarks, and is out of dimension, it is too big. The standard (quoted) cycle time for this job is 14 seconds. The part tolerance for this job is 6.500" \pm .005.

Instructions:

1. Log into your Virtual Lab Lessons site (www.paulsonskillbuilder.com)
2. Open lesson "Lab 5"
3. "Cycle" the machine.
4. After you cycle the machine you will see under Part Problems you have a Flash problem, Burn mark problem, and dimensional problem.
5. Begin to make machine control changes and Cycle the machine after each control adjustment to see how your machine control changes have affected your cycle/part.

To complete this lesson:

- Have no part problems or alarms
- Achieve a cycle time of 14 seconds or less

In addition to the above requirements, you must also meet the below "good molding practices" criteria.

- Cushion size must be less than 10% of the Screw Back Distance.
- Mold Full at VPT must be between 94% - 96%.
- Melt temp must be \pm 2°F of front zone barrel temperature

NOTE: Only make one control change at a time and then click the "Cycle" button to see the effects of that particular control change. This is the best practice to follow when making any control changes whether it be in SimTech or on an actual molding machine. The exceptions are the 4 barrel temperatures and 5 fill rates.

Lab 6 Solving Voids and Warp (Level 2)

Solving Voids and Warp

We are molding a cover out of ABS plastic on a 300 ton machine. Your part has voids and warp. The standard (quoted) cycle time for this job is 23 seconds. The part tolerance for this job is 6.500" ±.005.

Instructions:

1. Log into your Virtual Lab Lessons site (www.paulsonskillbuilder.com)
2. Open lesson "Lab 6"
3. "Cycle" the machine.
4. After you cycle the machine you will see under Part Problems you have a warp and voids problem.
5. Begin to make machine control changes and Cycle the machine after each control adjustment to see how your machine control changes have affected your cycle/part.

To complete this lesson:

- Have no part problems
- Achieve a cycle time of 23 seconds or less

In addition to the above conditions, you must also meet the below "good molding practices" criteria.

- Cushion size must be less than 10% of the Screw Back Distance.
- Mold Full at VPT must be between 94% - 96%.
- Melt temp must be ±2°F of front zone barrel temperature

NOTE: Only make one control change at a time and then click the "Cycle" button to see the effects of that particular control change. This is the best practice to follow when making any control changes whether it be in SimTech or on an actual molding machine. The exceptions are the 4 barrel temperatures and 5 fill rates.

Lab 7 - Solving Warp, Sinkmarks, and Dimensional Problems (Level 2)

Solving Warp, Sinkmarks, and Dimensional Problems

We are molding a part called a bezel out of Polystyrene on a 300 ton machine. The customer's specifications for this part are 8.000" x 8.000". The part is too small, it has sink marks and it is warping. The standard (quoted) cycle time for this job is 30 seconds. The part tolerance for this job is $\pm .005$. You must solve the part problems and then optimize the cycle. Of the three 'good molding practices' two of the conditions are already met. The Mold Full at VPT is currently at 94.89% which is with our specification of 94-96%. The cushion size is less than 10% of the screw back distance, again within our 'good molding practices' specifications. However, the melt temperature is 427.7°, not within 2°F of the Front Zone and Nozzle temp. setting. This will need to be fixed.

Instructions:

1. Log into your Virtual Lab Lessons site (www.paulsonskillbuilder.com)
2. Open lesson "Lab 7"
3. "Cycle" the machine.
4. After you cycle the machine you will see under Part Problems you have warp, sinkmarks, and dimensions problems.
5. Begin to make machine control changes and Cycle the machine after each control adjustment to see how your machine control changes have affected your cycle/part.

To complete this lesson:

- Have no part problems or alarms
- Achieve a cycle time of 27 seconds or less

In addition to solving all part problems and getting your cycle time to 23 seconds or below, you must also meet the below "good molding practices" criteria.

- Cushion size must be less than 10% of the Screw Back Distance.
- Mold Full at VPT must be between 94% - 96%.
- Melt temp must be $\pm 2^\circ\text{F}$ of front zone barrel temperature

NOTE: Only make one control change at a time and then click the "Cycle" button to see the effects of that particular control change. This is the best practice to follow when making any control changes whether it be in SimTech or on an actual molding machine. The exceptions are the 4 barrel temperatures and 5 fill rates.

