CTPM Aussie Cup Presentation

Thurs 19th Sept., 2013

"Axle Assembly Cats"

B&D Roller Doors, Kilsyth VIC

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Team photo:

Then…

Now …

Left to Right: Hoang; Stewart; Nathan and Lou

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Agenda:

Logic Flow		Description	Presenter	Timing
Team and mandate	1	Team Members	Nathan	2 min
	2	Team mandate		
Recap of current situation	3	Background to Activity & “Before” video	Lou	5 mins
Recommendations	4	What options did we explore?	All	5 mins
	5	How did we rank these? What is the recommended option?	Nathan	2 mins
	6	What will the cost be?	Stewart	1 min
Implementation	7	Implementation plan & update	Stewart	1 min
	8	Video of Automated axle transfer	Lou	3 mins
	9	Comparing “Before” with “After”	Lou	2 mins
What did we learn?	10	Successes & struggles : What were the benefits?	Hoang	2 mins
	11	Key lessons learnt	Nathan	2 mins
	12	Questions		5 mins
				30 mins

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Mandate

- Identify (measure) and **reduce Manual handling** risks related to Axle assembly process by 80%
- Identify (measure) and **reduce Non Value Add** activity by 50%
- Recommend Improvements to Work area to **eliminate any mobile plant and human interaction**
- Recommend **further improvement** opportunities to the Leadership Team

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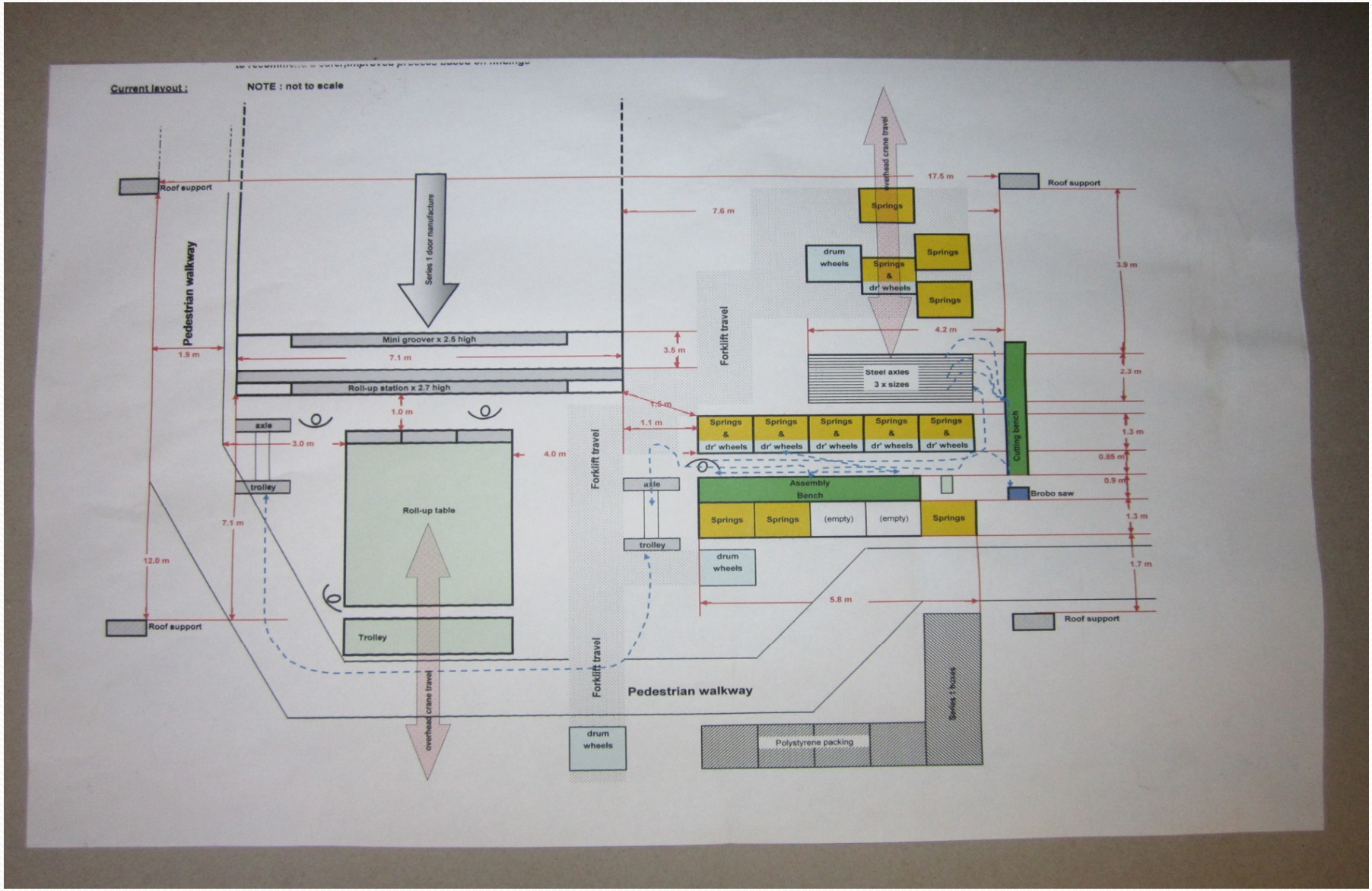
Original layout was:



Process Map
- Axle Assembly Basic Steps

1 x Axle assembler & 2 x Roll-up operators per shift

Cycle Time Assembly only = **156 sec**
Cycle time Assembly + transfer = **236 sec**

Value Adding time = **98 sec**
VA/NVA ratio = 98/138 = 1 : 1.4

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Operator Survey – Series 1

- What were the main problems the operators had?

Dislikes	How can we improve?
Plastic hard to pull down Using sticks on Press Stitcher needs resetting constantly	Set up equipment on Roll-up similar to Series 2
Poor housekeeping in S1	Improve housekeeping
Injuries on Axle Assembly **Lifting of Axles at bench & Roll-up**	**Fix Axle Assembly process – no more injuries!**
Coning on Roll-up Drilling of drum-wheels at roll-up (only Firmadoors) Short runs leading to increased change-over	Pre-drill to make task less hard

- **"Help us and we will help you"**

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Risk Assessment

- The Axle Assembly Process had been identified as a process with **excessive Manual Handling** operations
  - To **Risk Assess** the process we used the Australian Standard Risk Assessment model

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Value Add and Non Value Add

- Each step was assessed to understand whether any **customer value** was being created
- Did the step involve any physical change to the axle?

  ….These were assessed as **Value-Add** steps

- The steps that involved transferring of parts, carrying, lifting ie. that did not physically change the axle we assessed as **Non Value Add**

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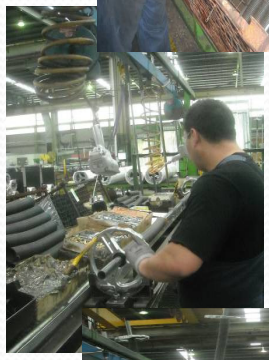
Series 1 Process Map & Risk rating:



