Paulson
Training Programs

Your Presentation Will Start Shortly

Presented by Todd W. Bryant
Sr. Instructor, PTP Inc.

PaulsonTraining.com

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Training Programs

Presentation
Boost Profits With Transformative Science-Based Molding and Kaizen's Small-Step Strategies

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Today's Agenda

Presentation Objectives

- Brief overview of SimTech molding simulation.
- A Short Introduction to the Plastics Point of View.
- A Deeper Dive into Kaizen – a proven system for implementing small, incremental steps that can have a big impact in reaching molding goals.

Today's Agenda

Presentation Objectives

- SimTech Live: A "Not So Optimized" Process to Final "Optimized" Process and Good Part
- Systematically Optimizing a Process:
    - Plastic Melt Temperature
    - Plastic Flow Rate
    - Plastic Pressure (Cavity)
    - Plastic Cooling Rate
- Wrap Up / Questions

SimTech Molding Simulation Software

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- Built into SimTech are algorithms that define what is a good part.
- From those calculations SimTech shows part defects and any machine setup problems.
- The goal of Paulson Training is to make injection molding a logical four-variables process followed by simulation and then applied on the production floor.

Plastic Point of View (PPV)

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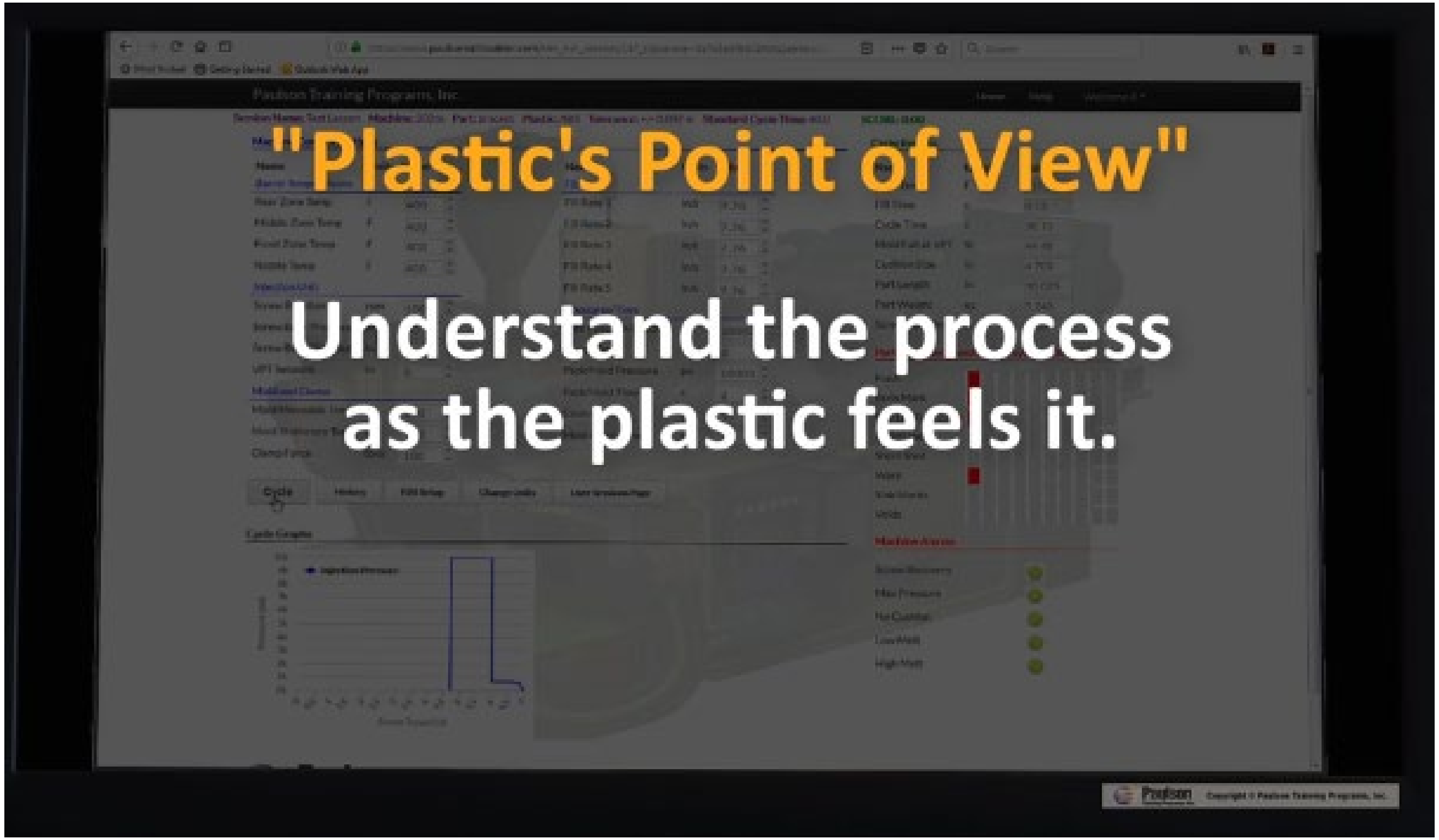

Plastic Point of View (PPV) (TIM3L3V5)

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Profitable Training Strategies

