LAURAS INTERNATIONAL

CASE STUDY

Suckers for Speed

Problem Cause Solution: Pick & Place

PROBLEM

The production line was suffering from lost output, high rework and high waste at its assembly stations. Each assembly station had to pick one component from the delivery belt, reorientate it, place it in the assembly carousel then pick a second component from the delivery belt and place it accurately on top of the first to form the complete product. The completed product would then go for packing. There were 6 such stations, feeding 2 packing lines. Each packing line was set to run at 120 units per minute. The actual feed rate to each packing line was less than 108 units per minute, due predominantly to assembly issues.

> *The operators and maintenance team had been trying to remove the problem for the last two years with little success and had resorted to slowing the line down.*

The problem occurred on all 6 machines and on all product variants. The failure could occur during the pick and place of the first component or the second component and there appeared to be no obvious pattern to the failure. The percentage of failures did not change significantly with changes in machine speed. The failures fell into three distinct categories:

- Product was not picked up from the delivery belt by the pick and place robot
- Product was picked up but then dropped rather than orientated and placed into the correct location
- Product was placed but not accurately.

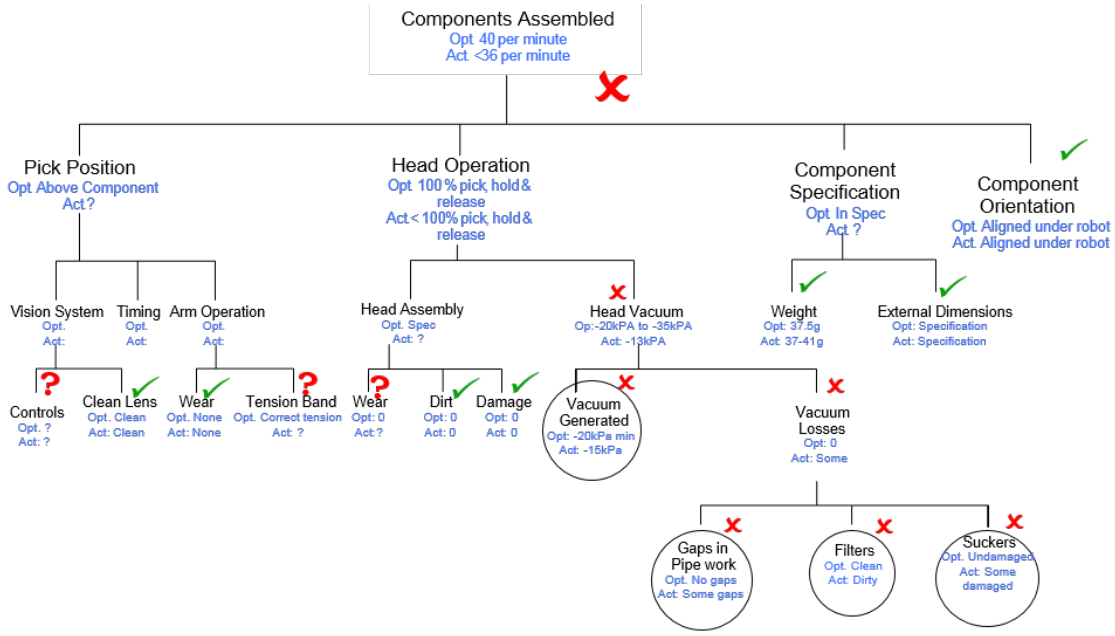
The operators' frustration was clear. They spent much of their time emptying reject trays but over and above that, they frequently had to stop each machine, open it up and remove product that had been dropped in various places within it. They were concerned about the amount of waste they were producing at a time when they were being told they needed to be more efficient and keep costs down.

When running well the 6 machines could supply more than the packing line could accommodate but due to the high reject rate and associated machine stops, the packing line was being starved of product. To help to ease the problem, the pick and place operators staggered their lunch breaks and attempted to keep their machines running whilst the rest of the line was stopped, building up work in progress.

CAUSE

A small team from within the business was pulled together to focus specifically on this problem. The team included an experienced operator and an experienced technician. After training in problem solving tools, the team set about observing the pick and place machines to clearly define the problem. The improvement team then developed a driver tree (see overleaf).

CAUSE



Taking measurements and comparing them to optimal soon revealed that there was insufficient vacuum at the head. Developing the driver tree further revealed two possible causes; insufficient vacuum generated in the first place or vacuum losses through the system. The maintenance team and operators frequently changed the suckers believing these to be causing a vacuum loss but this had failed to cure the problem. They had never considered that insufficient vacuum was being generated in the first place.

SOLUTION

Realising that vacuum losses could also occur elsewhere, the technician crawled the length of the machine, looking, feeling and listening for gaps in the pipe work. He discovered several loose connections along the route. Once tightened the improvement in vacuum was noticeable. He also checked, cleaned, and replaced the filters but no further significant change was noted. Once these changes had been made, all of the suckers were replaced in one go and a further small improvement was observed.

The pick and place machines were now able to run successfully at speeds of up to 42 units per minute, where they had previously been at less than 36 units per minute, enabling the packing lines to exceed their 120 units per minute run rate. The amount of waste reduced dramatically and the operators were pleased with the results even though the final action hadn't yet been implemented; generating sufficient vacuum in the first place.

The technician analysed the operation of the vacuum generator and discovered that there was a faulty control valve reducing output. A replacement valve was ordered and was due to be fitted when available. A summary of the actions taken and the result of those actions can be seen below:

DRIVER	ROOT CAUSE	ACTION	WHO	WHEN	EFFECT OF ACTION
Head Operation	Gaps in pipe work	Tighten pipe wor from pump through system	CT (Engineer)	Complete	Vacuum increased from -13 to -17. Dropped product dramatically reduced.
Head Operation	Dirty Filters	Check & clean	CT (Engineer)	Complete	No Change
Head Operation	Damaged Suckers	Replace damaged suckers	SD (Operator)	Complete	Small reduction in dropped product
Head Operation	Insufficient vacuum generated	Replace malfunctioning control value	CT (Engineer)	Part due 20th March	

The final result - a 16% speed improvement with pick and place machines running successfully at speeds of up to 42 units per minute.