Solution Brief

Machine Condition Monitoring
Human Wellness Monitoring
Asset and Operations Optimization

# Enhancing Worker Safety and Improving Productivity for Manufacturers with Satsafeti's Conveyor Solution

**The Satsafeti solution, powered by Intel® Core™ and Xeon® Processors and optimized with the OpenVINO™ Toolkit, uses AI-based computer vision to help manufacturers increase production efficiency and create safer working environments.**

satsafeti

## About Satsafeti

Satsafeti's Intelligent Conveyor Solution helps manufacturing companies convert their existing conveyors into optimized, self-acting machines. Designed to integrate with the factory floor, Satsafeti provides 24/7 AI video equipment monitoring that can predict, detect, and prevent safety risks to floor operators and conveyer belt failure. Predictive analytics, real-time alerts and triggered conveyer belt halts help maintain conveyer belt integrity and safety, while increasing production efficiency. Satsafeti also offers customized maintenance robots to reduce human presence on the conveyor belt, creating safer working conditions and delivering maximum value in every working hour.

## Manufacturers Face Significant Challenges to Efficient and Safe Production Cycles

Conveyor belts are the main transportation medium for materials in steel and base metal producing factories. Every 10 million metric tons of production capacity requires approximately 3,000 conveyor belts to transfer materials from one unit to another to form the entire production line.[1]

Despite how integral conveyor belts are to floor operations in this industry, manufacturing businesses still experience significant challenges operating them. These include:

- **Breakdown of Conveyor Belts:** Conveyor belt breakdowns are frequent, hard to predict without the right system in place, and require significant time and manpower to fix.
- **Production Halts:** Conveyor belts are often interconnected, meaning if an incident occurs, it is rarely isolated and can impact the entire production line. For reference, a single instance of conveyor breakdown can result in significant production halts for multiple subunits. This results in significant setbacks and financial losses for steel and base metal manufacturers that produce millions of metric tons of production capacity.[2]
- **Worker Safety Risks:** Conveyor belts pose significant safety risks to workers, especially if they are malfunctioning or not operated and maintained correctly. According to the U.S. Department of Labor, conveyor accidents cause over 40 tragic workplace fatalities a year, and 9,000 workplace injuries.[3]
- **Operational Losses:** Production halts, conveyor belt malfunction, and misuse that creates safety risks are all factors that lead to high operating costs—costs that could be avoided with an intelligent conveyor system.

To solve the challenges that accompany traditional conveyor systems, manufacturers in metal and steel production are recognizing the need to enforce better production and safety practices on the floor.

However, many lack the resources to accomplish this manually. Instead, they are turning to AI-powered conveyor belt monitoring systems that guide and automate optimal floor management and conveyor maintenance monitoring. Filling this high market demand is Satsafeti's Intelligent Conveyor Solution, which uses a combination of smart cameras, machine vision applications, and industrial computing solutions to provide 24/7 conveyor belt management.

## Satsafeti Empowers Manufacturing Companies to Turn Conveyors into Intelligent, Self-Acting Machines

Manufacturers can now rely on Satsafeti's Intelligent Conveyor Solution to help overcome conveying challenges, protect their employees, and optimize production. The Satsafeti System integrates with Distributed Control Systems (DCS) and Programmable Logic Controller (PLC) Systems to enable manufacturing businesses to convert their existing conveyors into intelligent, self-acting machines.

Satsafeti works in conjunction with production floor cameras and sensors to offer AI-based analysis of conveyor systems that predicts, detects, and prevents conveyor belt breakage. Equipment managers are alerted of risks in conveyor breakage before they happen along with the source of the identified issue, whether it's due to associated equipment failure, belt motor malfunction, or a myriad of other conveyor deviations. These alerts give managers the necessary foresight to schedule downtime of the impacted conveyor for inspection to proactively correct the issue of operations and minimize the production halt time.

Satsafeti also detects and flags danger to floor operators in real-time. When a safety violation or threat is identified, such as a worker getting too close to a conveyor, the platform will send an immediate alert to the floor manager and can automatically stop the belt in less than two seconds to prevent worker injury. Users can create custom configurations to tell the platform what constitutes a safety violation, who to notify, and what action to take when said violations occur.

Lastly, Satsafeti offers customized maintenance robots to augment manual labor, reduce human presence on the conveyor belt to create safer working conditions, and deliver maximum value in every working hour.