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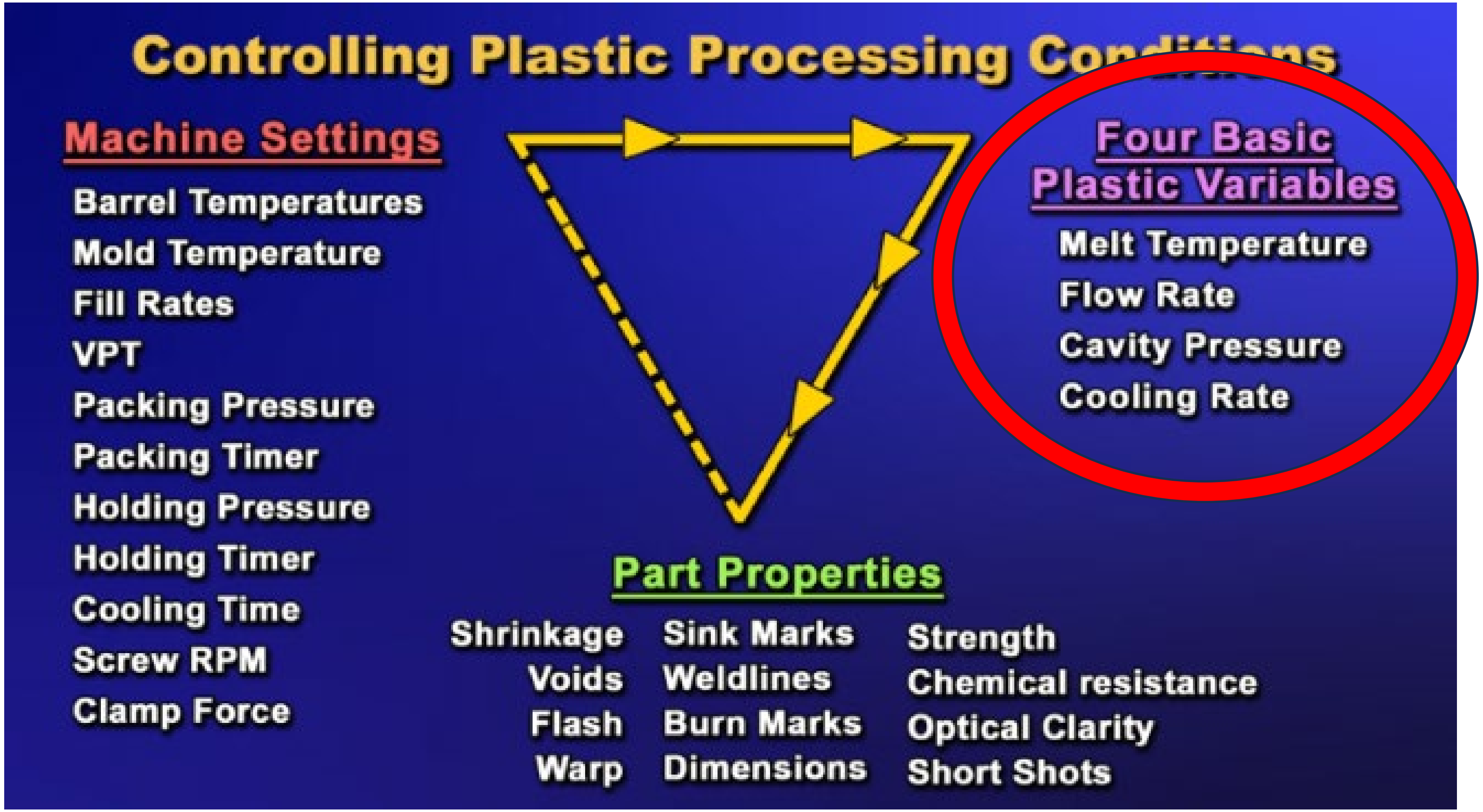

