MĀKUSAFE

SMART. SAFE. MĀKUSAFE.

A REPORT OF FINDINGS FROM PILOTS

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INTRODUCTION

Every day on the planet more than a thousand workers don't make it home to their families at the end of the work day because of a workplace accident.[1] In addition to the tragic loss of life, more than a billion dollars each week are paid out in the US alone on worker compensation claims for accidents that could have been avoided.[2] In addition to the direct worker compensation costs it is estimated that indirect costs range from two to ten times more than the direct costs of an accident.[3]

ABOUT MākuSafe®

Co-Founded in 2016 by entrepreneurs Mark Frederick and Gabriel Glynn, MākuSafe® Corporation exists to address the problem of workplace injuries and fatalities. The company's novel approach includes patented wearable armband technology that contains a variety of sensors to detect environmental and human motion data. Their proprietary cloud software platform, MākuSmart® uses machine learning to process real time data from the wearable devices in order to notify safety and operations leadership of potential risk. Additionally, MākuSmart® provides a suite of tools for safety leadership to manage, conduct, and measure their day to day safety operations. In addition to making great strides in workplace safety, the company's technology has been featured in more than 50 publications including Industry Week, EHS Today, New Equipment Digest, The Engineering and Mining Journal, Digital Insurance, FinTech Magazine, and in 2019 MākuSafe® was named the ACORD InsurTech Innovation Challenge winner.

[1] International Labor Organization - Safety In Numbers http://www.ilo.org/legacy/english/protection/safework/worldday/report_eng.pdf
[2] Liberty Mutual - Workplace Safety Index https://business.libertymutualgroup.com/business-insurance/Documents/Services/Workplace%20Safety%20Index.pdf
[3] OSHA (US Dept. of Labor) https://www.oshatrain.org/courses/pages/700costs.html

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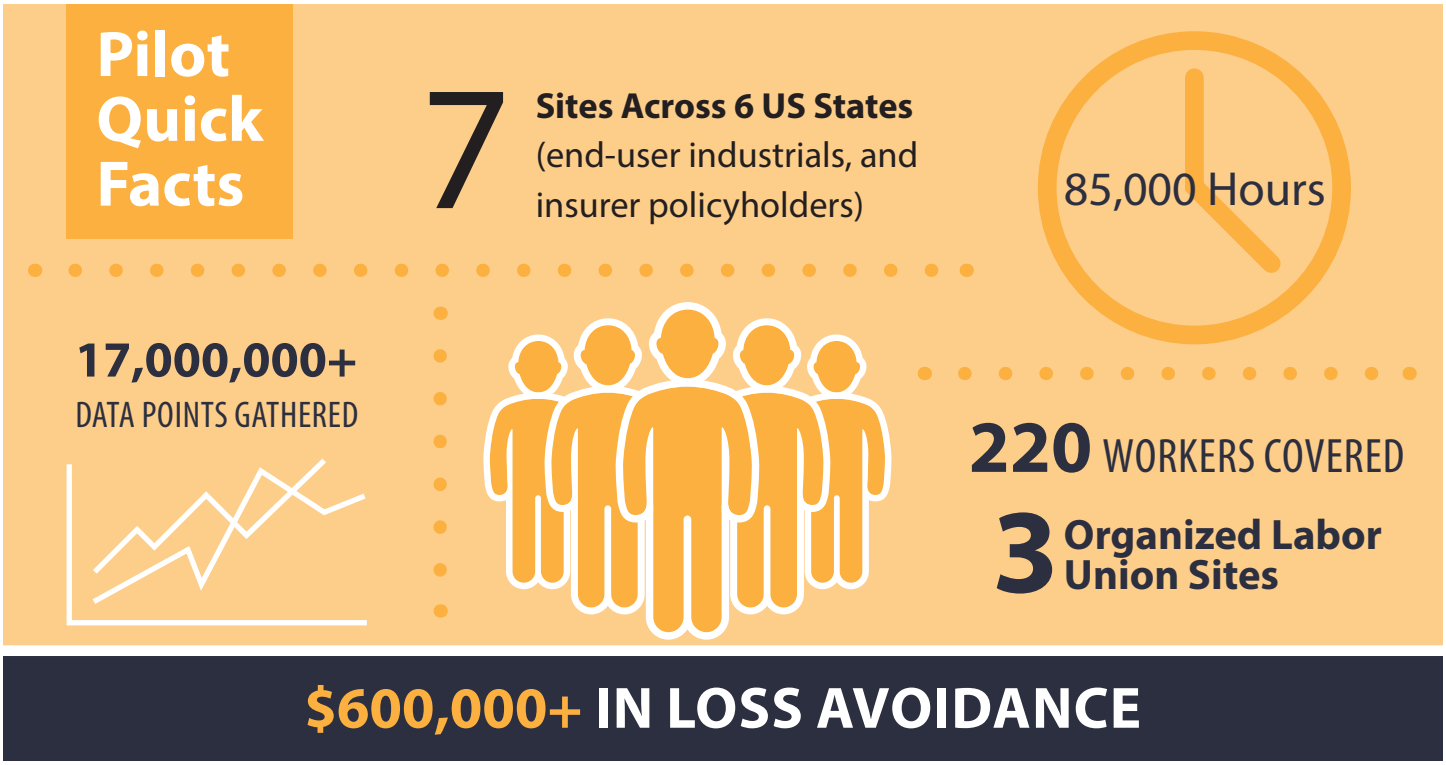
PILOT PROGRAM OVERVIEW

