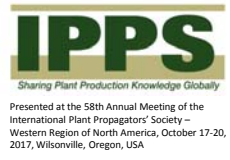


ASK

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Adapting
Automation to
your operation

Joe Kupillas



IPPS
Sharing Plant Production Knowledge Globally
Presented at the 58th Annual Meeting of the
International Plant Propagators' Society –
Western Region of North America, October 17-20,
2017, Wilsonville, Oregon, USA



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- Interested in nursery –
Great grandfather started
Fruitland Nursery in 1906
- Nursery worker ~1972-2009
 - Loading trucks,
 - Pruning – mugo pines,
junipers,
rhododendrons
 - Potting
 - Propagating
 - Managing
- Emphasis on systems
 - OAN New Tech task
force late 1990s
 - Organized field days
 - Developed CNEF
(Container Nursery
Efficiency Forum)



Why me?

Bottom Line: Nursery type,
not equipment type

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- 1993 Briggs Nursery – ribbed for penciling productivity projections

JOE NEEDED 5000 KINNIKINWKK PRUNED IN 2.3675 MAN HOURS

I've selected YOU....

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Current role

Apply my time and experience in an effort to improve the bottom line for nurseries and greenhouse operations.

- Through streamlining physical processes
- Through the application of improved chemistries
- Through improved water quality

Manufacturers I support

Wurdinger Manufacturing Inc.
Labor Saving Solutions

PACE 49 Inc.

PHYTON
CORPORATION

CENTRAL Life Sciences
A Central Garden & Pet Company

ETATRON
AMERICA
Serving North and Central America


Why me?

Outline of what we will discuss

- Why Automate?
- Adoption of automation
- Calculate return
- Elements of an effective process
- Case studies
- Parting thoughts
- Questions



Adapting Automation to your operation



Why Automation?

1. **Reduce Labor**
 1. Cost per unit is going up, not down
 2. Cake walk theory – not enough to go around
2. **Increase throughput**
 1. Automation CAN improve product uniformity.
Quality expectations are continuing to escalate
3. **Improve safety** – well designed systems often reduce the physical requirement
4. **Get more** out of the infrastructure resources – water, administration, growing area, etc.
5. **Improved crop dependability** for YOUR customers.
“Cookie cutters” are good to reliably produce product year in and year out



Why Automation?

1. Cut Cost – Bean counters LOVE automation



Why Automation?



2. Improve Ergonomics

“Unfortunately the people who work here seem to be getting older. I need to adjust the physical requirements so that they can continue to make meaningful contributions”



Why Automation?



3. Improve Quality

People become interchangeable, however finished result remains constant



Why Automation?



4. Increase per worker productivity


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Why Automation?

4. Increase per worker productivity

Calculate it

- Pre-machine
 - 21 people planting 2-gallon spruce at rate of 3,000 per day
- Post-machine
 - 8 people planting 2-gallon spruce at a rate of 8,000 per day.



AND eliminated re-work in the field

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Why Automation?

What else happens when we increase daily output?

1. Improve product **uniformity** – easier for herbicide apps, watering and more days to root and grow.
2. **Repurpose** people applied to this job – frees up time for other functions like pruning, spacing, shipping. (opportunity cost)
3. Can open up space for **greater** production per production area.

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Adoption

Adapting Automation to YOUR operation

- Get on the internet
- Find a machine
- Order the machine
- Plug machine in
- Populate machine with people
- Schedule delivery to a bank with piles of...

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Adoption

Adapting Automation to YOUR operation

Lets think about the landscape 5 years from now

- A. What will happen with the selling price per plant?
- B. What will happen with competition?
- C. What will happen with labor?
 - ✓ Cost per unit?
 - ✓ Availability?
 - ✓ Age?
 - ✓ Work ethic?