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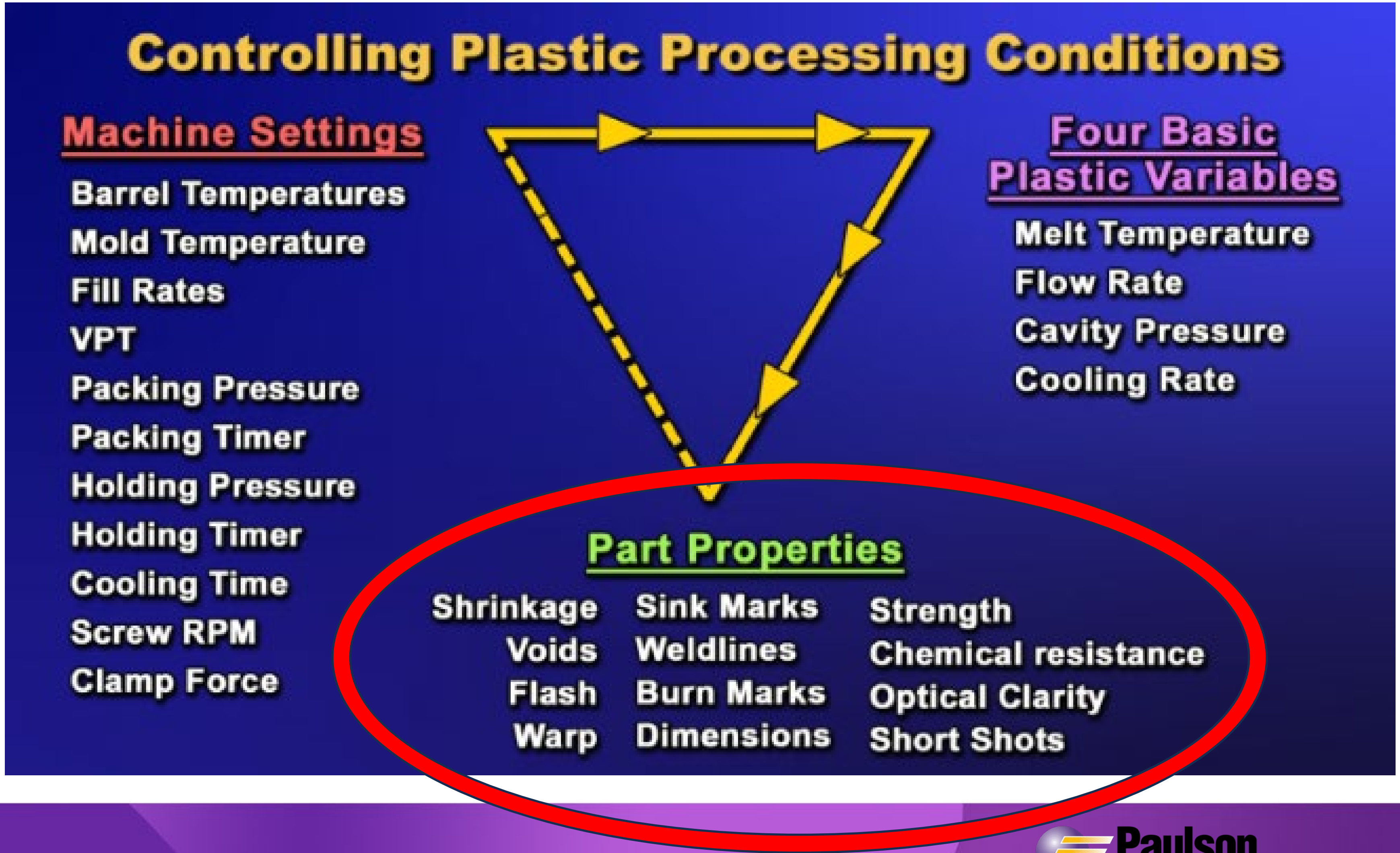

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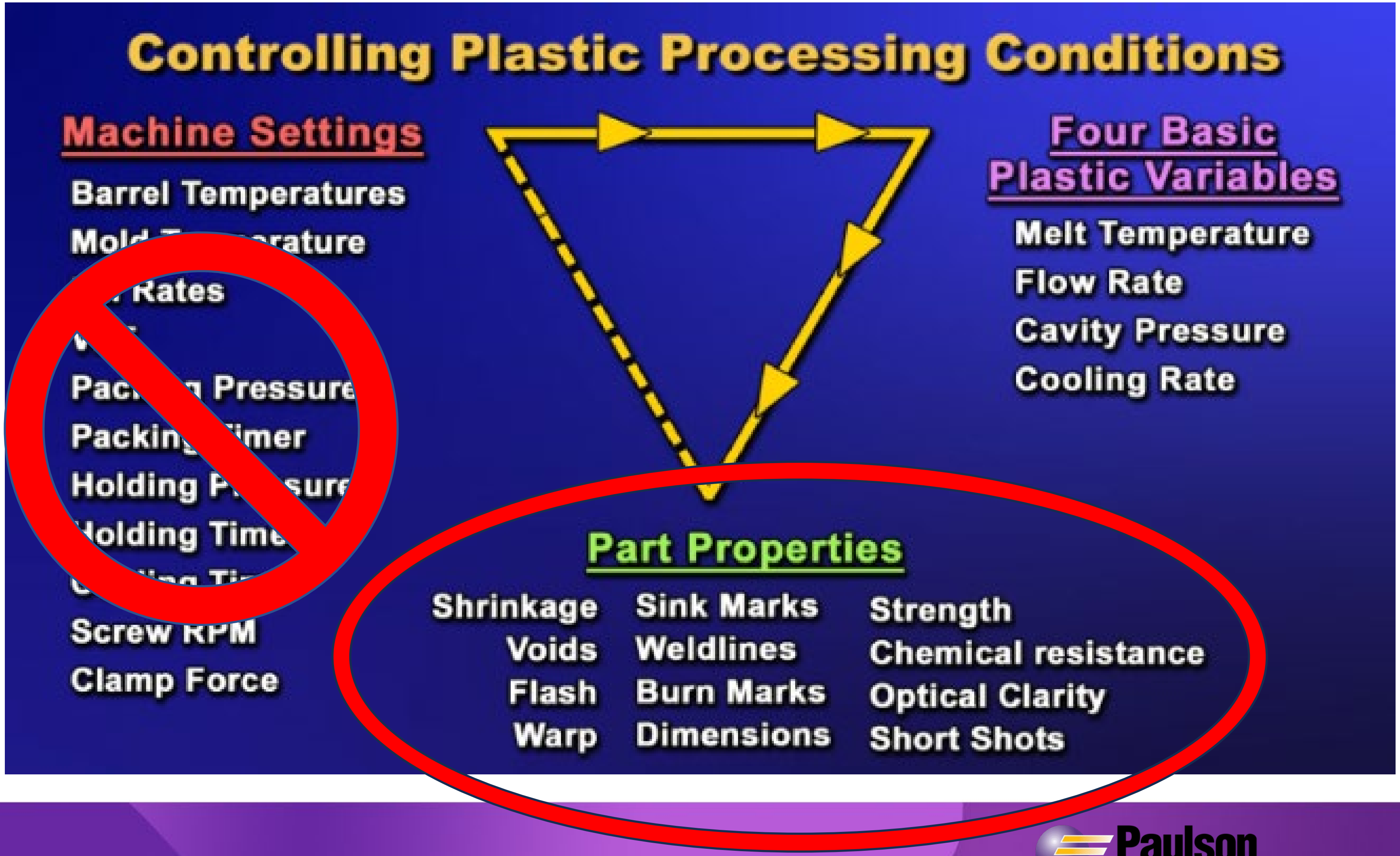