For three years MākuSafe® had been beta testing multiple versions of their wearable technology as the company worked to the efficacy and accuracy of their technology. In June of 2019 the company received its first shipment of their technology produced in mass at their contract manufacturing facility. This shipment of technology was deployed to seven different companies across six US states for pilots that lasted approximately 90 days each. The goals of these pilots were:

1. Prove the technology's ability to identify potential hazards or hazardous trends in the data.
2. Prove effective as a tool for safety leadership to improve safety outcomes and build safety culture with employees.
3. Provide feedback to MākuSafe® leadership to improve features and functionality of the technology.

This Pilot Report highlights some of the most interesting findings from throughout the program. In order to protect the privacy of the pilot companies and their workers, no identifying information will be provided in this report. This report will not cover all the findings from the pilots, but instead will focus on some of the key areas of safety that the MākuSafe® technology addresses.



[Fig. 1 - A set of quick facts about the pilots conducted by MākuSafe® in 2019]

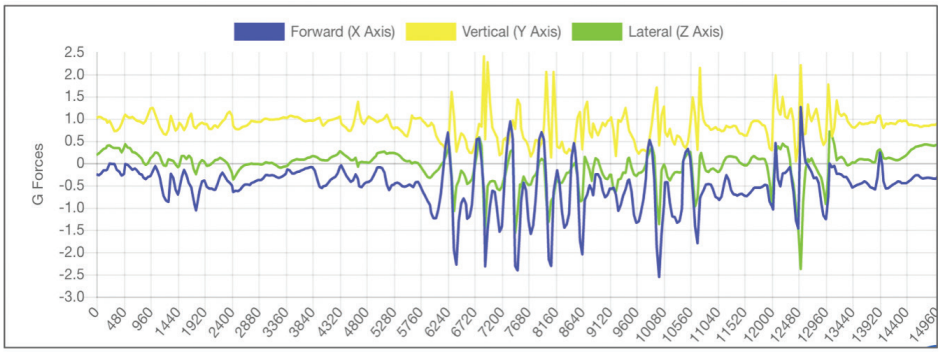
MOTION & ERGONOMICS

INDUSTRY PROBLEM

Slips/Trips/Falls, repetitive motion, sprains/strains, and other human motion hazards continue to lead to the most losses, in both severity and frequency. Depending on the source, slip/trip/fall (STF) injuries can cost, on average, anywhere from $20,000 - $50,000 per incident.[4] Following OSHA guidelines for Walking-Working Surfaces[5] is a great way to avoid these accidents, but oftentimes we must rely on workers to report potential hazards before they become costly. Too often we see that if a worker trips or slips on something, but they do not fall or experience an injury, they fail to report the incident. In addition to STF, repetitive and other forceful motions present substantial risk to workers and resulting injuries may take weeks, months, or even years to present. With the right data, these types of hazards can be identified and remediated before they become a costly problem.