ies 1: Process Map and Risk Rating — Jan 2012- last update

Step #	Description	Cycle time (secs)	Comments	Risk Rating	Current	Interim	Auto Axles	Mezzanine	Accumulator	Mobile Crane	Jib Arm (single)	Jib Arm (Dual)	Conveyor	Foot Pedal	Table
			Includes paperwork in hand clock 'on top of bench'												
3	Refer to Production paperwork for next build specifications	3	Auto reading 'axle no.' defaults to 'axle no.'												
3	Pull drum wheel to a comfort height on assembly bench	3	Auto hand clamp - cannot get full turn when tightening, excessive movement in de locator												
2	Clamp axle using clamp of drum wheel holder	2	MH risk - reaching to store and dispense lubricating oils / slips moisture from axle (so grease can stick)	MTI or minor LTI (>3 Day LTI) (12)	12	12	4	12	12	12	12	12	12	12	12
5	Set axle side from storage	5	Auto reading 'axle no.' not auto default												
5	Set up axle to be put into curing oven and clamp axle securely	7	Auto date and 'date' defaults to date stamp												
5	Set axle in oven using the fingers rule	5													
3	Place curing stick in flange top	1													
2	Clamping and place off current with cap	2	MH risk - reaching to store and dispense lubricating oils	First Aid or minor MTI (8)	9	9	0	9	9	9	9	9	9	9	9
6	Place axle on assembly bench, locating (R) and against end stop	6	MH risk - reaching, bending & twisting in jury pers	Extensive Injuries / Admit to Hospital (>3 Day LTI) (15)	15	15	3	15	15	15	15	15	15	15	15
5	Set (L) spring/(Rear), lift axle and slide (L) spring onto axle	4	MH risk - reaching, bending & twisting in jury pers	MTI or minor LTI (>3 Day LTI) (12)	12	12	3	12	12	12	12	12	12	12	12
5	Set drum wheel, lift axle and slide drum wheel onto axle (in correct orientation) and right to (L) spring onto axle	6													
5	Set paint brush from grease pot and grease axle, ensuring grease is applied over the (L) spring and drum wheel	7													
5	Set flat washers x 2, hex bolt and nyloc nut and fasten the the spring to the drum wheel using the overhead air wrench	10													
12	Set axle clamp x 2 (+ arm support bracket if req'd), lift axle and slide onto axle	2	MH risk - reaching overhead for air wrench; pushing down above shoulder height to tighten clamps	MTI or minor LTI (>3 Day LTI) (15)	12	12	0	12	12	12	12	12	12	12	12
5	Fasten the axle clamp to the axle through the LH spring's end loop using the overhead air wrench, ensuring the axle is hard against the end stop in assembly bench	10													
5	Check that the drum wheel is central to the drum wheel locator - adjust to suit														
	Repeat process done for the other end														
5			MH risk - reaching, bending & twisting in jury pers	Extensive Injuries / Admit to Hospital (>3 Day LTI) (15)	15	15	3	15	15	15	15	15	15	15	15
5	Set (R) spring/(Rear), lift axle and slide (R) spring onto axle	5	MH risk - reaching, bending & twisting in jury pers	MTI or minor LTI (>3 Day LTI) (12)	12	12	3	12	12	12	12	12	12	12	12
5	Set drum wheel, lift axle and slide drum wheel onto axle (in correct orientation) and right to (L) spring onto axle	10													
5	Set paint brush from grease pot and grease axle, ensuring grease is applied over the (L) spring and drum wheel	7													
21	Set flat washers x 2, hex bolt and nyloc nut and fasten the the spring to the drum wheel using the overhead air wrench and drop spring	10	MH risk - reaching overhead for air wrench; pushing down above shoulder height to tighten clamps	MTI or minor LTI (>3 Day LTI) (12)	12	12	0	12	12	12	12	12	12	12	12
5	Fasten the axle clamp to the axle through the RH spring's end loop using the overhead air wrench, ensuring the axle is hard against the end stop in assembly bench	10													
5	Check that the drum wheel is central to the drum wheel locator - adjust to suit	1													
54	Set Customer tag and attach to RH drum wheel assembly(when facing assembly bench) with a cable tie	6	MH risk - reaching and dexterity of axle / product in place in trolley	Extensive Injuries / Admit to Hospital (>3 Day LTI) (20)	20		0							20	
		9	Auto capture												
	Pull	120													
7	Pull axle trolley (which is in locked & up to 'up' position) to the 'up' position		MH risk - straining to push fully loaded trolley (between assembly bench and stillages, across rubber matting to unlocking area (static?) if wheel contacts debris on floor	Extensive Injuries / Admit to Hospital (>3 Day LTI) (15)	15		0			12				10	
2	Stowage trolley for long springs and drum wheels parked close to bindo area	30	MH risk - straining to push fully loaded trolley (between assembly bench and stillages, across rubber matting to unlocking area	Extensive Injuries / Admit to Hospital (>3 Day LTI) (15)	15		0							15	
2	Pick up operator removing axle assembly from trolley and carrying to location	30	MH risk - reaching and twisting and dexterity from vertical to horizontal position to fit to door	Extensive Injuries / Admit to Hospital (>3 Day LTI) (20)	20		0							20	20
2		30	Issue - forklift and pedestrians in same work cell	Extensive Injuries / Admit to Hospital (>3 Day LTI) (20)	20		0							20	20
2	Unpack bracket and in place ready														
					Current	Interim	Auto	Mezzanine	Accumulator	Mobile Crane	Jib Arm (single)	Jib Arm (Dual)	Conveyor	Foot Pedal	Table
		156	Non-approx	Total Risk Score	189	99	16	99	99	111	99	99	134	184	139
		99	Value Add	Total Risk Reduction		48%	84%	48%	48%	41%	48%	48%	29%	3%	26%
		129	Non-Value add	Non-Value Add Reduction		64%	72%	64%	43%	43%	64%	64%	46%	0%	50%

Analysis Overview

- **24** key process steps identified
- **Total cycle time** :
  - 236 secs incl.
  - 98 secs Value Add time and 138 secs Non Value Add time
- Risk rating calculation against **Total Risk**

(Non-Value Add reduction was based on **steps eliminated**)

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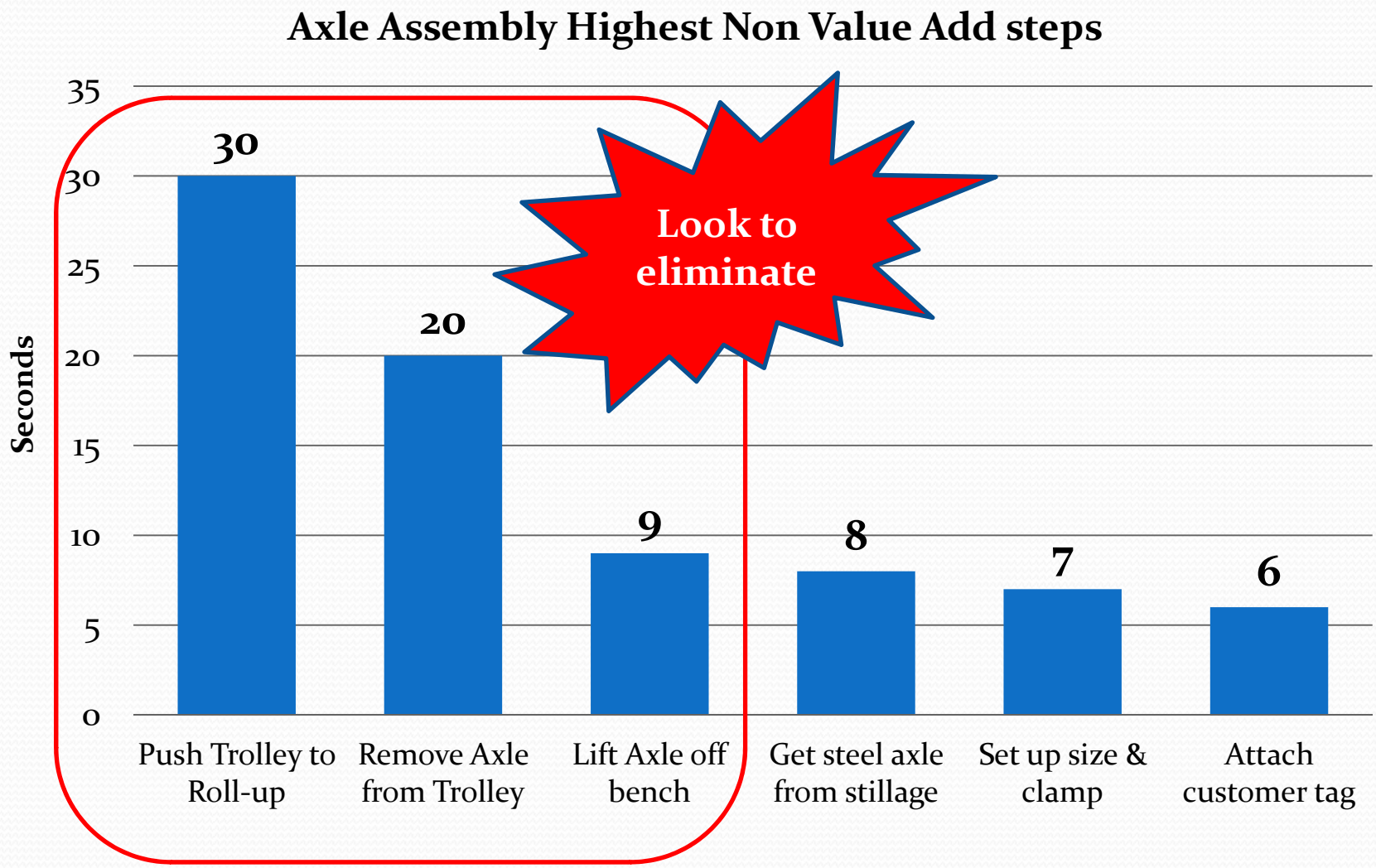
Analysis Overview – Non Value Add



