CENTER FOR BUSINESS GROWTH & INNOVATION

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UNI University of Northern Iowa Business & Community Services

CBGI Industry 4.0 Technical Assessment

Visit Date:	**January 1, 2024**
Assessment of:	**Hutcheson Foundry** **Contact: Todd Hutcheson** **8120 Jennings Drive, Suite 128** **Cedar Falls, IA 50614** **todd.Hutcheson@uni.edu** **1 (319) 431-6396**

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Summary of Findings

- Hutcheson Foundry produces castings for the aerospace & defense industry. They are the largest casting supplier in the world for Company A, also doing work for Company B and others. They plan to explore working with the transportation industry soon.
- Hutcheson produces about 10,000 pieces per week on three shifts with a total of 245-250 employees. They produce 120 unique part numbers for Company A, and they would be classified as a high volume/low mix manufacturing environment.
- The facility generally consists of older equipment and has a large need for integration, connection and value improvement mapping of its processes and equipment. It is a progressive, but “target rich” environment.
- The leadership team in Cedar Falls is very open to sharing information and discussing means of improvement. They are also open to change and view their own operation with an appropriately critical eye. They are anxious to learn, and even more anxious to apply what they learn about I4.0 to improve their facility. Hutcheson has a leadership culture very anxious to learn and implement I4.0 principles in a cost effective way that is valued by their customers.

Key Opportunities

- Big Data & Analytics
    - Increase automatic data collection via sensor applications and installation, utilizing cloud storage for data access/integration. Hutcheson collects a lot of data, but it currently resides in local, non-integrated locations making it difficult to analyze in a connected and collective fashion
    - Once the availability, coverage and integration of data is improved, utilize relevant data to make better day-to-day business decisions
    - Up the Data Analytics capability from answering “What happened? (reactive) to “Why did that happen? (diagnostic)” to “What is likely to happen? (predictive)”
    - Data silos must be integrated to give the best opportunity for analytics to determine highest impact target opportunity areas and to avoid sub-optimization of one process vs. another
    - Hutcheson could be positioned to approach the creation of a “digital twin”, allowing simulation and process improvement testing without capital expenditures or implementation times.
- Autonomy/Additive Manufacturing

    - Continue to increase the sensor and PLC control of equipment to centralize control and ease data collection effort
    - Improve the use of automatic inspection and data collection/analysis to improve the detection and prevention of quality issues.
    - Use sensors to detect equipment faults automatically and real-time, minimizing lost time in production. Predictive preventative maintenance would help in many areas.
- The Internet of Things
    - Company-wide data sharing, integration and analysis
    - Centralize access to information
    - Improve capability of tracking product as it moves between manufacturing and internal distribution sites.
- Cloud Computing
    - Utilize simple cloud technology for data storage and automatic data collection. Does not need to be 100% initially, can begin with a mixture of local and cloud storage.
    - Pilot solutions in a few key business areas before spreading to the entire operation
- Miscellaneous (not listed on assessment form)
    - Workforce attraction & retention, and a concern for tribal knowledge erosion as more seasoned employees are placed with a "revolving door" of less-experienced employees
        - Employee retention has been difficult and there are a large number of experienced employees that could retire/leave in the near future. Retention has improved over the past 6 months.
        - Improved labor efficiency (50% in 2022 to 75% today) has been a result of improved hiring practices and higher retention rates.
    - Workforce augmentation. Difficulties attracting qualified employees leads to an additional use for automation … replacement of a workforce that cannot be acquired through traditional means.
    - Currently, x-ray technology is used on a 10% sampling basis. Due to the volumes processed by the plant, there are large amounts of scrap which is melted for reuse. Data analysis of the location and causes of casting voids would help eliminate any scrap generate, and eliminate the rework of re-melting castings. The cost of in-line 100% inspection could be investigated.