THE MākuSafe® APPROACH - GATHERING MOTION DATA

MākuSafe® uses a 3-axis accelerometer to gather motion from directly on the worker. When the device detects any type of forceful motion, it packages the data up and sends it to the MākuSmart® cloud platform to be analyzed. No action or effort from the worker is needed. In MākuSmart®, machine learning models analyze the accelerometer data (example in Fig. 2) and categorize it appropriately. Today, the platform categorizes the data into one of five types: Slips, Trips, Falls, Forceful Push/Pull, and Unidentified Forceful Motion. In the case of Unidentified Forceful Motion the safety manager can then manually categorize the motion as "Potentially Hazardous" or "No Risk". As more motion data is gathered by all workers using the MākuSafe® system, that data is used to improve the machine learning models and to identify new types of hazardous motions.



[Fig. 2 - Accelerometer data gathered by the MākuSafe® wearable device is analyzed in the cloud platform, MākuSmart®, to properly categorize the motion that was picked up by the wearable device.

[4] High cost of Slips, Trips, and Falls - EHS Today https://www.ehstoday.com/safety/article/21915840/the-high-cost-of-slips-trips-and-falls-infographic & Slips, Trips, Falls by Hoffmann Work Comp https://www.hoffmannworkcomp.com/slips-trips-and-falls-can-cause-costly-workplace-injuries/

[5] https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.22

PILOT EXAMPLES

Example 1 - During a pilot at a retail product manufacturer, a 'Trip' indicator was identified by the MākuSmart® platform. The safety director of the facility saw the indicator flag in the platform and went to the production floor to talk with the affected worker. The worker indicated that he had indeed tripped in the area but that he didn't fall or have an injury from the incident. The hazard was identified as an ergonomic mat used to provide comfort for workers in the area.

Example 2 - During a pilot at an industrial laundry facility the MākuSmart® platform was showing a high frequency of unidentified forceful motion by multiple workers in a single area of the facility. Using that information the safety manager conducted an observation on the work being performed in that area and noticed that when heavy material was being dumped out of the industrial dryers, the material would oftentimes become lodged in the "chute fixture" that directed the material towards the workers. As a result, workers would have to jerk the material free from the chute in order to separate it and complete their tasks. MākuSafe® was able to use this "unidentified motion" data to create a new category of motion, called "Forceful Push/Pull" and train their model to identify this type of motion for all customers going forward.

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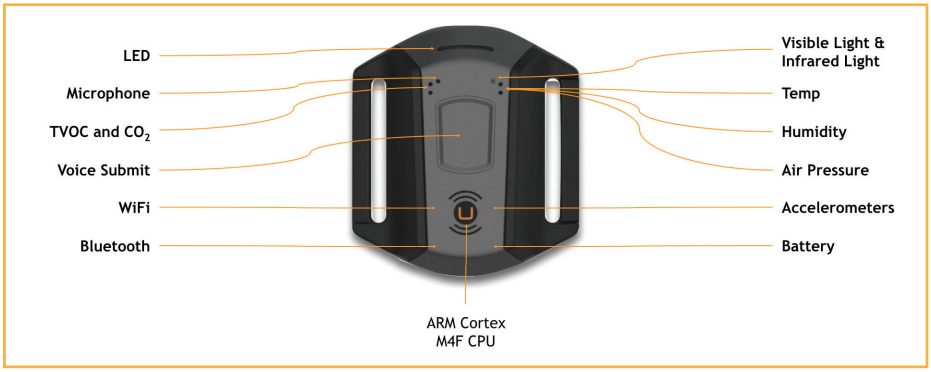
ENVIRONMENTAL HAZARDS

INDUSTRY PROBLEM

The environment around a worker presents a variety of hazards. Noise exposure, air quality, and excessive heat are just a few of the things that workers face on a daily basis. Exposure to certain environmental conditions not only presents direct risk to the worker, but environmental conditions can also accelerate fatigue in a worker and that fatigue can lead to a heightened risk of an accident or injury. Because of this, OSHA sets standards for many environmental conditions, like noise exposure, in order to protect a worker from being harmed by the environment in which he/she is working. Many companies are beginning to implement a strategy of constant environmental monitoring using stationary sensors, but oftentimes this data may not accurately represent the exposure of an individual worker if, for example, the sensor is placed too far away from their work area.