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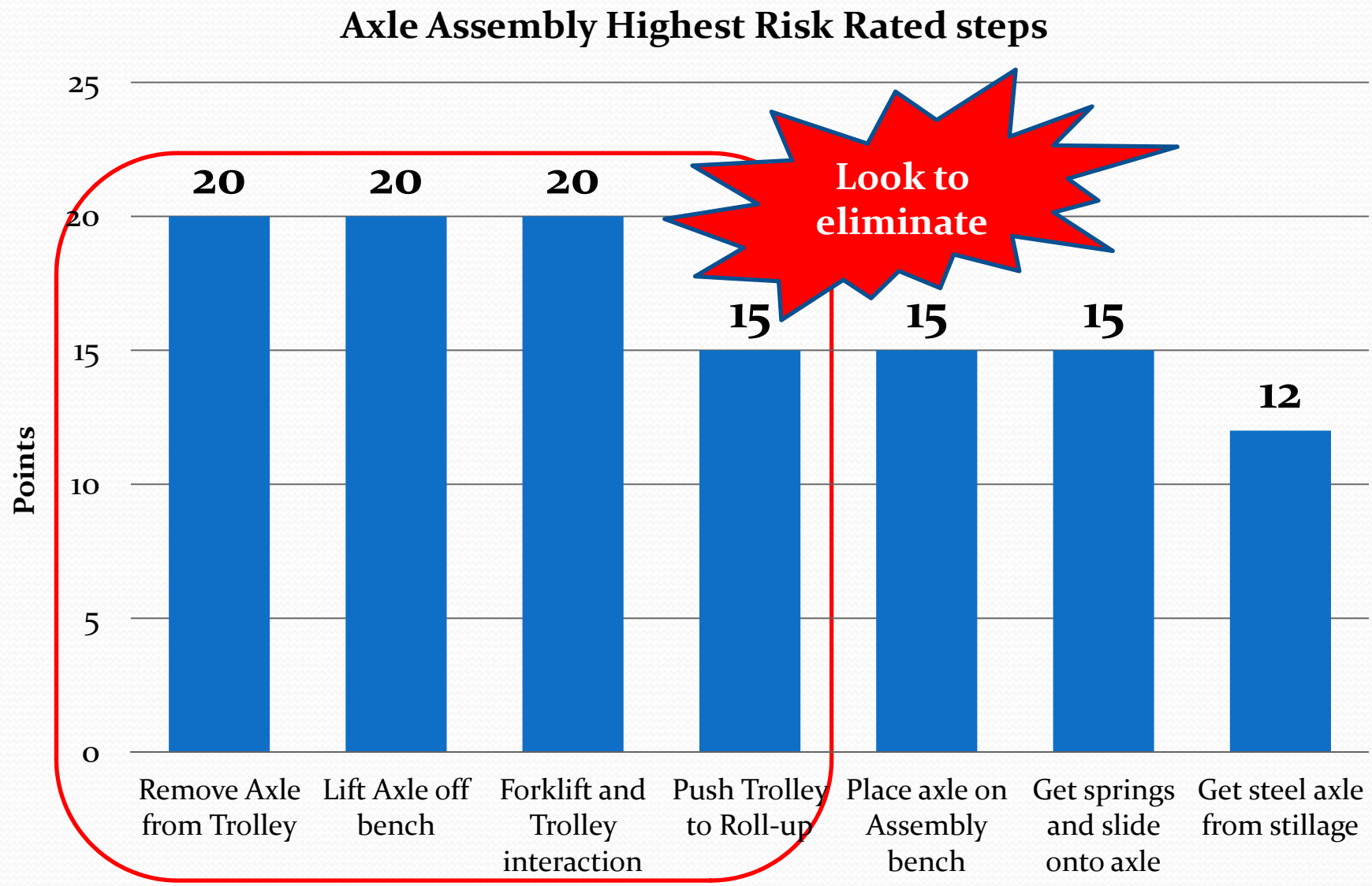
Analysis Overview – Risk



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Video of process – Before:

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Brainstorming Process

The Axle Assembly Cats asked themselves:

- What will **decrease or eliminate** the most **risk**?
- What will **decrease or eliminate** the most **unnecessary steps** (reduce Non Value Add)

- To ensure we **thought creatively** we did not constrain our thinking based on cost alone!
- All ideas were good ideas (**no bad ideas**!)

- **There was "robust" discussion!**

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What options did we explore?

1. Interim solution – manual transfer operation
2. Rolling Table
3. Axle release hook
4. Mobile Jib Crane
5. Jib Crane – Single
6. Jib Crane – Dual
7. Automated gantry / Accumulator
8. Mezzanine

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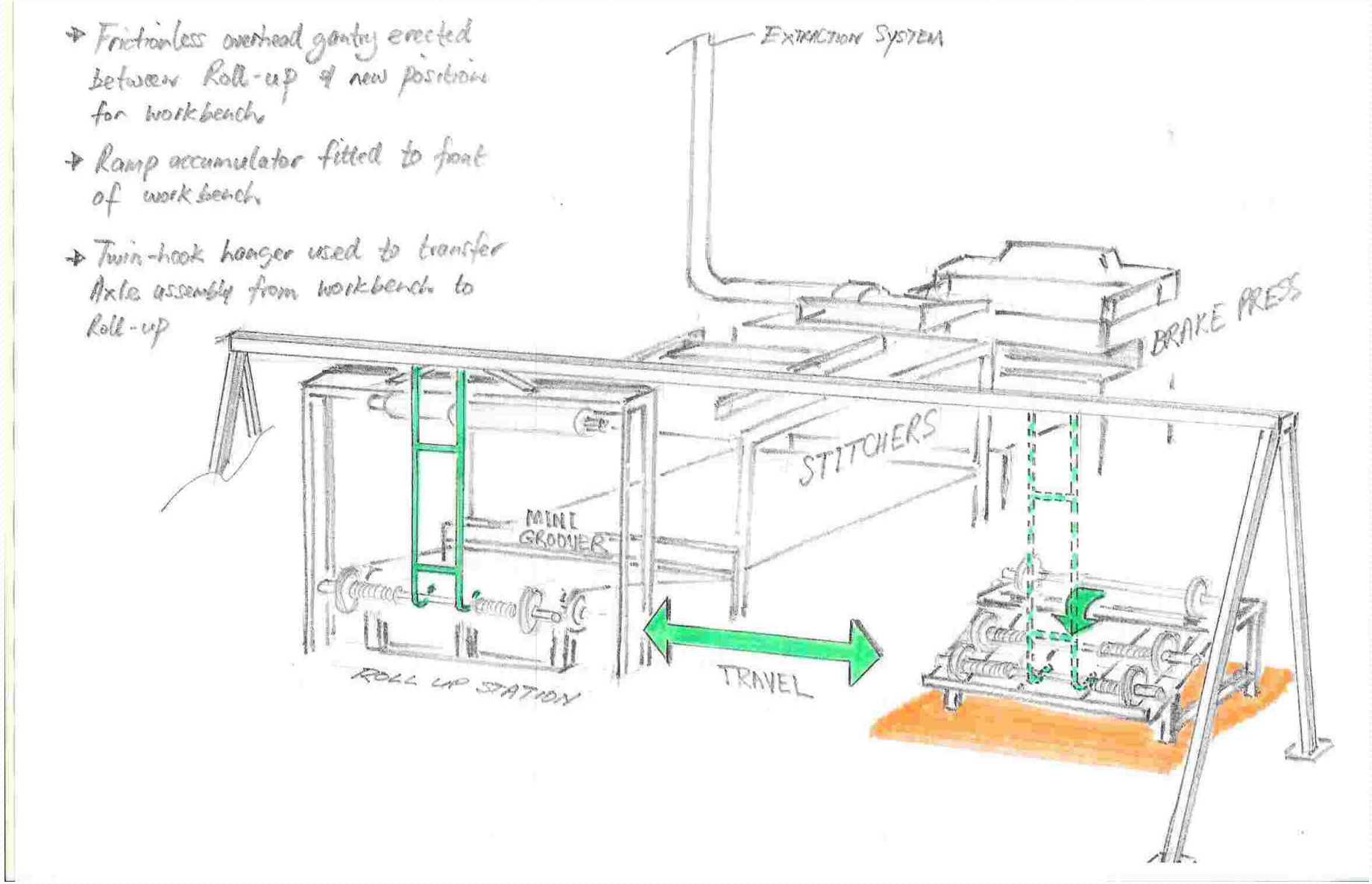
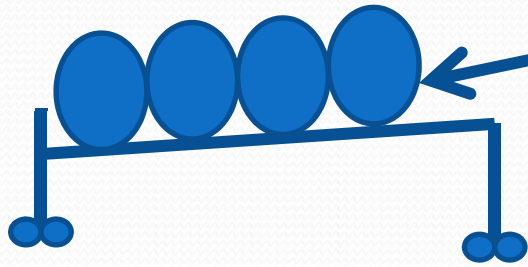
Manual transfer solution