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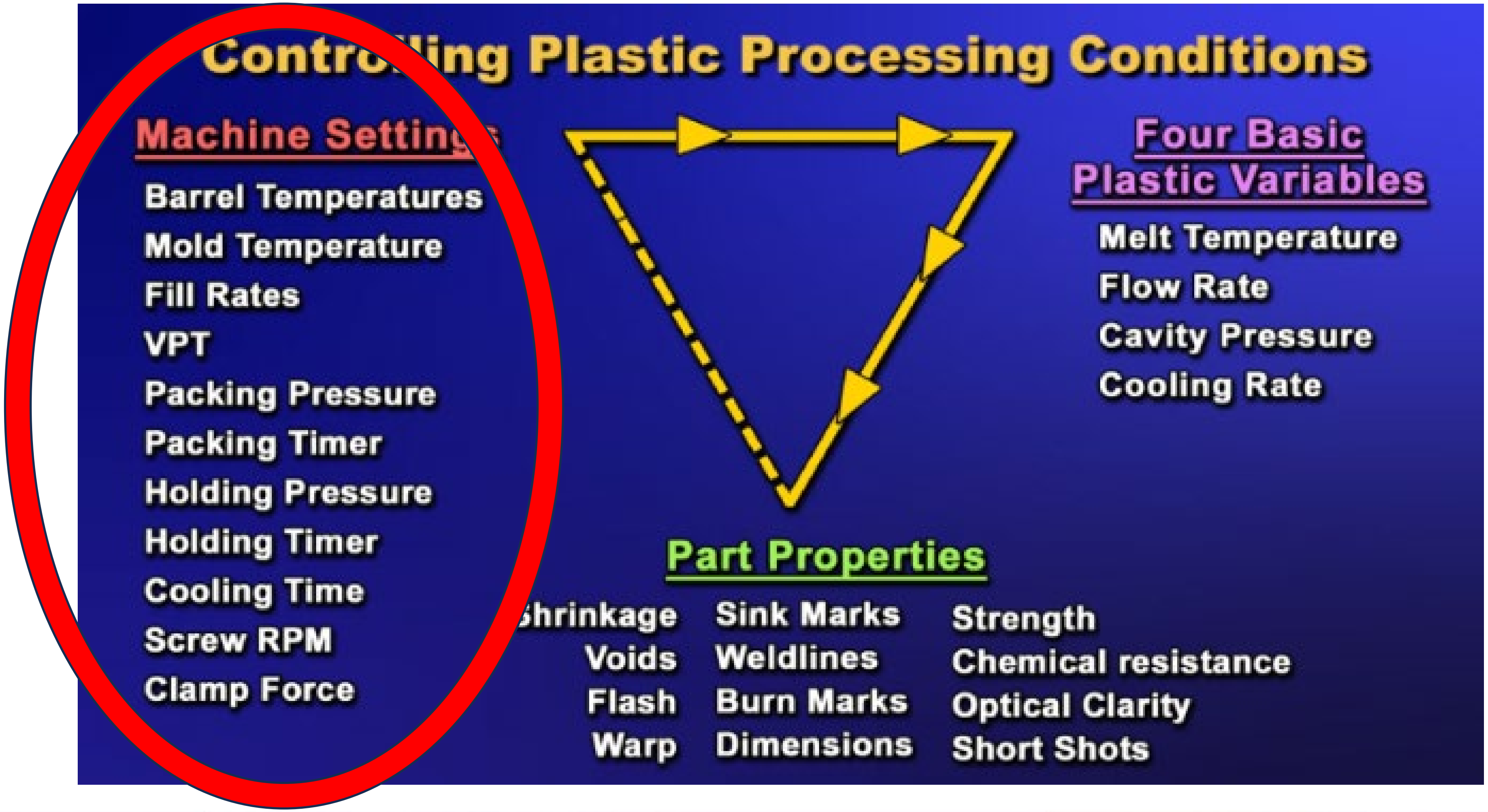

Understanding Kaizen Philosophy

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- Kaizen is a proven system for implementing small, incremental steps that can have a big impact in reaching your goals.
- We can use Kaizen to help in reducing molding costs in our plants.
- We can improve quality by utilizing Kaizen.
- Implementing big ideas through small steady actions is the essence of Kaizen.
- Kaizen is a small but powerful tool for controlling costs.

Reduce Molding Cost with Kaizen

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- Kaizen does not compromise the quality of the product or service.
- Kaizen does not undercut the well being of employees.
- Kaizen is not a one-time maneuver made out of desperation.
- In organizations that practice Kaizen every employee is expected to remain constantly alert for wasted resources.
- This is efficient and effective thanks to this basic assumption:

➢ *The people who are best able to reduce the costs of the job are the people who are actually performing the job!*

When Small Steps are Too Hard

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- Let us now consider what to do when small steps are too hard.
- When even small steps are too hard, it’s a sign that your fears are waking up.
- There are various ways to quiet those fears and move down the kaizen path to the goal.
- Resistance in any form – fear, panic, resignation, boredom – is a sign that fears are waking up.
- There are many reasons for a company or individual to fear change.

