Final Report

AMPC
AUSTRALIAN MEAT PROCESSOR CORPORATION

Industry 4.0 – Artificial Intelligence / Machine Learning Stage 1 (Machine Talking to Humans)

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Contents

1.0 Executive Summary

The Australian processing industry is acknowledged for its historical ability to continually conceptualise, evaluate and adopt new ideas (especially internally focused ideas and deployments). The recent Cost to Operate and Processing Cost Competitiveness report has further demonstrated that Australia is (1) the highest processing manufacturing country compared to its main competitors and (2) that the opportunities to reduce these costs required both a domestic and international large scale innovation driven solution to ensuring Australia can remain a competitive processing country and ideally lose the title of the world's most expensive country in which to process meat.
To address these cost to operate outcomes, Nolan Meats have significantly invested in many and varied improvements and technology implementation within their business. In their own individual right, each of these investments has resulted in improvements to the Nolan's business and its supply chain but sustaining these results is the driver for this project.
There is now an additional synergistic value add opportunity to implement an I.4.0 integration data piece that enables all these new solutions to be reported back to a central point via real-time production infographics data dashboards.

2.0 Introduction

Comparing numbers presented in a flat table to find the top value is extremely difficult and takes a long time. Humans more easily grasp information through visualization. In a business context, visualization helps convey a story to decision makers, allowing them to act more quickly than if the data were presented as reports. This is the power of I.4.0, machines talk to machines and machines talking to humans.
The first phase of the large program is to focus on machines talking to humans, via a centralised infographics data dashboard. This projected aimed at ensuring all team members in our Boning room understood their performance in real time. By doing this we want to improve yields and throughputs which will reduce the cost of operating.

3.0 Project Objectives

Develop and implement a Nolan Meats Real-time production infographics data dashboards strategy, supported by AMPC. This includes but is not limited to:
• To establish a team of stakeholders to review the various information available and condense this data into a useable live visual aid
• Increase individual productivity through shared information
• Generate a sense of ownership and increased morale within the team Members
• IP rated enclosures to protect electronic equipment. Which does not impede vision
• Embrace Industry 4.0 to Integrate various applications across site

