

# How HCD led to first-time IoT success for this manufacturer

Flexco's embrace of IoT is leading to new business opportunities outside of traditional manufacturing



## THE BUSINESS CHALLENGE

Flexco, a Midwest-based conveyor belt solutions company, has tens of thousands of conveyor belt cleaning blades at customer mining sites across the globe--but without any way to track their status or performance.

Cleaning blades are essential to conveyor belt health as they scrape the belts clean of debris. But as blades wear down against rock and other abrasive materials, they can fail to remove debris build-up and perform as designed. This can lead to productivity and safety concerns, unplanned down time, and damage to mining and conveyor equipment--all major concerns for their customers.

“

Flexco set out to solve this pain point for its mining customers and eliminate unplanned and costly down time by detecting belt-stopping problems before they occurred. IoT would be essential for the solution, but knowing what to build and how to build it remained their challenge.

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# The Strategy: Figuring Out What Deserves to Be Built Using HCD

## Phase 1: Strategy

To solve this problem and create a solution that was both desirable and technically feasible, Flexco turned to us to guide them through the human-centered design (HCD) process to help discover a solution that would have strong business viability.



### 1 - DISCOVER

Discovery began by immersing ourselves in the customer's world. We spent time with Flexco and traveled with them to a mine in Australia to conduct field research and gain first-hand insights on:

- Observing day-to-day work realities in the mining field
- Learning how conveyor belt systems operate and cleaning blades function in the field
- Gaining various stakeholder perspectives on pain points, wants, and needs (desirability)

We learned their desires for an IoT-powered edge device included:

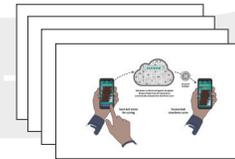
- A device that can accommodate battery replacement while conveyors are in operation
- A custom algorithm to capture and convert data into predictive insights that prompt user action
- Edge technology that can process data on site before sending to the cloud
- Optimizing battery life
- Ability to pinpoint optimal maintenance timing
- A compatible app and cloud-based connection for viewing data, logging maintenance

### 2 - ANALYZE

Armed with research and insights from site visits and discussions, we identified patterns in feedback across stakeholder groups for what was desirable in an IoT solution. That opened a pathway toward what could exist and determining if the work to bring those desires to life was technically feasible.

Specifically, a solution needed to do the following and still be technically feasible:

- Ensure reliable device connectivity in remote locations
- Perform in environments with dust, dirt, mud, and grease
- Operate consistently in extreme hot and cold environments for a minimum of 5 years



### 4 - DECIDE

Without physically building prototypes, we explored concept ideas and tested them with stakeholders through Visual Research Tools to focus the possibilities, while still meeting the needs of all stakeholders. This included showing concept ideas of the physical product, user interface and experience, and the IoT hardware/software development needed to capture data and provide predictive insights.



### 3 - CREATE

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# Building the solution: Physical design meets IoT functionality and connectivity

Phase 2: Implementation

HCD provided the road map and answered the question--what deserves to be built? By following what was articulated as desired and technically feasible, Flexco was able to progress through the design and implement stages of development with confidence on what would emerge.

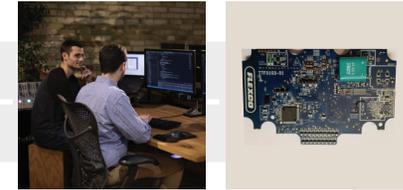
## DESIGN



### 5 - DESIGN

Our industrial design team conceived the physical product housing for the IoT solution, while our engineering team determined the system integrations, and hardware/software architecture based on the technical feasibility requirements of the solution. Our engineers collaborated with technical partners to develop specific features and a cloud solution free of friction to ensure a consistent and accessible flow of all data from edge device to the cloud.

## IMPLEMENT



### 6 - IMPLEMENT

With final CAD design schematics in hand, our design team refined the physical housing through a series of three prototypes until the design was finalized, at which point it was machined and physical project was brought to life. Our developers built out the hardware and software architecture that provided the solution its functionality and embedded into the final physical product.

## VALIDATE



### 7 - VALIDATE

Our engineering team validated that all systems worked together as intended, taking an end-to-end, whole system perspective of operational effectiveness. This included algorithm programming, edge device functionality, cloud connectivity, and remote user experiences. All regulatory, explosion, and IP testing were also confirmed ahead of launch

### 8 - BETA TESTED AND READY FOR LAUNCH

Meet Flexco Elevate™ Belt Conveyor Intelligence™ - an innovative, real-time monitoring system that harnesses predictive analytics through a self-learning algorithm to help mining operations know when to provide maintenance or replace blades before they break. The system attaches an i3 Device to the cleaner frame at the end of a conveyor belt where it aggregates and processes data describing how long a belt has been running with the product on it and how long the blades have been in service. The data is wirelessly transferred to AWS IoT Core and AWS IoT Analytics, then displayed on a custom platform, Flexco Elevate™.

## LAUNCH



## THE RESULTS

HCD paved the way so that Flexco built the right solution. Now Flexco is realizing the results it set out to achieve and solve a pain point for customers with its IoT solution, which includes:



### MAXIMIZING UPTIME AND PRODUCTIVITY

Conveyor downtime is reduced and cleaner blade lifespan is evaluated and extended based on real-time monitoring.



### MONITORING EQUIPMENT VIRTUALLY

Service delivery improves, predictive maintenance is automated, and service engineers no longer need to manually test and determine the life of the blade on the belt cleaner, saving them hours of unnecessary work.



### ACCESSING REAL-TIME INSIGHTS

Conveyor belt health monitored by providing a continuous stream of real-time insights.



### GLEANNING DATE FOR NEW BUSINESS MODEL OPPORTUNITIES

Providing the ability for Flexco to compare the cost of operations and overall value with clients running "clean belts" with clients who don't.



### AVOIDING CATASTROPHIC EVENTS

Identifying abnormal vibration or impacts and notifying service teams affords customers to address the situation and prevent large-scale events and resulting downtime.



### Building the solution: physical design meets IoT functionality and Connectivity

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