Common Obstacles in Kaizen

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- There are five common obstacles that nearly everyone has encountered.
- Those five obstacles are:
    1. An overwhelming crisis
    2. Fear and anxiety
    3. A harsh, critical inner voice
    4. Isolation
    5. Looking for answers in the wrong places

Common Obstacles in Kaizen

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- When any of these obstacles are encountered, it’s time to stop, reevaluate, slow down…and then break the steps for change down into such tiny pieces that resistance gently dissolves.
- No forcing, no fighting and no agonizing self-incrimination at the company or individual level.
- Be careful. When a company or individual desperately wants relief, they are left vulnerable to bad decisions.
- When so much fear is at play, small steps are a lifeline.

Kaizen in Injection Molding

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- Let’s apply this to a specific scenario in our molding operations.
- The Bigger Problem: We are running a part and it has Burn Mark, Dimensional issues and the cycle is 2 seconds slow.
- Applying Kaizen we break down the problem into smaller pieces to solve.
    1. Burn Mark
    2. Dimensional Issue
    3. Slow Cycle
- Lets address the Brun Mark and break that down into smaller pieces.

Kaizen in Injection Molding

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- At its basic level a Burn Mark on the part indicates that air is being trapped in the cavity and eventually gets compressed so much that “auto-ignition” occurs.
- The evidence that auto-ignition occurred is the charred area on our part.
- Let’s keep applying Kaizen by asking the question, “What is causing the air to be trapped and compressed?”
- A logical response is there is a venting issue with the tool or more generally speaking the air in the cavity cannot escape fast enough.

Kaizen in Injection Molding

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- Apply kaizen to the potential solutions.
- One such solution is to slow the fill rate of the material entering the mold.
- Break the solution into even smaller steps by slowing the fill rate down for the final 20% of the filling the cavity.
- This will allow the air more time to escape the cavity without sacrificing a great deal of time to the overall cycle. We are typically speaking in terms of tenths of a second.
- We will see an example of that today where our fill time changes from 0.43 to 0.60 seconds.

Fianl Thoughts About Kaizen

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- Even when you are eager to try Kaizen, others in your organization may push to change “faster.”
- Your internal voice may whisper, *“Small is always slow. Big is necessarily better.”*
- But small steps get you to the same place that big steps do; the main difference is that small steps are more likely to work.
- Sometimes they are faster too!

Principles, Tools and Strategy

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- Paulson "Best Molding Practices"
  1. Actual Melt Temperature should be within ±2°F of the Front Zone.
  2. VPT should be set between 94 and 96%. We will target 95% Velocity to Pressure Transfer Point (VPT).
  3. The Cushion should be set equal to or less than 10% of the Screw Back Distance also termed "Shot Size".

Principles, Tools and Strategy

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- We will **Systematically Optimize** the molding process using the **Four Plastic Variables** to achieve the "Best" plastic conditions to provide optimum part properties.

  1. Plastic Melt Temperature.
  2. Plastic Flow Rate.
  3. Plastic Pressure.
  4. Plastic Cooling Rate

SimTech Live - Demonstration

www.paulsontraining.com/SimTech-injection-molding-machine-simulator/

SimTech - Setup

Setup

Exit without Saving | Save and Exit

Name

2023 MAPP Ber

Enter a name for this session

Standard Cycle Time

18.00

Standard Cycle Time used for Score

Tolerance

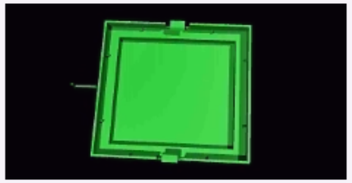
standard

standard	in	+/- 0.005

Select dimensional tolerance - loose, standard, or precision

Part

cover



Part Length	in	6.500
Part Width	in	6.500
Part Thickness	in	0.080
Part Volume	in^3	5.330
Number of Cavities		2

Units

english

Choose the units to work in

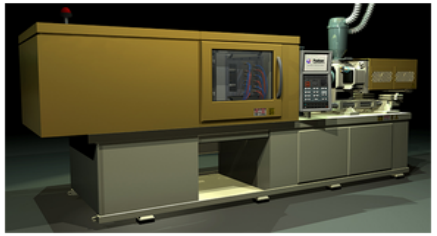
Plastic

Polypropylene

Plastic Type		PP
Low Melt Temp	F	389
High Melt Temp	F	501
Mold Core Temp Low Limit	F	70
Mold Cavity Temp Low Limit	F	70

Machine

300tn



Max Injection Press	psi	25000
Max Clamp Force	tons	300
Max Shot Size	in^3	39.300
Max Flow Rate	in^3	25.000
Screw Diameter	in	2
Max Screw Travel Dist	in	8

Profitable Training Strategies

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Machine Control Settings

Barrel Temperatures

Rear Zone Temp	490	F
Middle Zone Temp	480	F
Front Zone Temp	440	F
Nozzle Temp	440	F

Injection Unit

Screw Rotation	200	rpm
Screw Back Pressure	1500	psi
Screw Back Distance	2.48	in
VPT Setpoint	0.35	in