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Adoption

1. Realize the need.
2. Determine area(s) of potential investment
3. Seek outside input
4. Put a pencil to the equation
5. Detail the proposal
6. Commit and don't look back
7. Work the buy-in
8. Implement with flexibility

Employ a thoughtful process



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Adaption

1. Identify process(es) that consume labor
 - Planting
 - Trimming
 - Spacing
 - Shipping
 - Grading
 - Sanitizing
 - Sticking
 - Transplanting
 - Cleaning
 - Moving



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Adoption

2. Focus on one production task and ask how it can be further “systemized”

- General **review** of existing practices
- **Reach** into the future – say 5 years and ask how it may change in terms of production numbers or sizes
- Play the “What If” game
 - Rules:
 - *Forget about the wallet momentarily*
 - *No such thing as a bad idea*
 - *Invite outside input*

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Adaption

ZEROING IN

- What can be done to reorganize steps and or work expectations into a more efficient process?
- Goal of the “what if” game?
 - Look back in 2 years. Biggest regret?
Didn't make this change earlier.

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Adoption

PERSPECTIVE

Which side of this coin offers the bigger return on investment?



The image shows two identical coins side-by-side. The left coin has the word "COST" written in white, bold, capital letters across its center. The right coin has the word "BENEFIT" written in white, bold, capital letters across its center. Both coins are dark with a lighter circular center and a decorative border.


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Adoption

PERSPECTIVE

Cost: If you save 20% on \$100,000, that is \$20,000.

Benefit: If you increase production by 20% with \$1,000,000 annual sales, that is \$200,000 Annually.



The image shows two identical coins side-by-side. The left coin has the word "COST" written in white, bold, capital letters across its center. The right coin has the word "BENEFIT" written in white, bold, capital letters across its center. Both coins are dark with a lighter circular center and a decorative border.

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Adoption


Suggestion

Be mindful of cost

Focus on the return side of the coin – exponential potential

COST

BENEFIT



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Adoption

Buy In Strategy

Do you have one?

You can develop the perfect process, but without buy in, a new machine may be

ART



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Adoption

Buy In Strategy

- Improved product uniformity
- Free up cash flow *
- Improved contribution per employee

Ownership barriers

- Machines will adversely effect quality
- Blank check fear. How will the total cost be supported with existing cash flow?
- Machines are complicated. Who will fix or maintain them?
- Don't have room

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Adoption

Buy In Strategy

- Fewer people needed
- Machines don't get sick
- More consistent results

Management barriers

- Need to educate & train
- Effects aspects that were not considered
- Machines are complicated – who will fix or maintain them?

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Adoption

Buy In Strategy

Worker barriers

- Will I loose my job if this works well?
- I am very good at the previous practice, acquired skills will be less valuable
- Machines will make me work harder

- Less effort required
- Fewer strains and sprains
- Fewer questions about what to do

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Adaption

Getting the most out of the Capital Improvement Buck

Areas that may offer the lowest hanging fruit

- % of annual labor effected
- Process work day reduction
- Impact on product sell through
- Opportunity cost on seasonal labor needs.



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Adoption

Think critically

About the required touches to *manufacture* plants

- Satisfy a particular type
- Satisfy a particular size
- Satisfy a particular condition

Automating or “systemizing” rewards critical thinking about process steps.



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Adaption

Up and down stream process impact

- Upstream impact – may need to adjust pots, soil delivery, plant structure.
 - Can impact source (seeds vs plugs vs bare root for example).
- Downstream impact – may need to change transportation, bed configuration, eliminate container sizes or employ infrastructure adjustments





Adoption

Example



This mower requires uniform bed width, even surfaces and few vertical obstructions.

Adaption



Greenhouse layout is designed to maximize labor efficiency and provide access throughout rooting stages.




Adoption


Rewards when successful

Improvements

- ✓ accurately cost products
- ✓ accurately budget labor and production
- ✓ Throughput
- ✓ Interchangeable workers
- ✓ hourly contribution per worker
- ✓ Reduces % of each sales dollar applied to labor



	Return On Investment
<h2>ROI Calculation Example</h2> <ul style="list-style-type: none">• <u>Step 1: Identify hourly labor cost figure</u><ul style="list-style-type: none">• <u>Loaded Labor rate per hour</u><ul style="list-style-type: none">• includes average hourly wage + adjustment for benefits (vacation, insurance, paid leave) + payroll taxes.• wage x 1.3 = loaded hourly labor cost. <p><u>Loaded Labor Rate:</u> \$12.50 (average wage) x 1.3 = \$16.25 per hour.</p>	