Hoang's Axle Assembly Option

Axles are built and then rolled onto a table where they gather. The table can be wheeled to Roll-up

Benefit
The Axle Assembly Operator does not have to lift the completed axles



Disadvantage
- Roll-up Operators will still need to lift axles off the end of the table
- Insufficient space for 3m long axles to be stored close to Roll-up

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Lou's Axle Unloading Option

Unlatch hook to release Axles from Trolley

Remove cylinders from bottom of trolley & replace with hinged locator

Operator will unlatch hook to remove axle

Benefit
Operators will not need to lift the Axle out of the trolley thereby decreasing some manual handling

Cost : 8hrs @ $25/hr = $200 approx

Disadvantage
Only a small amount of manual handling is decreased

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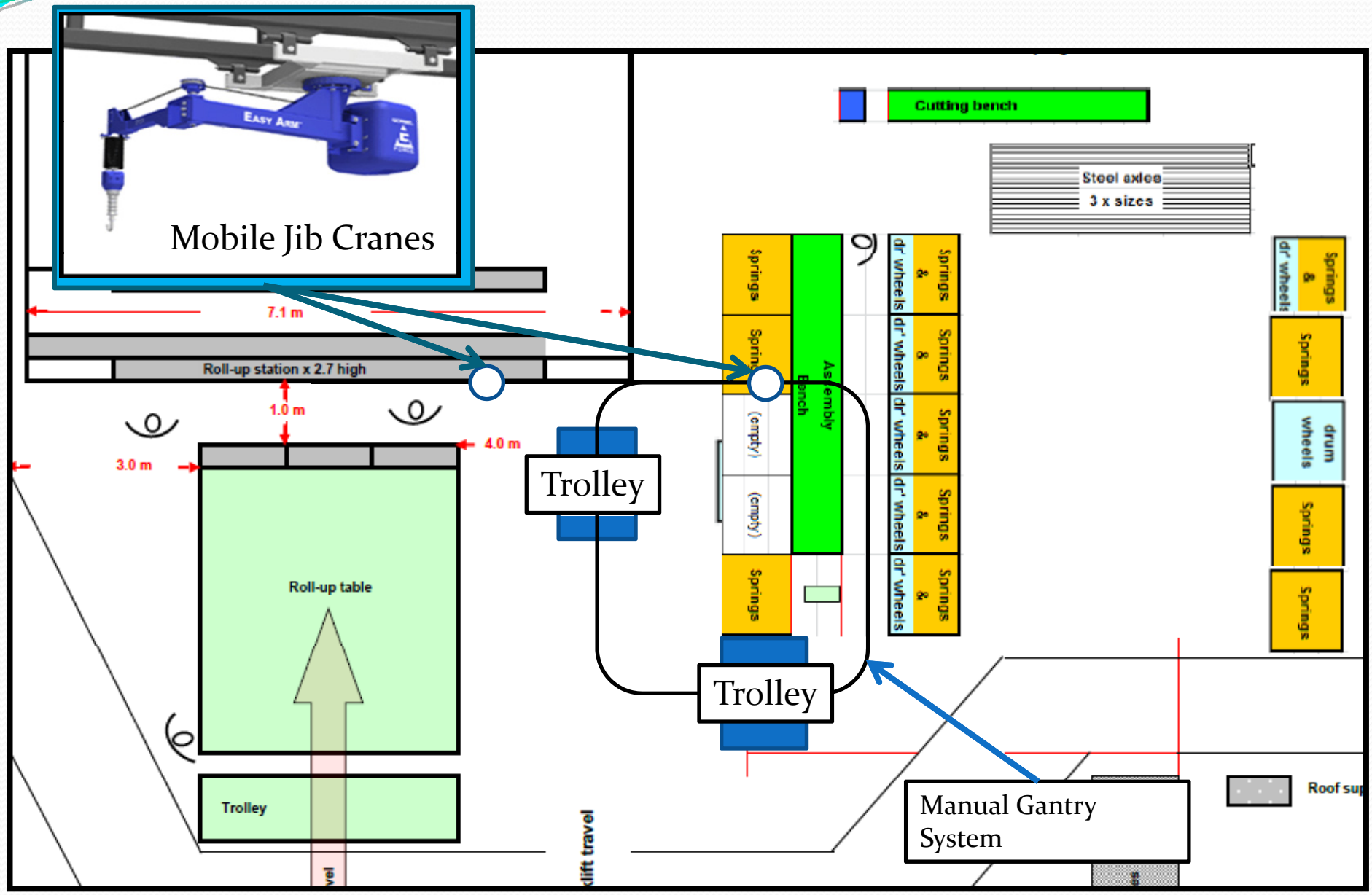
Proposed: Mobile Jib Crane



Mobile Jib Crane

Benefit

- No lifting from Axle assembly
- No lifting onto Roll-up
- Layout will separate traffic and people
- Operators are not waiting for axles
- Not changing the workflow

Disadvantages

- Trolleys will still need to be manually pushed

Cost - $125,000 (approx)