Considerations

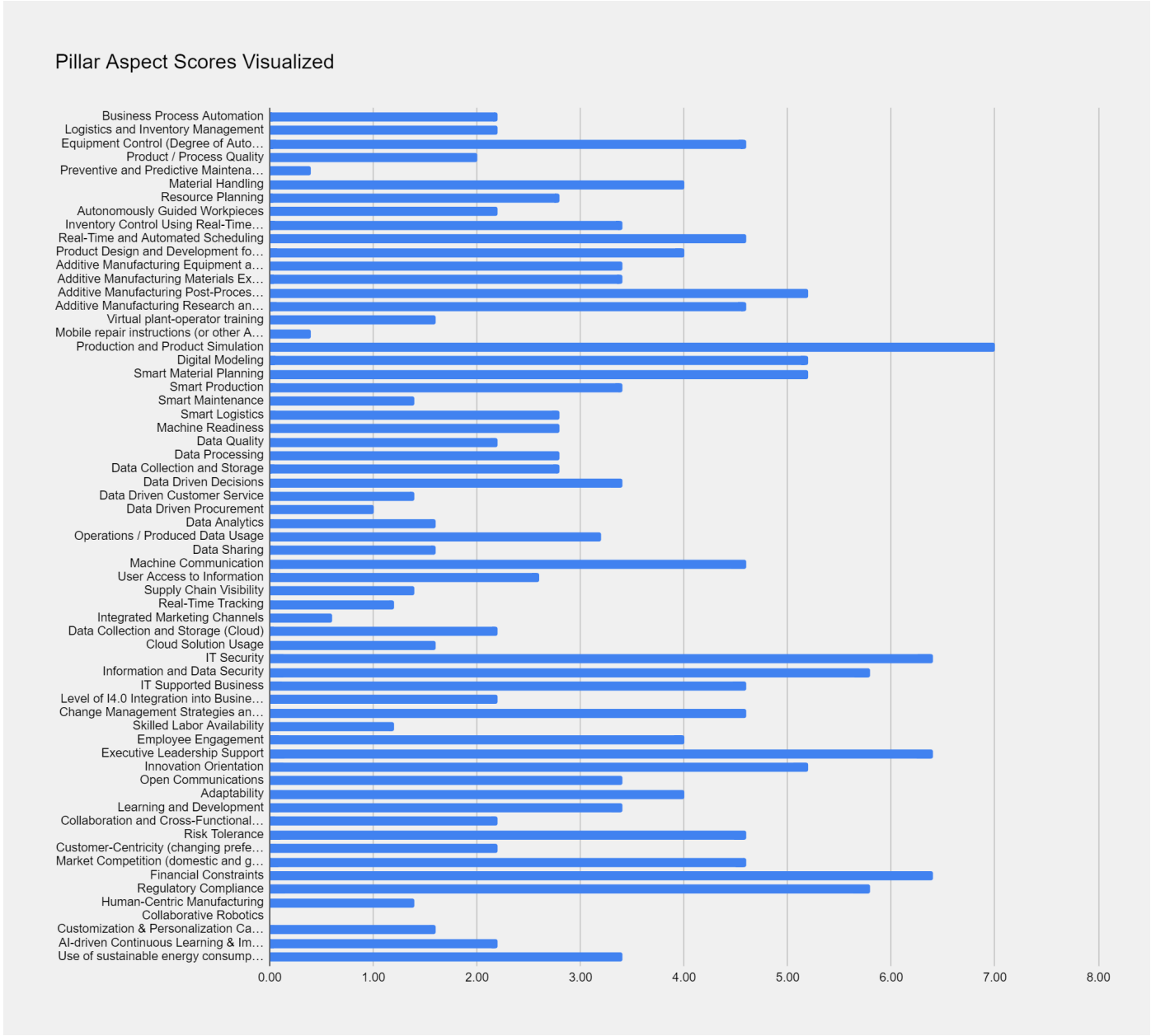
- A capacity and workflow review should be considered. Organization within cells, and location of the cells themselves, could be improved and continuous improvement projects could be utilized to "lean out" the processes used.
- The Hutcheson leadership team utilizes "systems thinking", viewing the operation as a whole rather than individual cells. This is a somewhat rare cultural advantage for Hutcheson, and should allow them to sync up the business needs at the finished assembly level to the upstream production from the foundry. Very positive.
- Company should continue addressing one opportunity at a time. Documented process information including: process steps, cycle times, quality needs, variants, future needs, etc. would facilitate these efforts. The use of interns is a great advantage, and could be continued throughout the year rather than as periodic projects.

Other Comments

- Multiple opportunities were identified based on the onsite tour, assessment and discussion. The company needs to prioritize these opportunities by developing respective business cases for them.
- The full assessment matrix with recorded results has been sent to plant leadership.
- We appreciate the openness with which Hutcheson employees shared their work and culture with our UNI team. The visit was incredibly positive and we look forward to continuing to work with HUTCHESON to develop solutions to their business issues. Thank you!

Appendix A

Assessment Data



Pillar	Average Score	Min Score	Max Score	Average Weight	Adjusted Weight	Min Weight	Max Weight	Gap
Autonomous Robots	2.84	2.10	3.60	1.63	1.41	1.50	1.70	1.69
Additive Manufacturing	4.12	3.40	5.20	1.12	0.97	1.00	1.20	-1.01
Augmented Reality	1.00	0.50	2.50	0.62	0.54	0.20	0.90	0.72
Simulation & Digital Twin	6.10	4.00	7.00	1.56	1.35	1.30	1.80	-1.77
Horizontal and Vertical System Integration	3.12	2.60	4.00	0.98	0.85	0.80	1.10	-0.40
Big Data and Analytics	2.30	1.63	2.88	1.60	1.38	1.50	1.80	2.14
The Internet of Things	2.00	1.67	2.17	1.29	1.12	1.00	1.50	1.58
Cloud Computing	1.90	1.00	2.50	1.04	0.90	0.90	1.20	0.99
Cyber Security	5.60	5.00	6.00	1.06	0.92	1.00	1.20	-2.66
Wild Cards within a Business	3.68	2.80	4.40	1.00	0.86	0.70	1.30	-0.90
Organizational Culture	4.18	3.10	4.90	1.14	0.99	0.90	1.40	-1.01
Industry 5.0	1.72	1.20	2.60	0.84	0.73	0.70	0.90	0.61
Total Average:	**3.21**	**2.42**	**3.98**	**1.16**	**1.00**	**0.96**	**1.33**	

Appendix B

Assessment Summary Charts