

Improving Material Changeover Efficiency in an Assembly Line

Shu-Hsia Lee^{1,2}, Minh-Duc Le¹, Sheng-Jie Lin¹, Sin-Hong Ou¹, Yen-Hui Wang^{3,*}, Chia-Nan Wang¹

¹National Kaohsiung University of Science and Technology, Kaohsiung City, 807618, Taiwan

²ASE Technology Holding Co., Ltd. Kaohsiung City, 811641, Taiwan

³Chihlee University of Technology, New Taipei City, 220305, Taiwan* ttxyhw@mail.chihlee.edu.tw

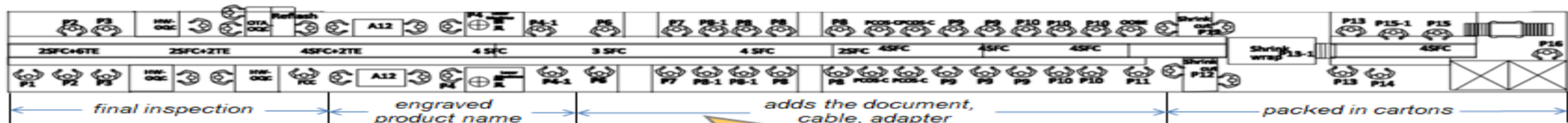
Introduction

- Improving the production line is increasingly popular among businesses thanks to the practical benefits it brings.
- Optimization of resources: Devices and machines need to be built synchronously, connected to each other and to a shared database.

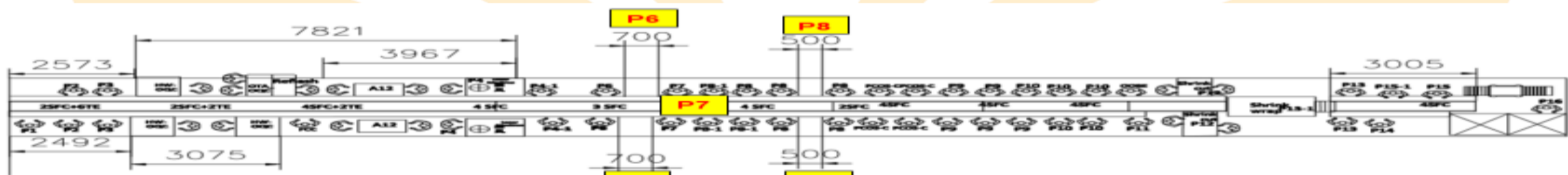
Methology

TRIZ makes the creative process more predictable because the problems that have already been solved are already there somewhere, and we just have to be creative to find and apply solutions to specific problems.

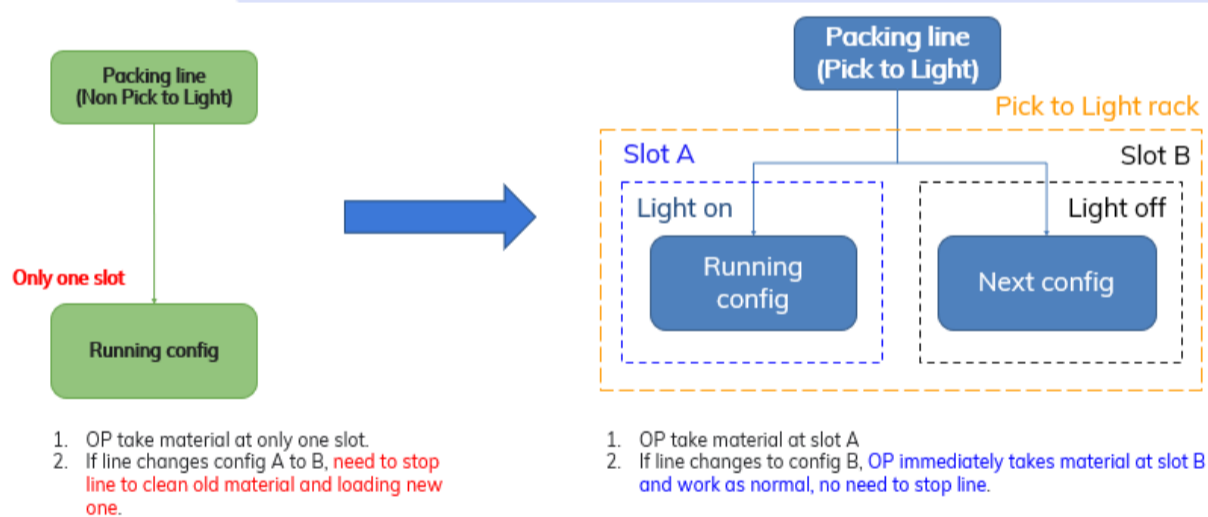
Study case and analysis



Fig(1) Packing production line layout



Fig(2) Pick-to-Light layout



Fig(3) Pick-to-Light rack

Change config (MO/SKU)	Non Pick to Light(s)	Pick To Light(s)
Clean old material	120	0
Change SOP	30	30
Load new materials, IPQC check	300	0
First Article Inspection (FAI) process	837	413
IPQC, ME, PE check FAI Label	485	485
Total (seconds)	1772	928
Total (minutes)	29.5	15.5

The result after apply Pick-to-Light

- Downtime for cleaning old material reduced 120 seconds
- Downtime for loading new material reduced 300 seconds
- Time for First Article Inspection reduced 424 seconds
- The total downtime reduced 844 seconds (equal 5.98h/month)

Fig(4) : Saving time after applying Pick-to-Light in packing line

Conclusion

No	Item	Normal process	Pick to Light	Remark
1	UPH	270	270	
2	Production efficiency	85%	85%	
3	Rack quantity	5	5	
4	Indirect labor (2 shifts)	4	4	
5	Saving time (monthly)	0	5.98	
6	Fixture cost (USD)	0	\$6,075	
8	Pick to Light saving cost (monthly)	0	\$915	
10	Monthly output (unit)	113373	114745	Using Pick to Light system make more 1372 unit/month
12	Return on investment (month)		6.64	Payback time is 6.64 months
Final Selection		Worse	Better	

- A Pick-to-Light solution that optimizes material turnaround time at the packing production line whenever the production line changes orders or production plans.
- This method builds a material rack system with two compartments: one for storing ingredients for the current configuration on the production line, and the other for storing materials ready for the next configuration.

Fig(5) Saving cost before and after improvement and pay back