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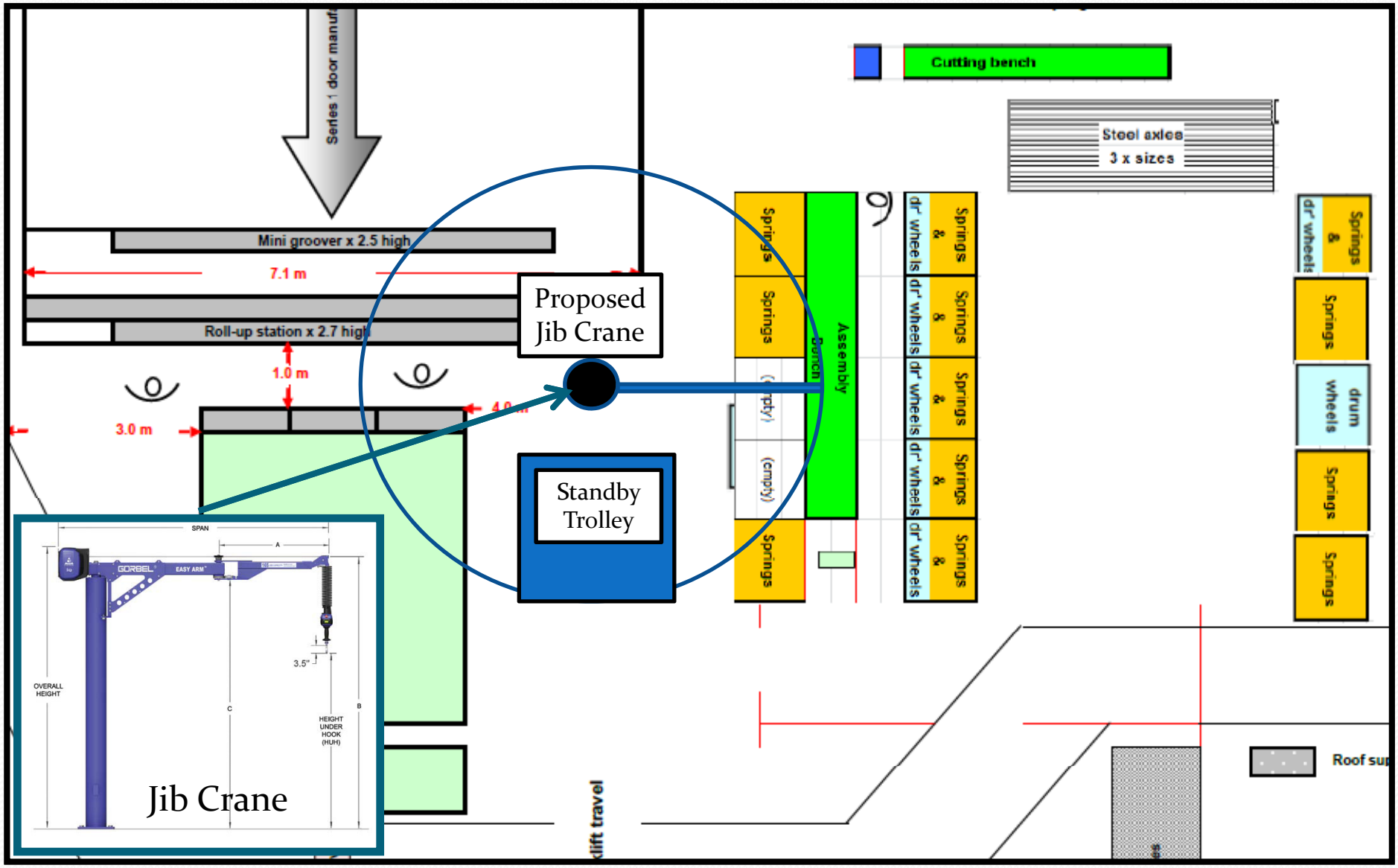
Proposed: Single Jib Crane



Jib Crane – Single

Benefit

- No lifting from Axle Assembly
- No lifting onto Roll-up
- Layout will separate traffic and people better

Disadvantages

- Only one person can use at a time (Operators will need to wait for crane to be available)

Cost - $80,000 (approx)

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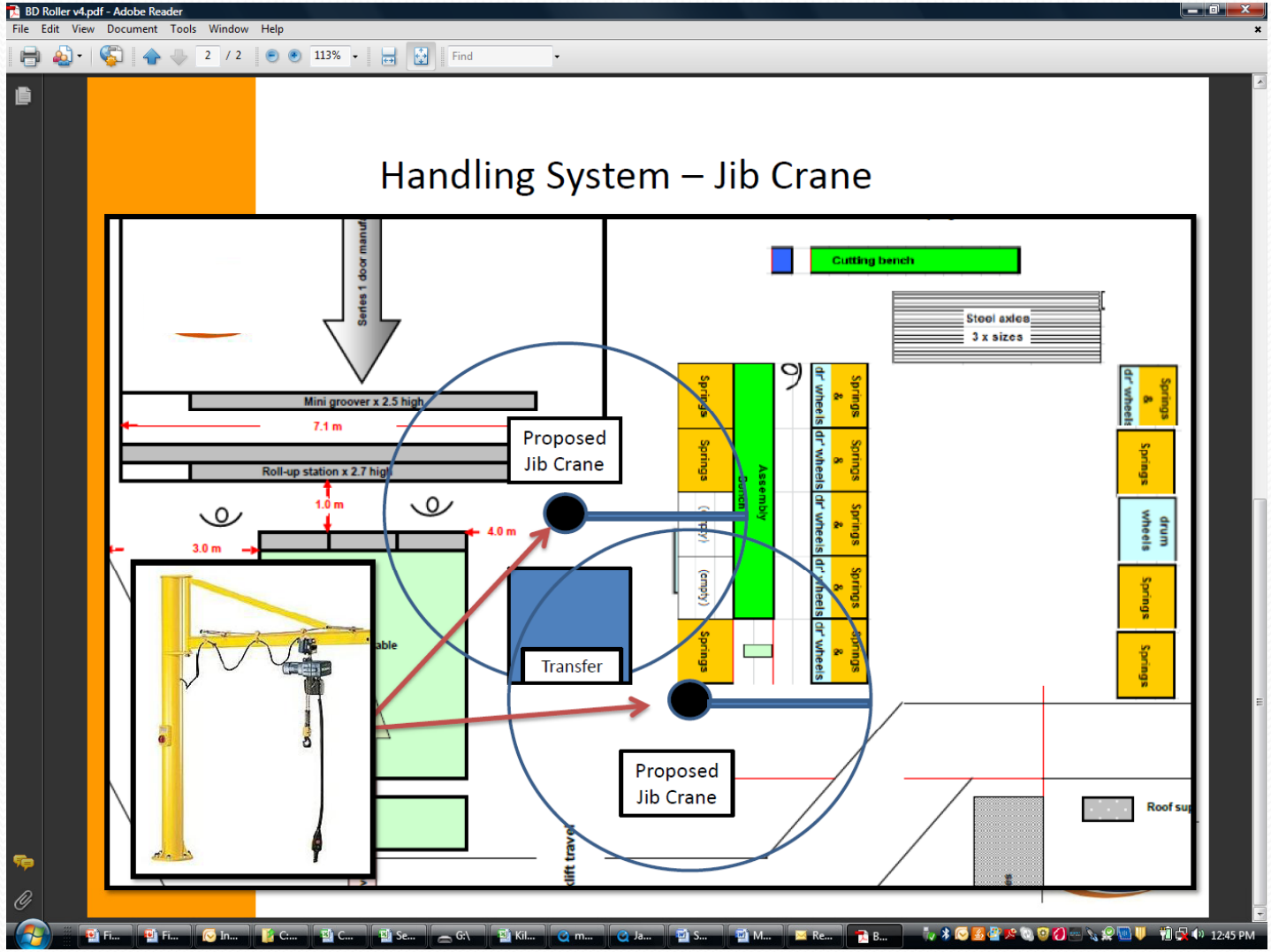
Proposed: Jib Crane – Dual



Jib Crane – Dual

Benefit

- No lifting from Axle Assembly
- No lifting onto Roll-up
- Layout will separate traffic and people better

Disadvantages

- Fixed to floor: correct layout & engineering specification important
- Could slow down production because of hoisting speed

Cost - $70,000(approx)