Mold and Clamp

Mold Moveable Temp	90	F
Mold Stationary Temp	90	F
Clamp Force	300	tons

Fill Rates

Fill Rate 1	5	in/s
Fill Rate 2	5	in/s
Fill Rate 3	5	in/s
Fill Rate 4	5	in/s
Fill Rate 5	5	in/s

Pressures/Time

Max Injection Pressure	20000	psi
Ramp Time	0	s
Pack/Hold Pressure	3000	psi
Pack/Hold Time	3.7	s
Cooling Time	15	s
Mold Open Time	1	s

Problems (most recent cycle to the left)

Flash
Burn Mark
Size
Weld Lines
Short Shot
Warp
Sink Marks
Voids

Machine Alarms

Screw Recovery
Max Pressure
No Cushion
Low Melt
High Melt

Cycle Results

Melt Temp	411.3	F
Fill Time	0.43	s
Cycle Time	20.13	s
Mold Full at VPT	94.89	%
Cushion Size	0.231	in
Part Length	6.508	in
Part Weight	2.458	oz
Screw Run Time	1.94	s

Session

Name	2023 MAPP Benchmarking Conference
Machine	300tn
Part	cover
Plastic	Polypropylene
Tolerance	+/- 0.005 in
Std. Cycle Time	18.0
Score	**0.00**

Profitable Training Strategies

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Paulson Training Programs, Inc. RETURN ON INVESTMENT (ROI) CALCULATOR

Enter Your Data Below

Job Facts	
Total Hours for Job (hrs)	5,000.00
Quoted Machine Hour Rate ($/hr)	45.00
Quoted % profit	10.00

Cycle Time	
Quoted Cycle Time (sec)	18.00
Actual Cycle Time (sec)	20.00

Reject Rates	
Quoted Reject Rates (%)	1.00
Actual Reject Rates (%)	3.00

Up-Time	
Quoted Up-Time (%)	85.00
Actual Up-Time (%)	82.00

Reset Print

This worksheet is designed to allow managers to take production data from a specific molding job, plug that data into simple formulas then determine if profits are being lost through inefficiencies on the production floor. In many cases, these inefficiencies are directly caused by misunderstandings and lack of training on the production floor. Training can eliminate these inefficiencies and get you closer to your quoted profits.

Effects of Cycle Time Gain/Loss	
Actual Machine Hour Rate (AMHR)	$40.50
Gain/(Loss) in Machine Hour Rate (MHR)	($4.50)
Gain/(Loss) from Quoted Cycle Time	($22,500.00)

Effects of Reject Rate Gain/Loss	
Gain/(Loss) from Quoted Reject Rates	($4,500.00)

Effects of Up-Time Gain/Loss	
Gain/(Loss) from Quoted Up-Time	($6,750.00)

Summary	
Quoted Profit	$22,500.00
Cycle Time Gain/(Loss)	($22,500.00)
Reject Rate Gain/(Loss)	($4,500.00)
Up-Time Gain/(Loss)	($6,750.00)
Total Profit	($11,250.00)
Total Gain/(Loss) of Quoted Profit	($33,750.00)

Profitable Training Strategies

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Machine Control Settings

Barrel Temperatures

Rear Zone Temp	450	F
Middle Zone Temp	440	F
Front Zone Temp	389	F
Nozzle Temp	389	F

Injection Unit

Screw Rotation	200	rpm
Screw Back Pressure	2800	psi
Screw Back Distance	2.48	in
VPT Setpoint	0.35	in

Mold and Clamp

Mold Moveable Temp	70	F
Mold Stationary Temp	70	F
Clamp Force	300	tons

Fill Rates

Fill Rate 1	5	in/s
Fill Rate 2	5	in/s
Fill Rate 3	5	in/s
Fill Rate 4	5	in/s
Fill Rate 5	2	in/s

Pressures/Time

Max Injection Pressure	20000	psi
Ramp Time	0.4	s
Pack/Hold Pressure	500	psi
Pack/Hold Time	1.5	s
Cooling Time	14.4	s
Mold Open Time	1	s

Problems (most recent cycle to the left)

- Flash
- Burn Mark
- Size
- Weld Lines
- Short Shot
- Warp
- Sink Marks
- Voids

Machine Alarms

- Screw Recovery
- Max Pressure
- No Cushion
- Low Melt
- High Melt

Cycle Results

Melt Temp	389.8	F
Fill Time	0.60	s
Cycle Time	17.90	s
Mold Full at VPT	95.17	%
Cushion Size	0.231	in
Part Length	6.504	in
Part Weight	2.445	oz
Screw Run Time	2.76	s

Session

Name	2023 MAPP Benchmarking Conference
Machine	300tn
Part	cover
Plastic	Polypropylene
Tolerance	+/- 0.005 in
Std. Cycle Time	18.0
Score	**100.54**

Profitable Training Strategies

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Paulson Training Programs, Inc. **RETURN ON INVESTMENT (ROI) CALCULATOR**

This worksheet is designed to allow managers to take production data from a specific molding job, plug that data into simple formulas then determine if profits are being lost through inefficiencies on the production floor. In many cases, these inefficiencies are directly caused by misunderstandings and lack of training on the production floor. Training can eliminate these inefficiencies and get you closer to your quoted profits.