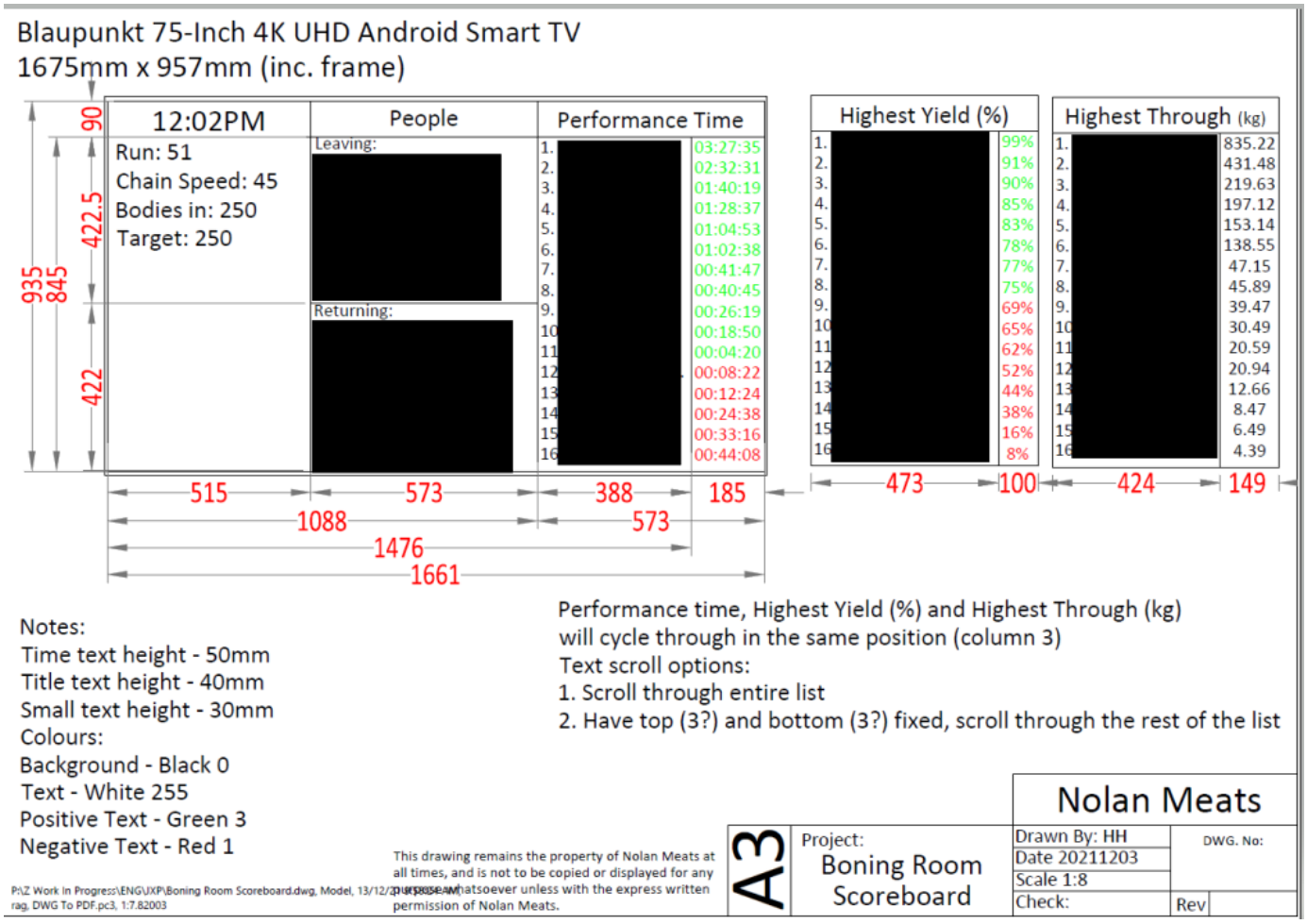
4.0 Methodology

Step 1 – Develop a Real-time production infographics data dashboards strategy
Step 2 – Ascertain the inputs required for each metric and where to source them from
Step 3 – Procurement of components
Step 4 – Build, installation and commissioning
Step 5 – Evaluation and reporting

5.0 Project Outcomes

Throughout this project it has become apparent that too much data without analysis can kill productive and efficient processing. The learnings are as follows.

1. Engaging the group early to really understand their needs about what they need to see is important when rolling out new equipment. By doing this it creates by-in from the operators to use the equipment (in this case display) to their best advantage.
    a. This group focused on what data was important for their daily decisions,
    b. Visibility of the screens and text of the targeted groups of people,
    c. How to present this data for a quick view of how they and the room is performing.
    d. The screen had to be non-distractive.
    e. A sample of one of the screens developed is shown below.



2. By having the collected data condensed to an easy to interpret version we have found that operators are easily reviewing their current performance and looking at how to improve both their yield and speed. See example below of raw data which has been condensed.