	ROI
<h2>ROI Calculation Example</h2> <ul style="list-style-type: none">• <u>Step 2: Productivity difference</u><ul style="list-style-type: none">• Existing practice units produced per person per hour (A)• Proposed practice units produced per person per hour (B)	

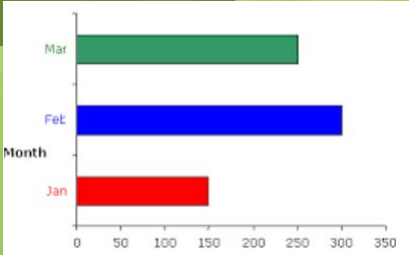
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ROI

ROI Calculation Example

- Step 3: Volume calculation

Determine expected annual number produced



Month	Expected Annual Number Produced
Jan	150
Feb	300
Mar	250

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ROI

ROI Calculation Example


Potting 2-gallon bare root spruce

Current Loaded Labor rate per hour=
\$16.25

(A) = 400 units per 21 people =
19/person/hr.; \$0.86/plant

(B) = 1066 units per 8 people =
133/person/hr.; \$0.13/plant

(C) Difference of \$0.73/plant



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ROI


ROI Calculation Example

Potting 2-gallon bare root spruce

\$0.73/plant

Total annual production of 60,000

$60,000 \times \$0.73 = \$43,800$



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ROI


ROI Calculation Example

Potting 2-gallon bare root spruce

Equipment cost (including power supply)

$\$50,000 / 5 \text{ year capital loan} = \$12,000$
annual cost (includes factor for interest)

$\$43,800 - \$12,000 = \$31,800$ annual cash contribution.



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ROI


ROI Calculation Example

Potting 2-gallon bare root spruce

Direct labor savings over 5 year period
of loan: $\$31,800 \times 5 = \$159,000$

Other bonuses

1. Value of equipment after term of loan
2. Opportunity cost on labor when production is compressed
3. Wages likely increase, so savings is underestimated
4. Product uniformity likely improved = better sell through



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ROI


ROI Calculation Example

Potting 2-gallon bare root spruce

What is the payback period on this
equipment purchase?