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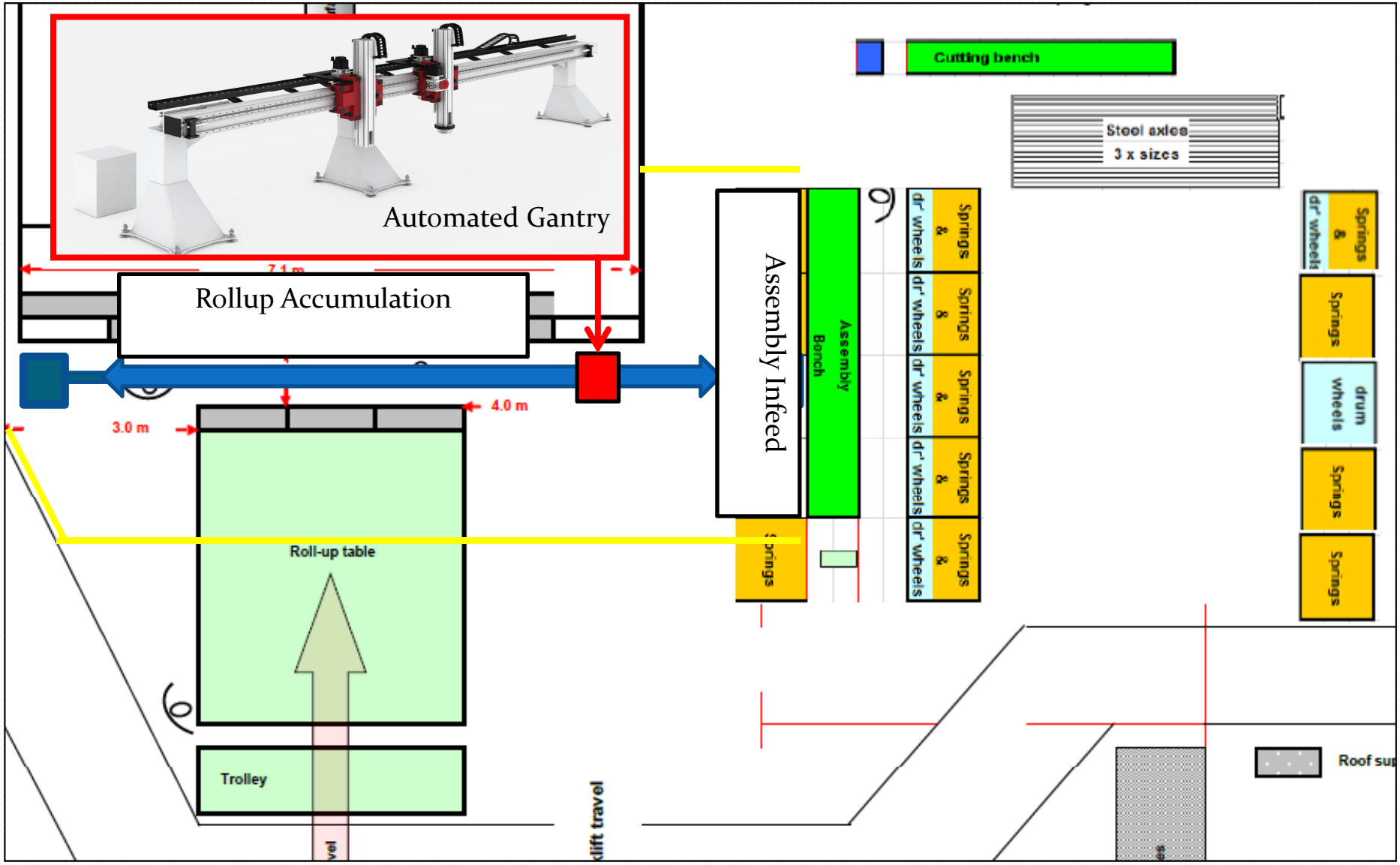
Proposed: Automated Gantry



Automated Gantry

Benefit

- No lifting off axle assembly
- No lifting onto Roll-up
- Separate traffic and people

Disadvantages

- High tech equipment - will require extra training for staff
- Equipment will need to be isolated (light guards)

Cost - $400,000 (approx)

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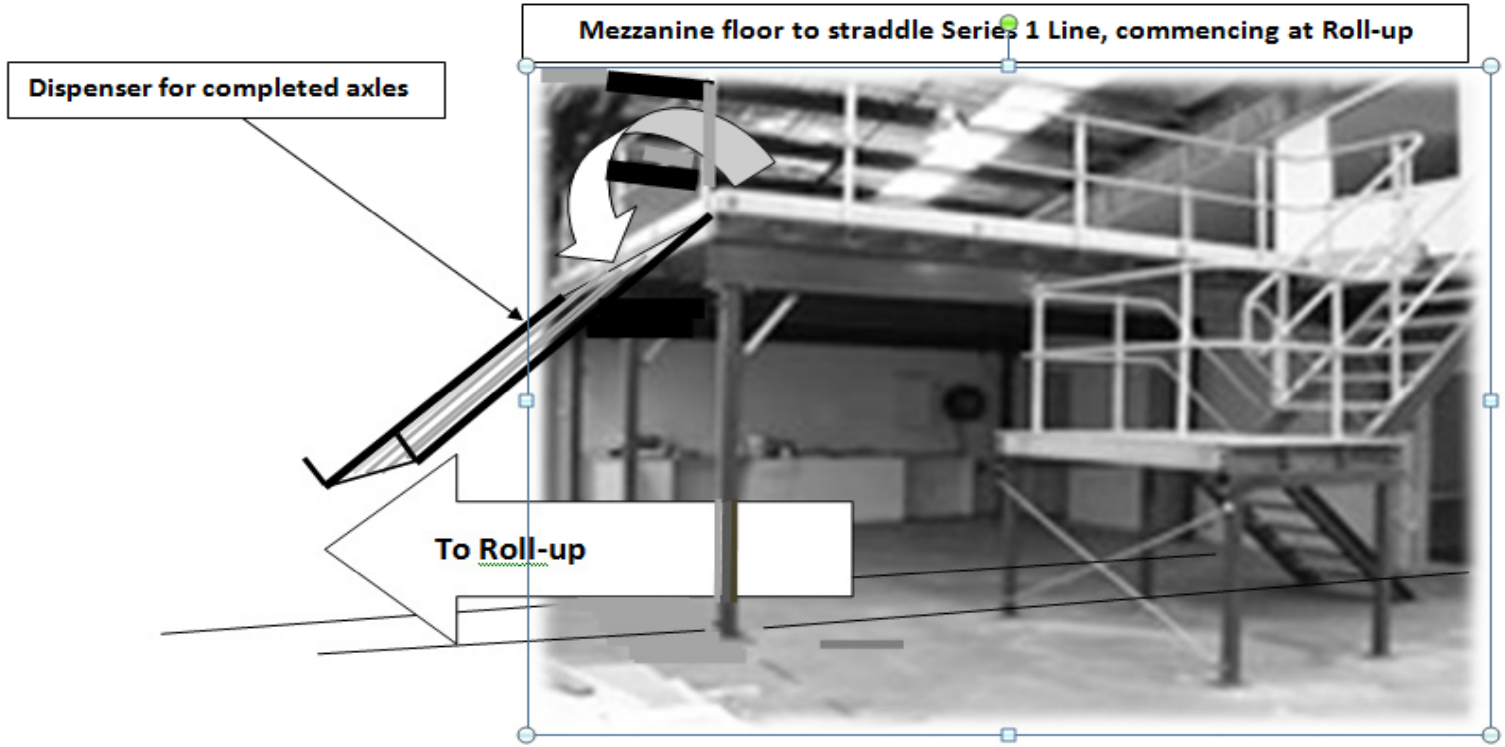
Mezzanine Floor

Proposed Mezzanine Floor :

- Function : new location for axle assembly
- Reason : to reduce MH by 80%
- Position : straddles Series 1 line commencing at Roll-up in a North / South direction
- Require Mechanical dispensing system (located immediately above Roll-up station)for completed "safety stock" axles
- Require Custom stillages / transfer system for componentry (ground floor to mez floor)
- Require SOP for crane movement in "No Go Zone"



Typical Mezzanine Floor design

Note : Proposed Mezzanine Floor must meet Australian Standards guidelines for EWP

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Mezzanine Option

Benefit

- Will create floor space

Disadvantages

- Will need to use added risk controls
- May have difficulty using slings to lift axle stock
- Stitcher equipment may not be able to be accessed
- May not be able to access axle if in wrong sequence
- Forklift to be used for re-stocking therefore would increase mobile plant movement around line

Cost - $75,000 (approx)

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How did we rank these?