	INPUT		OUTPUT		YIELD, (%)				TIME					RATE		SCORING			
	Count	Weight (kg)	Count	Weight (kg)	Actual	Target	%	+/-	Actual	Target	+/-	%	Delta	Time spent slicing	Output kg / hour	Yield	Time	Rate	
																45	10	45	100
[redacted]	131	970.5	180	683.4	70.4	69.9	0.6	5.5	31	46	15	0.3	2048	81	716.9	3	15	48	65
	42	156.9			0	0	0							30	313.8	0	0	21	21
	178	1229.0	122	443.4	36.1	38.7	-2.6	-32.0	27	17	-10	-0.6	-1777	162	455.2	-12	-10	30	8
	161	1444.8	189	767.1	53.1	53.9	-0.8	-12.0	58	37	-21	-0.6	-3459	188	461.1	-4	-21	31	6
	57	507.7	69	284.7	56.1	58.9	-2.8	-14.2	52	38	-14	-0.4	-816	68	446.0	-13	-14	30	3
	110	696.7	99	351.8	50.5	56.4	-5.9	-41.1	35	34	-1	0.0	-108	94	444.7	-27	-1	29	2
	121	772.1	116	392.1	50.8	54.4	-3.6	-27.8	41	31	-10	-0.3	-1200	112	413.6	-16	-10	27	1
	50	399.0	62	196.7	49.3	53	-3.7	-14.8	45	38	-7	-0.2	-328	64	374.1	-17	-7	25	1
	22	125.1	14	36.5	29.2	28.6	0.6	.8	34	25	-9	-0.4	-190	72	104.2	3	-9	7	1
	145	1249.9	191	658.4	52.7	59.2	-6.5	-81.1	49	41	-8	-0.2	-1156	133	563.9	-29	-8	37	0
	36	227.1	7	25.9	11.4	10.6	0.8	1.8	2	6	4	0.7	113	29	-200.0	4	4	-13	-6
	261	1989.0	275	1034.6	52	53.4	-1.4	-27.1	55	32	-23	-0.7	-5980	392	304.4	-6	-23	20	-9
	92	615.3	89	255.0	41.4	46.1	-4.7	-28.8	45	29	-16	-0.6	-1387	93	397.0	-21	-16	26	-11
	71	508.5	45	195.6	38.5	41.4	-3	-15.1	38	18	-20	-1.1	-1441	93	328.1	-14	-20	22	-12
	26	151.8	2	5.7	3.8	3.1	0.7	1.0	4	2	-2	-1.0	-44	28	-200.0	3	-2	-13	-12
	32	147.2			0	0	0							24	-200.0	0	0	-13	-13
	237	1525.0	198	656.4	43	43.8	-0.8	-11.7	55	26	-29	-1.1	-6802	318	287.7	-4	-29	19	-14
	37	279.4	38	120.4	43.1	48.2	-5.2	-14.4	42	24	-18	-0.8	-660	42	399.2	-23	-18	26	-15
	117	999.3	145	571.1	57.1	57.2	-0.1	-.9	80	43	-37	-0.9	-4334	245	244.7	0	-37	16	-21
	32	215.9	10	39.4	18.2	21	-2.8	-6.0	7	10	3	0.3	119	27	-200.0	-13	3	-13	-23
	48	229.9	16	45.1	19.6	21.6	-2	-4.6	36	8	-28	-3.5	-1368	73	189.0	-9	-28	13	-24
	97	538.6	58	187.7	34.9	36.1	-1.2	-6.6	55	18	-37	-2.1	-3588	164	197.1	-5	-37	13	-29
	28	143.7	24	70.8	49.3	57	-7.7	-11.1	92	25	-67	-2.7	-1896	52	165.8	-35	-67	11	-91
	6	67.8	4	13.2	19.5	32	-12.5	-8.5	22	26	4	0.2	21	4	-200.0	-56	4	-13	-500

[redacted], new slicing screen went up which I think encourages slicers to slice faster and to keep a good yield. It also makes rotations easier as we can see who is coming in from smoko [redacted]

3. We have got a local manufacture to assist in developing a solution which incorporated a powder coated cabinet with a roller shutter on the front. This allows the door to open and screen initiate when the production area is placed into production mode.
4. Data has been sourced from multiple sources. This data was then manipulated to a user-friendly view for the operators to analyse.

6.0 Discussion

We found through the analysis period that operators had become more aware of their performance. This has led to individuals wanting to improve their skills to achieve the goals. Team members which were struggling received more training as required to assist with their outcomes.

7.0 Conclusions / Recommendations

When designing screen layouts, it is important to understand,

1. What does the operator need to see? This may quite different to what they want.
2. Utilising the space available with the understanding the text will need to be interpreted by an operator.
3. Do not distract workers. If you take their time away from the task, the little increase in yield and task speed will evaporate due to delay in tasks.

When designing the interconnects between different software and data sources consider,

4. Communications protocols
5. Data sources

6. Network and messaging architecture
7. Network and device speeds
8. Local or cloud based

8.0 Bibliography

Nil.

9.0 Appendices

9.1 Appendix 1 – Photo of final screen position and layout