Initial equipment cost: \$50,000
Saved wages in one year: \$31,800

$\$50,000 / \$31,800 = 1.57$ years



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Process

Process Basics

Buffer inputs and outputs

Organize the process to *eliminate* unnecessary process interruptions



Two gallon spruce example:
Inputs: plants + soil + pots
Outputs: potted spruce



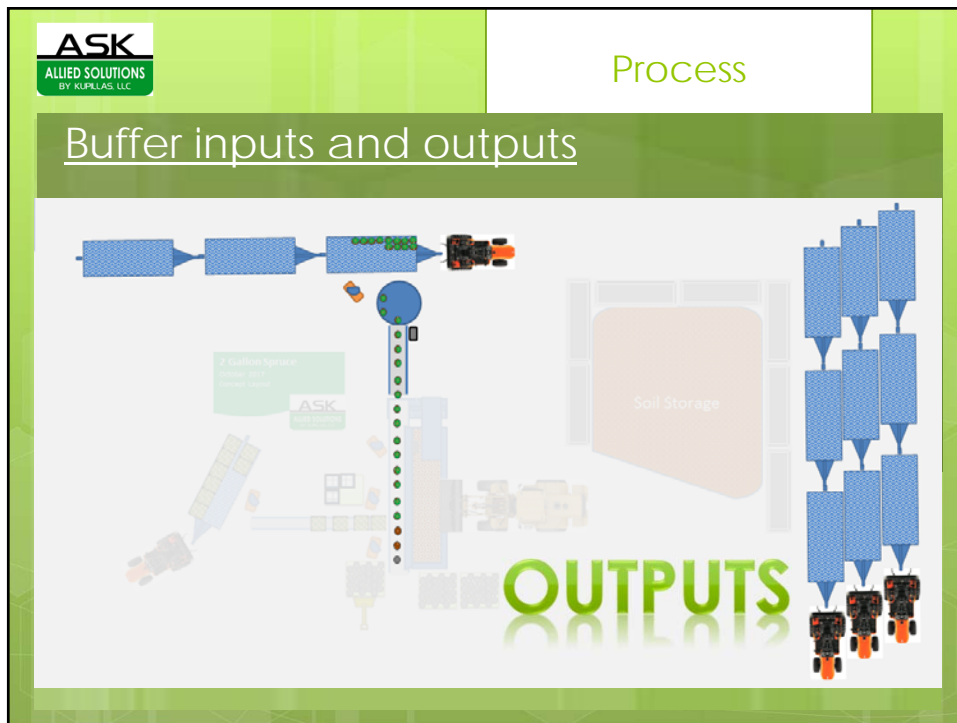
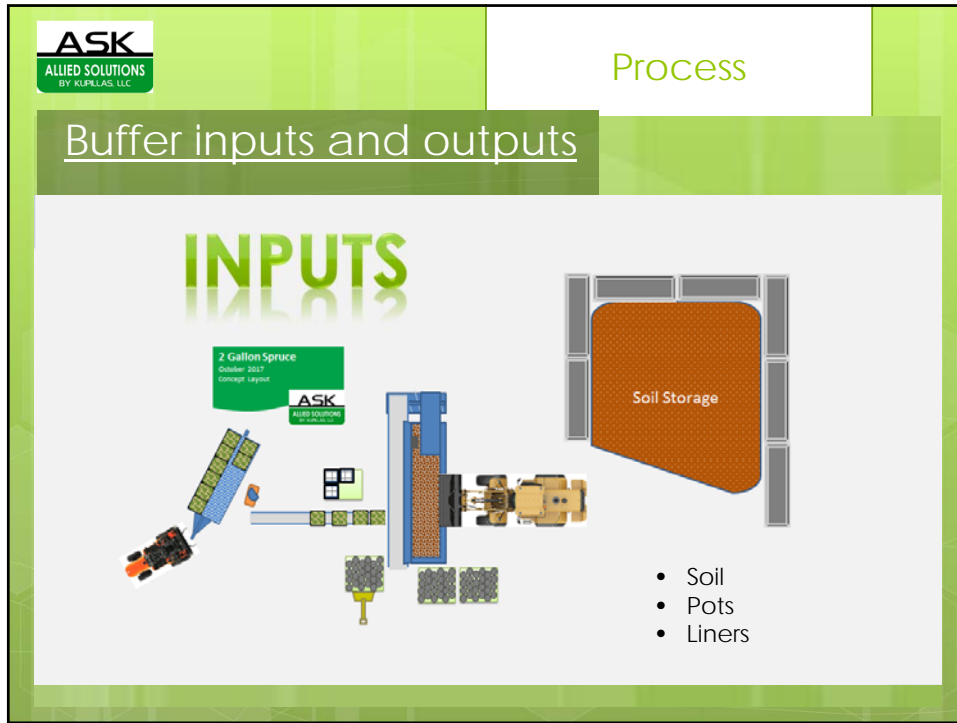
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Process