Lab 8 - Solving Sink Marks, Warp and Dimensions Problems (Level 4)

Solving Sink Marks and Dimensions Problems

We are molding a frame. This customer's dimensional specifications for part are 12.00" X 4.00" plus or minus 0.005". The plastic you are using is ABS on a 300 ton machine. Your part has sink marks and a dimensional problem, it is too small. The standard (quoted) cycle time for this job is 65 seconds. The part tolerance for this job is ± 0.005 .

Instructions:

1. Log into your Virtual Lab Lessons site (www.paulsonskillbuilder.com)
2. Open lesson "Lab 8"
3. "Cycle" the machine.
4. After you cycle the machine you will see under Part Problems you have a sink mark problem and a size problem.
5. Begin to make machine control changes and Cycle the machine after each control adjustment to see how your machine control changes have affected your cycle/part.

To complete this lesson:

- Have no part problems or alarms
- Achieve a cycle time of 65 seconds or less

In addition to solving all part problems and getting your cycle time to 35 seconds or below, you must also meet the below "good molding practices" criteria.

- Cushion size must be less than 10% of the Screw Back Distance.
- Mold Full at VPT must be between 94% - 96%.
- Melt temp must be $\pm 2^{\circ}\text{F}$ of front zone barrel temperature

NOTE: Only make one control change at a time and then click the "Cycle" button to see the effects of that particular control change. This is the best practice to follow when making any control changes whether it be in SimTech or on an actual molding machine. The exceptions are the 4 barrel temperatures and 5 fill rates.

Lab 9 - Optimize the Process and Reduce Cycle Time (Level 3)

Optimize the Process and Reduce Cycle Time

In this set-up, we are already making parts without any defects but the machine settings are not optimized. Your job is to eliminate all part problems, reduce cycle time, and set the controls to “good molding practices” conditions.

Instructions:

1. Log into your Virtual Lab Lessons site (www.paulsonskillbuilder.com)
2. Open lesson “Lab 9”
3. “Cycle” the machine.
4. You will not see any part problems or machine alarms but your cycle time is too high.
5. Begin to make machine control changes and Cycle the machine after each control adjustment to see how your machine control changes have affected your cycle/part.

To complete this lesson:

- Have no part problems or alarms
- Achieve a cycle time of 14 seconds or less

Meet “good molding practices” criteria.

- Cushion size must be less than 10% of the Screw Back Distance.
- Mold Full at VPT must be between 94% - 96%.
- Melt temp must be $\pm 2^{\circ}\text{F}$ of front zone barrel temperature

NOTE: Only make one control change at a time and then click the “Cycle” button to see the effects of that particular control change. This is the best practice to follow when making any control changes whether it be in SimTech or on an actual molding machine. The exceptions are the 4 barrel temperatures and 5 fill rates.

Lab 10 - Solving Flash, Dimensional, and Warp problems & VPT (Level 2)

Solving Flash, Dimensional, and Warp problems & VPT

We are molding a cell cover out of ABS plastic on a 150 ton machine. As you can see from the part problems, we have flash, warp, and the part is too big. The standard (quoted) cycle time for this job is 17 seconds. The part tolerance for this job is ± 0.005 .

You will see under the **Cycle Results**, the “Mold Full at VPT” is 9999 and the max pressure alarm came on which means the maximum pressure was used. This means the VPT setting was never reached. You’ll have to correct this. The VPT should occur when the mold is between 94% - 96% full. Because VPT did not occur before the mold was full, the mold flashed and that could cause serious damage to the mold.

Instructions:

1. Log into your Virtual Lab Lessons site (www.paulsonskillbuilder.com)
2. Open lesson “Lab 10”
3. “Cycle” the machine.
4. Begin to make machine control changes and Cycle the machine after each control adjustment to see how your machine control changes have affected your cycle/part.

To complete this lesson:

- Have no part problems or alarms
- Achieve a cycle time of 17 seconds or less

Meet “good molding practices” criteria.

- Cushion size must be less than 10% of the Screw Back Distance.
- Mold Full at VPT must be between 94% - 96%.
- Melt temp must be $\pm 2^{\circ}\text{F}$ of front zone barrel temperature

NOTE: Only make one control change at a time and then click the “Cycle” button to see the effects of that particular control change. This is the best practice to follow when making any control changes whether it be in SimTech or on an actual molding machine. The exceptions are the 4 barrel temperatures and 5 fill rates.