With an intelligent network of conveyors, steel and metal manufacturers can realize the following benefits:

### Improve Operational Efficiency

Satsafeti's Intelligent Conveyor Solution empowers manufacturers to improve conveyor productivity with minimal effort. Preemptive alerts of conveyor breakage enable equipment managers to schedule equipment orders and conveyor belt halts before the incident occurs, helping them minimize production downtime and risk to their employees.

Meanwhile, Satsafeti's customized maintenance robots perform accurate and efficient conveyor inspection. While a human operator only has the capacity to work on a few conveyor belts at a time, maintenance robots provide the automation and standardized inspection to work on more conveyor belts in the same amount of time.

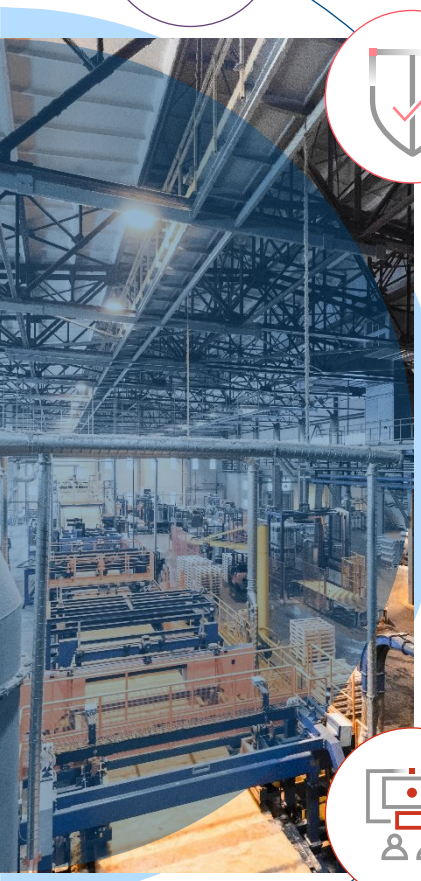
### Enhance Worker Safety

Providing a safe working environment to all employees has become a common concern in industrial environments and is a top priority for manufacturers. Satsafeti's Intelligent Conveyor Solution enhances safety protocols with conveyor belt safety analytics such as Guard Removal by Human, Human Intrusion Beneath the Conveyor Belt, and more. With these real-time detections, Satsafeti can help manufacturers significantly reduce safety incidents and improve their Lost Time to Injuries and Frequency Rate (LTIFR). The automated maintenance and alert system further protects conveyor equipment health and helps provide safer working conditions.

### Raise Production Margins

Satsafeti's solution helps prevent production losses to help manufacturing businesses realize their full revenue potential. It does this in two ways: by minimizing production halts caused by conveyor breakage and by protecting the conveyed product. This arrest in production losses can contribute to Satsafeti's customers increasing their annual production margins and the yearly output of the factory.

# Satsafeti Stands Apart from its Competitors with 26 Different Types of Analytics



## Belt Operations

- Belt Sway
- Conveyor Belt Damage (15 Different Types)
- Belt Health Prediction (Satsafeti Index)
- Material accumulation on Conveyor Belt
- Foreign Material Detection
- Belt Thickness Detection
- Feed Material Detection
- Feed Material Size Detection

## Belt Safety

- Idler Damage Detection
- Detection of Heavy Dust Accumulation
- Guard Removal by Human
- Guard Open Condition
- Human jumping on top of Conveyor
- Human intrusion beneath Conveyor
- PPE Compliance of operator at Conveyor Gallary
- Unnecessary Loitering on Conveyor Gallary
- Slip/ Trip and Fall on Conveyor Gallary
- Human Vicinity to Conveyor Belt while Belt running
- Fire / Smoke Detection

## Thermal Profile Monitoring

- Belt Thermal profile / Conveying Material Thermal profile Monitoring

## Chute Operation

- Chute Level Monitoring
- Foreign Material of Chute Detection

## Structural & Machine Integrity Monitoring

- Motor / Gear Box Monitoring
- Structure Crack Monitoring
- Unusual Sound Monitoring

## Intelligent Automation

- Customized Start/ Stop Command to PLC

## How the Satsafeti Intelligent Conveyor Works

This Intelligent Conveyor Solution can be deployed in any warehouse with Satsafeti's simple, three-step process.