Buffer inputs and outputs



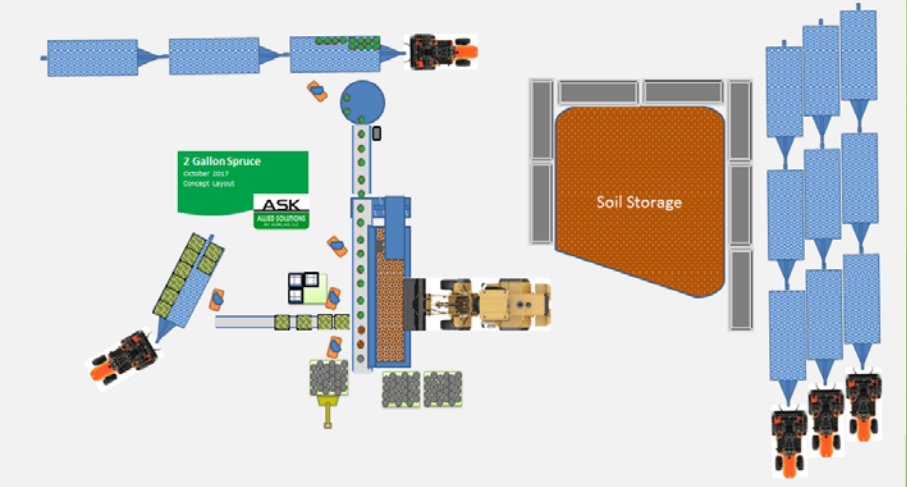
Top View
Potting Machine



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Process

Buffered Process = Continuous Motion

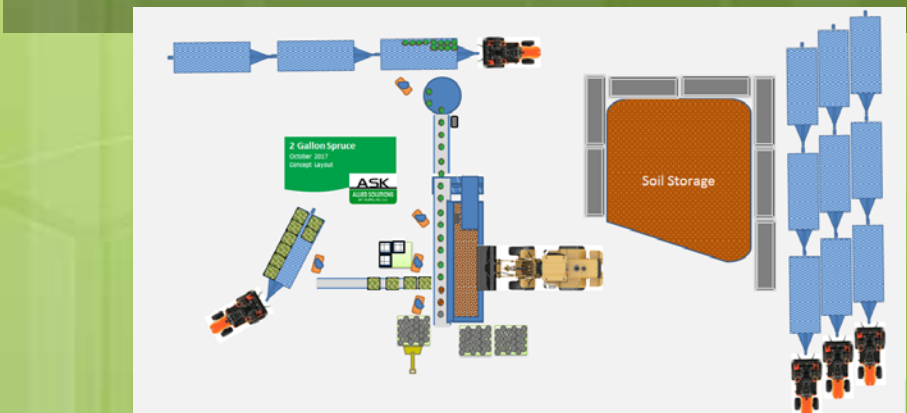


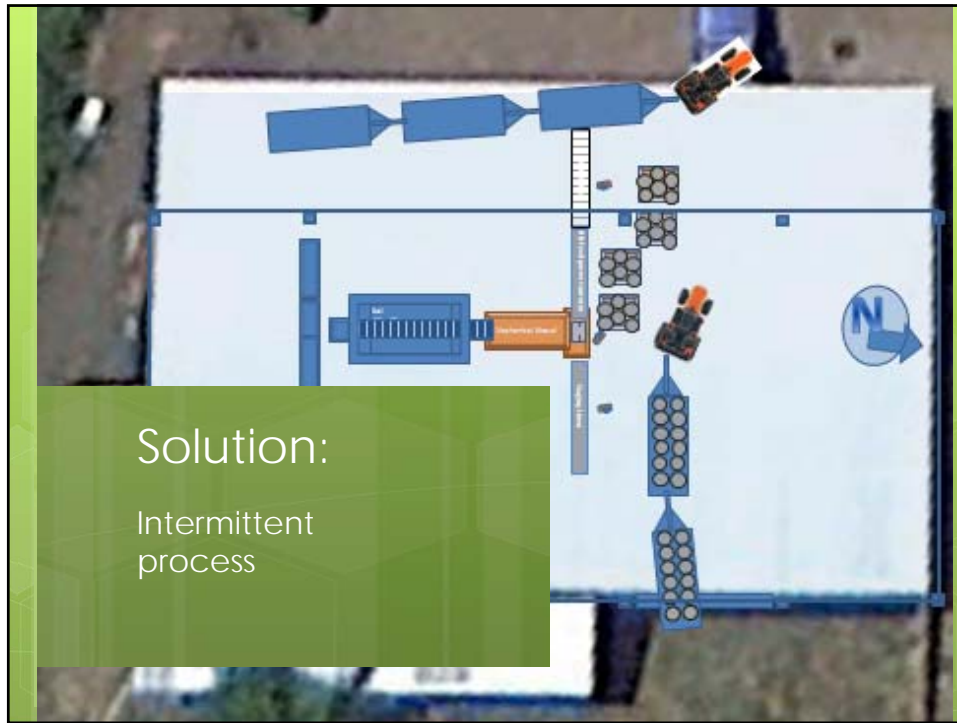
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Process

Buffered Process = Continuous Motion

Is continuous motion always the solution?