We used a decision **matrix process** to rank our options:

1. How **effective** was the solution?
   - How much would it **reduce MH risk**?
   - How much would it **reduce Non Value-Add** activity?
2. Would the solution introduce any **new risks?**
3. **Cost wasn't a priority** - what option meets the selection criteria?

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How did we rank these?

	Effectiveness		Will it introduce new risks?	Will it improve traffic manage ment?	Will it slow down the roll-up?	Cost approx	Overall rating
	Manual Handling risk reduction	Non-Value Add reduction					
Manual transfer solution	46%	62%	No	Yes	No	$25K manual $75K mech.	1.
Mezzanine	48%	64%	Work at heights & mobile plant risk	No	No	75K	
Dual Jib Arm	48%	64%	No	Yes	Yes	70K	
Mobile Jib Arm	41%	43%	No	Yes	Yes	125K	
Single Jib Arm	48%	64%	No	Yes	Yes	85K	
Rolling table	26%	50%	No	No	Yes	5K	
Automated gantry	48%	64%	Will need isolation	Yes	No	400K	
Conveyor	29%	36%	Ni	Yes	No	100K	
Axle release hook	3%	0%	No	No	No	<1K	

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Cost / Benefit: Manual transfer system

Cost	**$50,000**	**Approx**
Benefit	10% risk reduction = $29K premium cost 20% risk reduction = $58K premium cost	$29K/Year
	Increased capacity due to Roll-up cycle time reduction= **363 approx more S1 doors/year**	$7k/year to budget
Payback		1 Year & 5 months

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Implementation Plan

	Dec	Jan	Feb	Mar	Apr
Gain approval for preferred option	▼				
Communicate to Series 1 Team	▼				
Prepare detailed specification		■			
Confirm costing		■			
Schedule			■		
Implement				■	
Trial				■	
Monitor					■

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Final Presentation Feedback:

- Senior Management strongly recommended an **Automatic version** of the Manual Transfer system be scoped and costed.

Next Steps Were:

- **Concept** for Auto Axle Transfer system submitted to 3 x Automation specialists **to provide quote**
- Automation Innovation, Clayton VIC was appointed as the successful contractor

Finally:

- The unit was **assembled, tested and installed**
- **Maintenance** were **trained**
- **Operators** were **trained**

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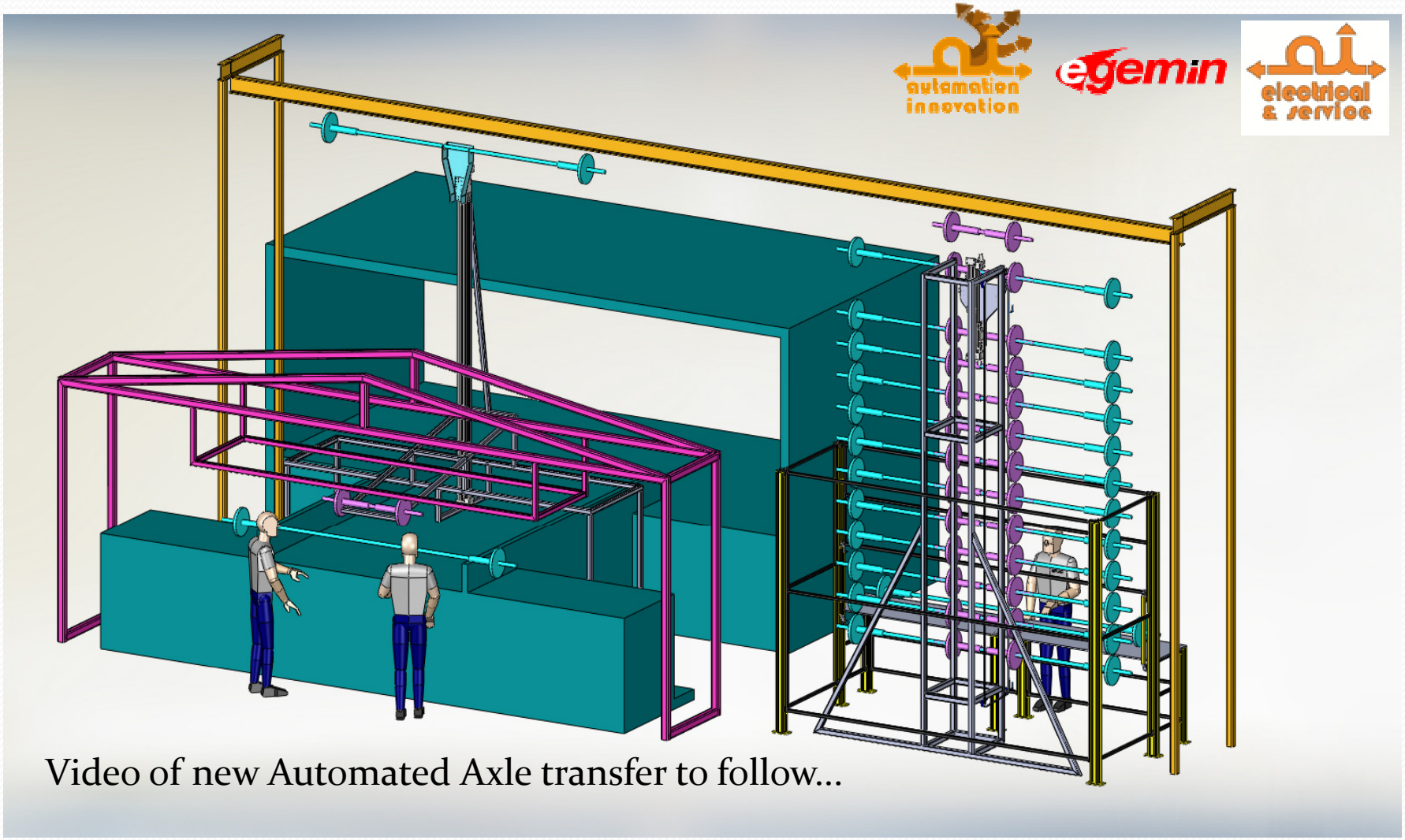