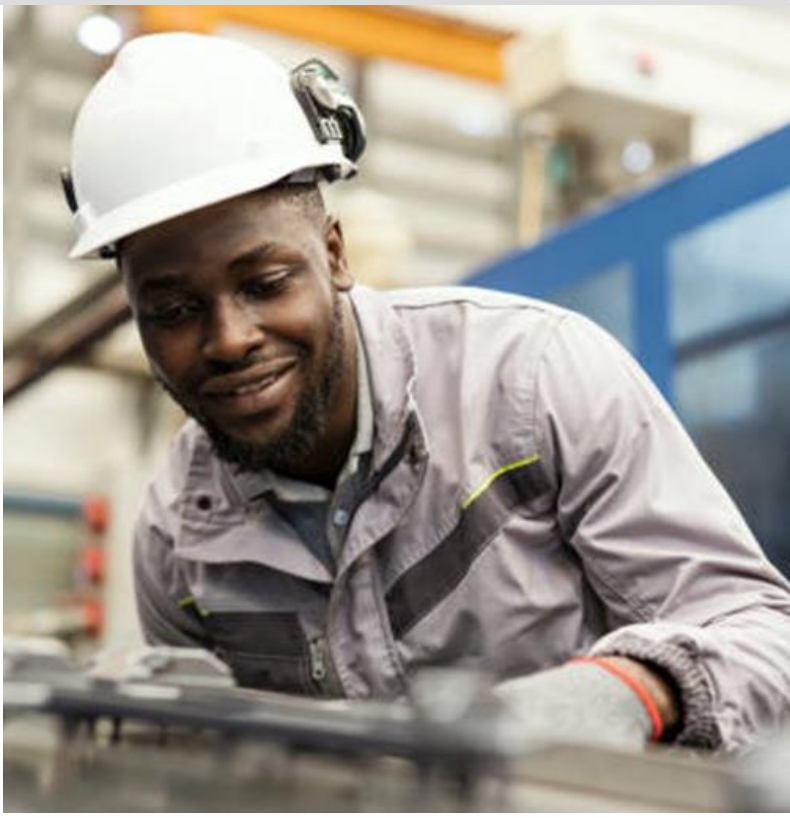
### 1 Hardware Consulting & Installation

The first step of deploying Satsafeti's Intelligent Conveyor Solution is supplying and installing the required hardware. Satsafeti's team manages this process by first determining what processing power the customer needs and optimal setup locations. Based on this information, Satsafeti's team provides customers with a list of hardware recommendations within the customer's budget for the appropriate equipment, such as cameras, thermal cameras, Intel® Core™ processor-based edge devices, and Intel® Xeon™processor-based servers. Installation is handled by a system integrator or Satsafeti itself.

The selection of Edge hardware depends upon the size of operations and the required analytics of the manufacturer. For large installations, Satsafeti offers a hybrid architecture where local Edge processing units pre-process data and then send it directly to the business's cloud network for analysis. Satsafeti recommends customers utilize Intel Technology to secure the advanced computing power required to gain this seamless computer vision on manufacturing floors.

### 2 Customized Analytics Setup

In the second stage of deployment, Satsafeti's team will set up the desired capability per camera or sensor and configure which user(s) will receive alerts based on the analyzed data and configured parameters. To do this, Satsafeti's team simply opens the module user interface and enters the IP address of the camera or sensor they would like to assign to it. For instance, if an equipment manager wants to track Belt Safety Analytics, Satsafeti's team will enter the camera's IP address to this module in the system and configure it to send the equipment manager alerts.



While other market options only track limited conveyor analytics, such as belt thickness or if someone is opening the guard railing of a conveyor belt, Satsafeti captures 26 different types of highly customizable analytics. This high-powered computer vision of conveyor systems is made possible by optimizing the AI models with the Intel® Distribution of OpenVINO™ Toolkit to run on Intel® Core™ processors at the edge and Intel® Xeon® processors in the data center. Data is captured at the edge and sent to the cloud or an on-premises server. Here, data is analyzed and prepopulated into a dashboard, which will send immediate alerts to the appropriate user(s) when issues are detected. This in-depth analysis of the conveyor belt shows the client actionable insights to increase productivity, enforce safety practices, and guide automated maintenance.

### 3 Maintenance

Once the deployment of Satsafeti's Intelligent Conveyor Solution is complete, customers enter an annual maintenance or rental contract which covers hardware procurement and installation, solution configuration, conveyor analytics management, and maintenance AI. This gives manufacturers end-to-end visibility and control of their conveyor systems.