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Process

Green Button Time vs. Red Button Time

Solution:
Choreograph roles for red and green button functions

This example: Total crew size never to exceed 3 people


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Process

Green Button Time vs. Red Button Time


Green Button:

- 1 x Liner prep
- 1 x Planting
- 1 x Float/loading

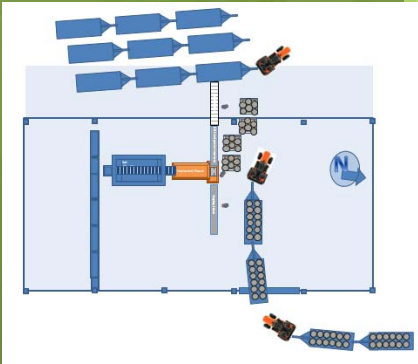


Red Button:

- 2 x set down
- 1x Liner load



Choreograph roles for red and green button functions



This example: Total crew size never to exceed 3 people

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Process

Key with intermittent process?

Organize to maximize minutes per day in the green button zone





Case Study

Grower "cleans" styroblocks.

Key: Identify the accepted definition of clean.

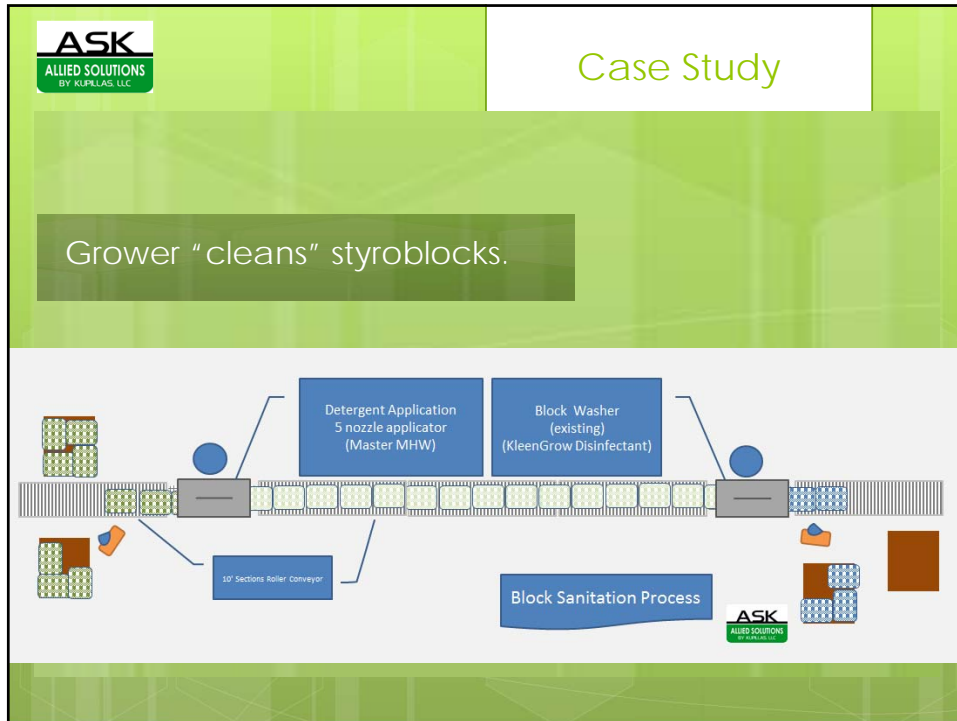
Does this mean that it looks sparkly and white?
Does this mean that it won't infect my next crop?



Case Study

Grower "cleans" styroblocks.





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Case Study

Grower "cleans" styroblocks.

Proposed system adds one machine, 2 injectors and roller conveyor

- Improved per worker contribution
- Improved cleaning consistency

A photograph showing a white styroblock tray filled with numerous young pine seedlings. The seedlings are planted in the individual cells of the tray, which is arranged in a grid pattern.