Enter Your Data Below

	Job Facts
Total Hours for Job (hrs)	5,000.00
Quoted Machine Hour Rate ($/hr)	45.00
Quoted % profit	10.00

	Cycle Time
Quoted Cycle Time (sec)	18.00
Actual Cycle Time (sec)	18.00

	Reject Rates
Quoted Reject Rates (%)	1.00
Actual Reject Rates (%)	1.00

	Up-Time
Quoted Up-Time (%)	85.00
Actual Up-Time (%)	85.00

Effects of Cycle Time Gain/Loss

Actual Machine Hour Rate (AMHR)	$45.00
Gain/(Loss) in Machine Hour Rate (MHR)	$0.00
Gain/(Loss) from Quoted Cycle Time	$0.00

Effects of Reject Rate Gain/Loss

Gain/(Loss) from Quoted Reject Rates	$0.00

Effects of Up-Time Gain/Loss

Gain/(Loss) from Quoted Up-Time	$0.00

Summary

Quoted Profit	$22,500.00
Cycle Time Gain/(Loss)	$0.00
Reject Rate Gain/(Loss)	$0.00
Up-Time Gain/(Loss)	$0.00
Total Profit	$22,500.00
Total Gain/(Loss) of Quoted Profit	$0.00

Reset Print

Profitable Training Strategies

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Machine Control Settings

Barrel Temperatures

Rear Zone Temp	450	F
Middle Zone Temp	440	F
Front Zone Temp	389	F
Nozzle Temp	389	F

Injection Unit

Screw Rotation	200	rpm
Screw Back Pressure	3100	psi
Screw Back Distance	2.48	in
VPT Setpoint	0.35	in

Mold and Clamp

Mold Moveable Temp	70	F
Mold Stationary Temp	70	F
Clamp Force	300	tons

Fill Rates

Fill Rate 1	5	in/s
Fill Rate 2	5	in/s
Fill Rate 3	5	in/s
Fill Rate 4	5	in/s
Fill Rate 5	2	in/s

Pressures/Time

Max Injection Pressure	20000	psi
Ramp Time	0.4	s
Pack/Hold Pressure	500	psi
Pack/Hold Time	1.5	s
Cooling Time	10.9	s
Mold Open Time	1	s

Problems (most recent cycle to the left)

- Flash
- Burn Mark
- Size
- Weld Lines
- Short Shot
- Warp
- Sink Marks
- Voids

Machine Alarms

- Screw Recovery
- Max Pressure
- No Cushion
- Low Melt
- High Melt

Cycle Results

Melt Temp	389.5	F
Fill Time	0.60	s
Cycle Time	14.40	s
Mold Full at VPT	95.17	%
Cushion Size	0.231	in
Part Length	6.504	in
Part Weight	2.445	oz
Screw Run Time	3.12	s

Session

Name	2023 MAPP Benchmarking Conference
Machine	300tn
Part	cover
Plastic	Polypropylene
Tolerance	+/- 0.005 in
Std. Cycle Time	18.0
Score	**124.97**

Profitable Training Strategies

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Paulson Training Programs, Inc. — RETURN ON INVESTMENT (ROI) CALCULATOR

Enter Your Data Below

This worksheet is designed to allow managers to take production data from a specific molding job, plug that data into simple formulas then determine if profits are being lost through inefficiencies on the production floor. In many cases, these inefficiencies are directly caused by misunderstandings and lack of training on the production floor. Training can eliminate these inefficiencies and get you closer to your quoted profits.

	Job Facts
Total Hours for Job (hrs)	5,000.00
Quoted Machine Hour Rate ($/hr)	45.00
Quoted % profit	10.00

	Cycle Time
Quoted Cycle Time (sec)	18.00
Actual Cycle Time (sec)	14.41

	Reject Rates
Quoted Reject Rates (%)	1.00
Actual Reject Rates (%)	1.00

	Up-Time
Quoted Up-Time (%)	85.00
Actual Up-Time (%)	85.00

Reset

Print

Effects of Cycle Time Gain/Loss	
Actual Machine Hour Rate (AMHR)	$56.21
Gain/(Loss) in Machine Hour Rate (MHR)	$11.21
Gain/(Loss) from Quoted Cycle Time	$56,050.00

Effects of Reject Rate Gain/Loss	
Gain/(Loss) from Quoted Reject Rates	$0.00

Effects of Up-Time Gain/Loss	
Gain/(Loss) from Quoted Up-Time	$0.00

Summary	
Quoted Profit	$22,500.00
Cycle Time Gain/(Loss)	$56,050.00
Reject Rate Gain/(Loss)	$0.00
Up-Time Gain/(Loss)	$0.00
Total Profit	$78,550.00
Total Gain/(Loss) of Quoted Profit	$56,050.00