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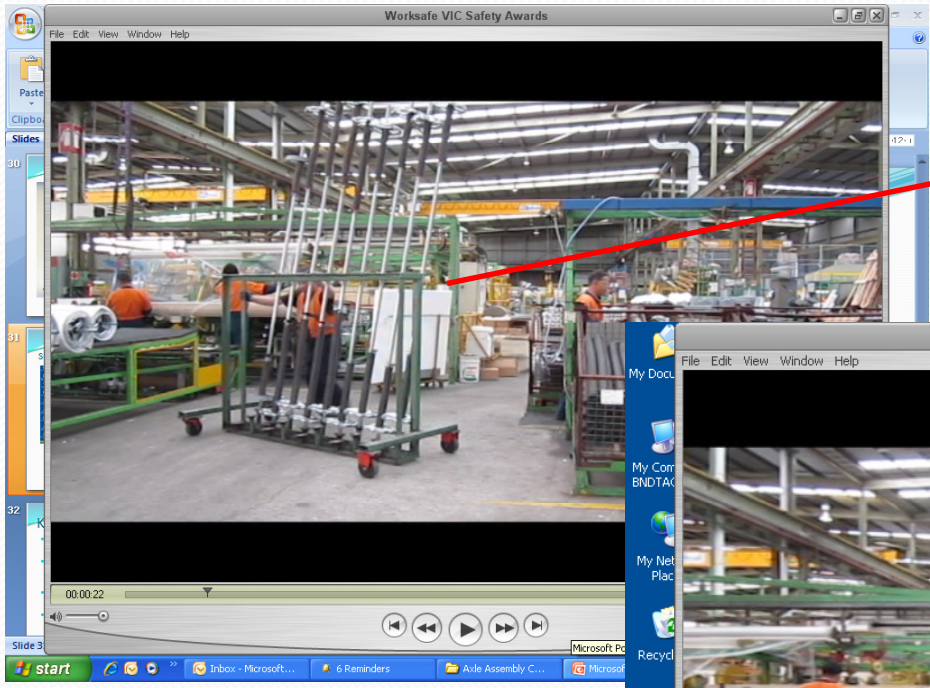
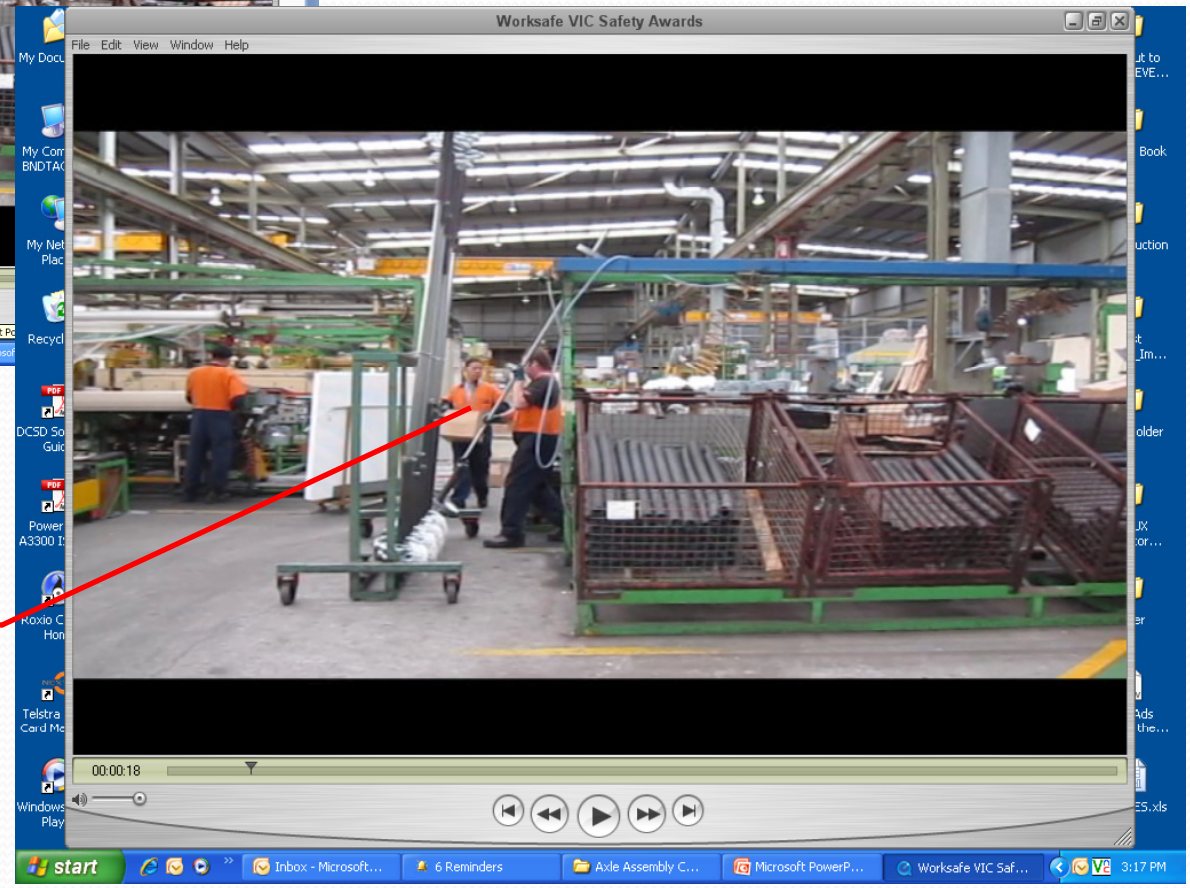
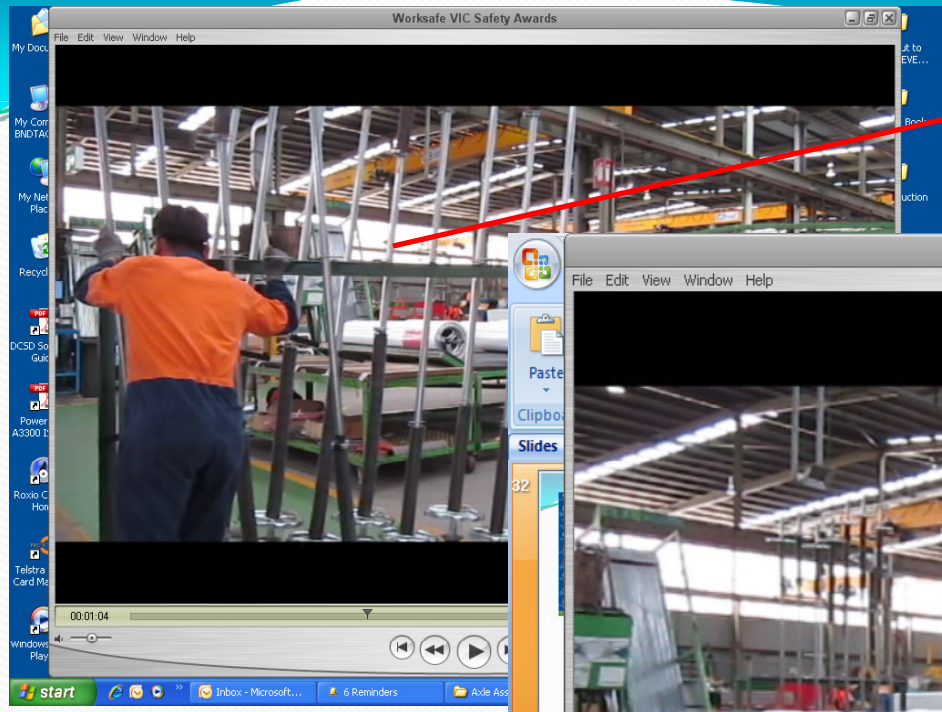
Summary: Comparing old with new



Axle trolley is pushed into position



Axle is rotated from horizontal to vertical



Axle trolley is pushed across to Roll-up

Axle is rotated from vertical to horizontal

Average weight of axle assembly = same weight of typical car tyre, approx.

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New and Improved:

- Summary video of Auto Axle Transfer system

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Summary of Benefits:

Tangible – ("measurable")

- Overall Manual Handling Risk Reduction = **84%**
  (Target was 80%)
- Non-Value Add reduction = **72%**
  (Target was 50%)
- Mobile Plant & people interaction – **eliminated**
- Safety performance since installation – **continues to be reviewed**

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Intangible Benefits – ("open to opinion")

- The Axle Assembly Cats were able to achieve success on something that had been in the '**too hard basket**'
- The team learned the value of a **structured** improvement process
- **Morale** received a boost
  - Axle Assemblers – reduced frustration
  - Series 1 Operators – happy now to work on Roll-up
  - Series 2 Operators – where is ours?
  - Shop floor – general consensus…something is finally getting done
- B&D employees saw a **significant investment** come out of their own improvement team activity

  (previously the employees had felt that Kilsyth was not getting investment, comparable to other sites)

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Key Lessons Learnt…

- Structured process and "**Brainstorming**" helped get an outcome
- We learned that we needed to continue to **give Operators a voice** in the process
  - History Sheet captured feedback from Series 1 Operators who felt '**they had been cut out of the loop**'
  - The team realised the importance of briefing the Series 1 Operators at **toolbox meetings** to show our progress and get their feedback
  - Despite members of the team worrying that they would be given a '**hard time**' by the Operators, the information was well received and the outcome was very positive

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Key Lessons Learnt…

- Some time needed to be spent in **testing** to ensure the Automatic Transfer system delivered the agreed result
- From final presentation to full installation was an **extended period** – the team were given continual updates through toolbox meetings to keep morale up
- **Training** in "trouble -shooting" for Maintenance and daily operation for Series 1 Operators was critical
- **Follow-up** Monitoring and Coaching by key personnel was also necessary
- People need to have some flexibility to take on new ideas
  → **sometimes changing the way we work has to be considered!**

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" A journey....."

Thank you for your time

Questions?

DuluxGroup

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