Case Study

Grower blends thousands and thousands of pounds of sedum cuttings

- Finished product has to have a specific weight-based ratio of up to 10 different varieties
- Current practice employs up to 11 people with scoop shovels on a smooth concrete slab
- Problem with the extreme physical demands to stir such large batches & can damage (smear) tender succulent cuttings.



Case Study

Sedum Blending

Process factors the following

- Accurate Ratio
- Reasonable physical demands
- Product is introduced with current packaging
- Finished product is re-packaged into boxes or crates
- Process is gentle on the product
- Process fits existing space
- Satisfies daily production requirements
- Applies reasonable mechanical solution (cost, maintenance, build)




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Case Study

Sedum Blending

Process development steps

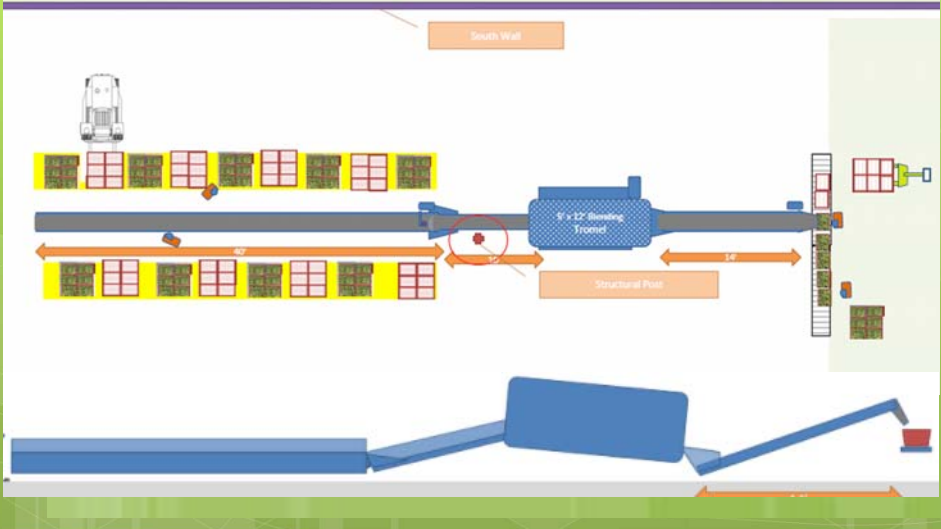
1. Develop clear idea of objective
2. Consider comparable systems (in this case from outside industries)
3. Create draft process proposal applying *"What If"*
 - A. Required components
 - B. Required space
 - C. Job requirements to operate
 - D. Cost estimate
 - E. Estimate production volumes
4. Review proposal with representatives of sedum blender
5. Manufacture
6. Work on buy-in
7. Install and test
8. **Adjust process to meet reality**




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Case Study

Concept Sketch






Case Study

Item	Item	Quantity
1	Mixing Trommel	1
2	Blend Staging Conveyor (BSC)	1
3	Conveyor Wall Extension	1
4	Bulk Tromel Feed Conveyor	1
5	Bulk Transfer Conveyor (BTC)	1
6	BTC Custom Kit	1
7	10' x 24" Roller conveyor	2
8	Blend Control Center	1
9	Control Upgrade	0
10	Install Support	1
11	Freight/Delivery	0

Concept Outline





Case Study

Feasibility work







Case Study



Case Study

Finished Process



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Case Study



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Examples of automation sources for greenhouse and nursery

OPTIONS



AGRINOMIX
MACHINE TOOLS FOR GROWERS

BOUFOIN & LAWSON

JAVO
Partner in Growing

Mitchell *Ellis* Products

Wurdinger Manufacturing Inc.
Labor Saving Solutions



Parting thoughts

- A. Be cautious about current practices limiting potential
- B. Find source that is willing to understand your need, not just sell what they have
- C. Consider breaking a meaningful project into phases
- D. You will never regret pre-planning

Question

Should your operation fit the equipment or should the equipment fit your operation?



- Why Automate
- Adoption of automation
- Calculate return
- Elements of an effective process
- Case studies
- Parting thoughts

Review

- Questions