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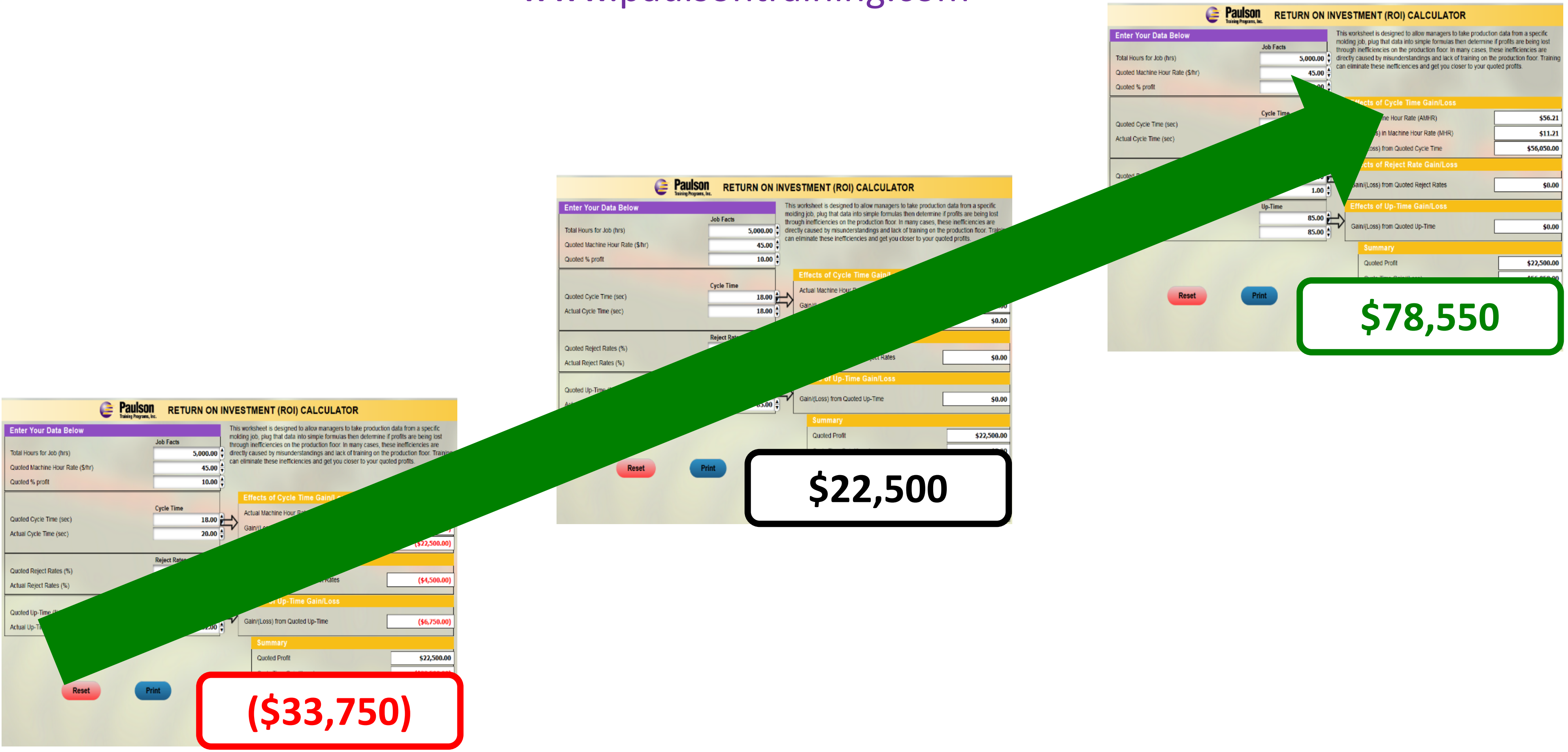

ProMolder Classes

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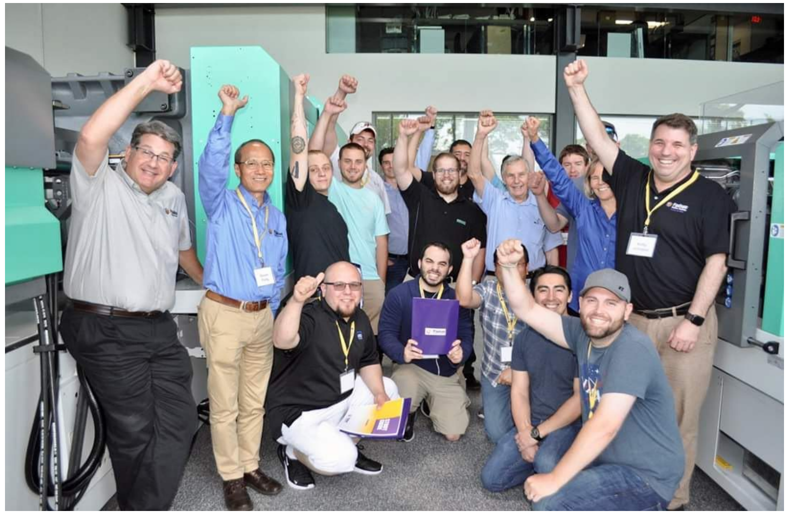

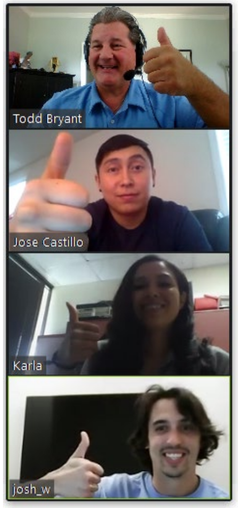

Training Certification Goals

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Paulson
Training Programs, Inc.

Tom Jones

Has successfully completed all requirements to receive

ProMolder Certification

March 9, 2022
Date

Karen Paulson
Karen Paulson, *President*
Paulson Training Programs, Inc.

SimTech Monthly Challenge

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Questions?

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Questions?

Paulson
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Thank You & We Appreciate You

Presented by Todd W. Bryant
Sr. Instructor, PTP Inc.

If you have any questions or need additional information now or in the future, please contact us.
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