THE MākuSafe® APPROACH - ENVIRONMENTAL SENSING

MākuSafe® uses a variety of environmental sensors (see Fig. 3) that are constantly gathering data about the environment immediately surrounding each individual worker. This granularity of data provides detailed insight into exactly what conditions to which each individual worker is being exposed. In addition to tracking this information against Permissible Exposure Limits (PEL's), the MākuSmart® system can gather greater context when other types of hazards occur. For example, when a series of trips are indicated by MākuSmart®, additional environmental data may indicate this particular area also has low light. This environmental data may also be key to understanding the optimal working conditions for a safe and productive workforce.



[Fig. 3 - MākuSafe® tracks a variety of environmental conditions that can both directly impact a worker and also accelerate fatigue.]

PILOT EXAMPLES

Example 1 - During a pilot at a heavy steel manufacturer the MākuSafe® system identified significantly high exposure limits of noise on an individual employee. The facility has a hearing conservation program in place and requires all workers to use hearing protection at all times and in all locations. Because of the job role, this particular employee was being exposed to in excess of 200% of the allowable dosage of daily sound exposure.

Example 2 - During a pilot at a retail product manufacturer an air quality issue was detected at one particular workstation. Armed with this information, the Shift Supervisor spoke with a worker in the area who indicated that some of the raw material packages "smelled differently". This also led to questions about the quality of raw materials they were receiving from their supplier as all materials should be the same.

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NEAR-MISS REPORTING

INDUSTRY PROBLEM

Industry experts at OSHA, NSC, and other safety organizations all agree that a quality near-miss reporting program is encouraged and can significantly improve worker safety. Near-miss information may be an indication of accidents to come and this is why many companies have near-miss reporting programs and encourage workers to report them when they occur. MākuSafe® conducted interviews with workers on the topic of near-miss reporting and found that the number one reason workers said they didn't report near-misses is that they did not want to stop their work to spend time filling out a paper or digital report form. Additionally, safety managers who were interviewed estimated that 80-90% of the near-misses that take place in their facility go unreported.

THE MākuSafe® APPROACH - NEAR-MISS REPORTING

MākuSafe® created an innovative way to provide a fast and simple way for workers to report near-misses. By depressing the button on the front of the device, a worker can talk into the device and audibly report a near-miss, a hazard, quality issue, and other things in a matter of seconds. These voice memos are immediately sent to the MākuSmart® cloud platform and notifications of a new voice memo are sent to leadership. Each voice memo is also automatically translated into text in the maksmart platform and the audio file of each memo is saved. By using this tool, MākuSafe® pilot customers experienced an increase in communication between front-line workers and supervisors, resulting in positive conversations and an increase in safety awareness and culture.

[Fig. 4 - This is the actual voice memo from a worker suggesting additional padding to the exposed area on the production line.]

PILOT EXAMPLES

Example 1 - On the first day of a pilot at a food packaging facility, an employee used the voice memo feature (See Fig. 4) to suggest adding padding to an area of their production line after they witnessed a coworker getting a bruise by bumping into an exposed fixture. Armed with this information the safety manager went to the production floor to meet with the reporting worker and investigate the hazard.

Example 2 - During a pilot at a food packaging facility a worker used the voice memo feature on the MākuSafe® wearable device to alert the safety manager of a potentially hazardous condition. Upon investigation the safety manager found that maintenance had painted the floor in this worker's work area and that the improper paint had been used. This resulted in an incredibly slippery surface for the workers in that area.

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SUMMARY & LOSS AVOIDANCE

As shown in the figure below, the MākuSafe® pilots resulted in a tremendous amount of risks and hazards that were automatically identified. Safety managers used the MākuSmart® platform to investigate and document these potential hazards. The potential financial losses associated with these risks indicators were calculated by using numbers provided by both the pilot customers and average costs from the insurance industry.

[Fig. 5 - Shows the amount of data gathered from pilots and the resulting actions taken by pilot customers. Loss avoidance was calculated by using actual costs provided by pilot customers as well as insurance industry data.]

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