**Intel enables Satsafeti's to provide their Intelligent Conveyor Solution at the right combination of price, power, and performance.**

To enable powerful AI vision on the production floor, Satsafeti leverages the Intel® Distribution of OpenVINO™ Toolkit alongside Intel® Core™ processors and Intel® Xeon® processors. Together, these Intel technologies help to ensure that Satsafeti's Intelligent Conveyor Solution provides optimal performance in industrial environments.

**Intel® Core™ Processors and Intel® Xeon® Processors:**

Satsafeti's Intelligent Conveyor Solution uses several AI models to generate comprehensive conveyor belt insights. These models must perform optimally 24/7 to provide preemptive and real-time alerts that have significant consequences for production line efficiency and worker safety. For these reasons, Satsafeti recommends using Intel® Core™ and Xeon® Processors to gain the best processing power for varying manufacturing needs and budgets.

Intel® Core™ Processors provide powerful computing at the Edge while taking up minimal space on the factory floor as they preprocess analytics and send them to more powerful-based servers. For companies with larger computing needs, Satsafeti recommends Intel® Xeon® processor-based servers which can handle a heavy computing load while maintaining strong heat dissipation in hot industrial environments.

**Intel® Distribution of OpenVINO™ Toolkit:**

Satsafeti's Intelligent Conveyor Solution may require multiple technology architectures depending on the size of the customer's conveyor belt network. Satsafeti uses the Intel® Distribution of OpenVINO™ Toolkit, a developer tool designed to enable inference at the edge and accelerate deployments, to scale their AI models across the entire family of Intel hardware without needing to redevelop while optimizing performance on Intel technology. The OpenVINO™ Toolkit also enables significant compute power and deep learning memory on one application interface, helping to increase the speed of Satsafeti's computing.

## CASE STUDY: Manufacturing Plant Corrects Conveyor Belt Operations with Satsafeti

**Challenge:** A large business manufacturing plant in Eastern India was facing significant conveyor challenges impacting their operations. The plant was struggling with conveyer belts frequently becoming off centered and causing spillage. This had multiple consequences for production, including production halts to correct the conveyor and clean up the spillage, wasted product, reduced output, and lower annual profit margins.

The frequent conveyor malfunctions and spillage would also contribute to safety risks to floor operators. Firstly, the spillage itself could cause worker injury upon contact. Secondly, floor operators were subject to additional risk of injury by having to repetitively correct a faulty conveyor belt. The plant recognized they needed a solution to maintain their conveyor systems and turned to Satsafeti's Intelligent Conveyor Solution to improve their operations and mitigate risks to their employees.

**Solution:** To solve the plant's problem, Satsafeti implemented a custom conveyor belt monitoring system to provide the equipment managers 24/7 monitoring of the belt through analysis of the IP camera feed. The system's algorithm was configured to map the original position of the conveyor belt, detect any deviation in its position, and send the equipment manager predictive analytics and real-time alerts of any deviation.

**Results:** Armed with this data, the plant's equipment managers are now able to detect conveyor belt deviations before the product is impacted, controlling spillage and issues in operations. With this capability, the plant has been able to optimize its conveyor system, improving the efficiency of the production line while minimizing safety risks to floor operators.

## Conclusion

While AI-based video analytics have the power to optimize production and enforce better safety practices around conveyor systems, businesses have been limited by technology that offers too few conveyor analytics to create impact. Satsafeti solves this by offering one of the most comprehensive Intelligent Conveyor Solutions on the market, complete with over 26 types of customizable conveyor analytics and automated maintenance robots. With this solution, manufacturers can now gain the full oversight of their conveyor systems they need with the advanced computing power to solve their conveying challenges ahead of time.

## Learn More

To learn more about Satsafeti, visit:

- The Satsafeti Website
- The Satsafeti Product Page

To learn more about Intel® technologies, visit:

- Intel® Core™ Processors Product Page
- Intel® Xeon® Processors Product Page
- Intel® Distribution of OpenVINO™ Toolkit Product Page

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### Sources

[1]Internal Data of Satsafeti

[2]Industry Data, American Iron and Steel Institute, 2023.

[3]Minimize Conveyor Injury Risks with Safeguarding, Industrial Equipment News (ien.com), 2020.

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