Dr. Prasad Akella

Founder and Chairman
Drishti

"Creating technology to empower people at work"

Executive: SAP, GM
Serial entrepreneur: **Cobots** @ GM, **Business social networks** @ Spoke, **Video analytics** @ Drishti
PhD (Stanford), MBA (Michigan), BS (IIT)
Fellow, ASME & SME

DRISHTI

safety

material

jidoka

manufacturing

sigma

quality

bill

autonomation
process

industry

productivity

kaizen

lean

continuous
improvement

training

DRISHTI

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Human + Machine = Operational Excellence

MANUFACTURING LEADERSHIP COUNCIL
2021 Awards for Ford, DENSO + Hella

THE TOYOTA WAY 2nd EDITION
"A revolution in TPS"

Forbes
2020 Forbes AI 50

NVIDIA
2020 Top AI Startup

WORLD ECONOMIC FORUM
2019 Tech Pioneer

0.0M

industrial robots

000M

humans

"Technology by itself can't transform companies."

— Erik Brynjolfsson and Matt Beane

Source: "Working with Robots in a Post-Pandemic World," *MIT Sloan Management Review*, 2020

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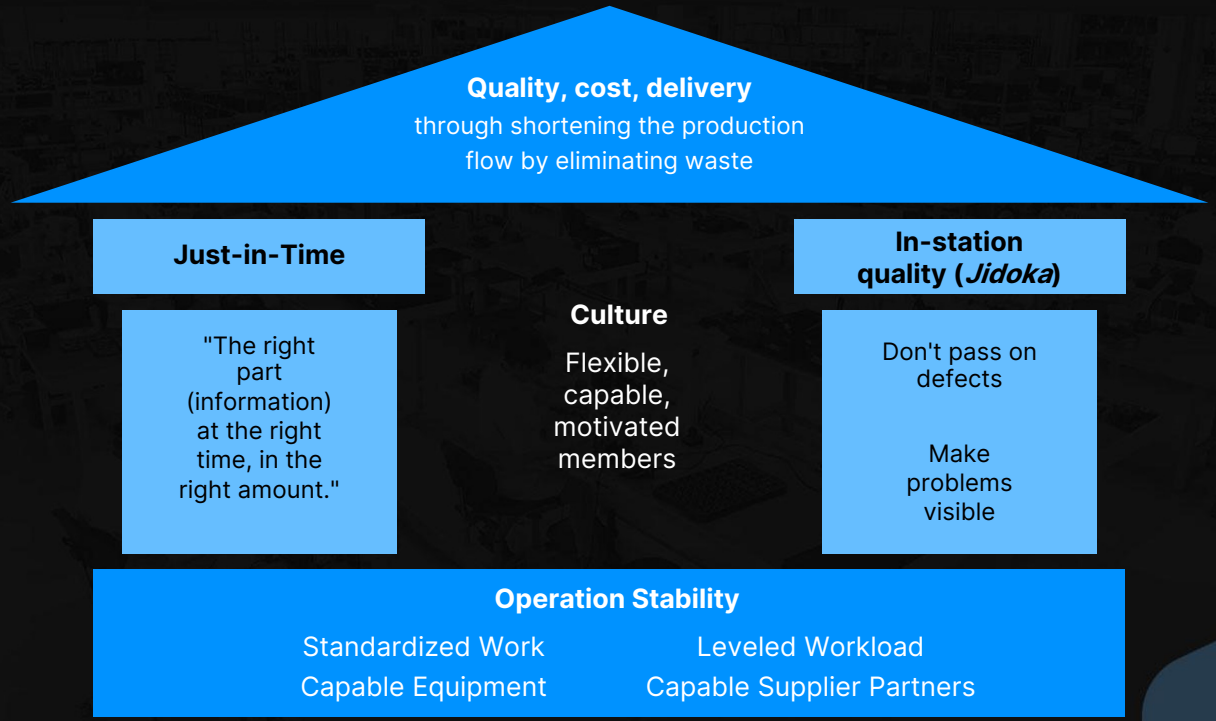
The Toyota Production System is a SYSTEM

Proven to lead to high-performance manufacturing across industries



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Credit: "The Toyota Way," Jeffrey Liker

Scientific thinking & The Toyota Way: a socio-technical system

The goal of the Toyota Production System is to jointly “optimize” the social and technical system — with the technical systems supporting human decision making.

Commit to this:

Philosophy
(long-term systems thinking)

Achieve goals:

Problem solving
(work scientifically toward a challenge)

Strive for this:

Process (struggle to flow value)

Invest here:

People
(respect, challenge & grow)

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The *andon* system: Empowering team members

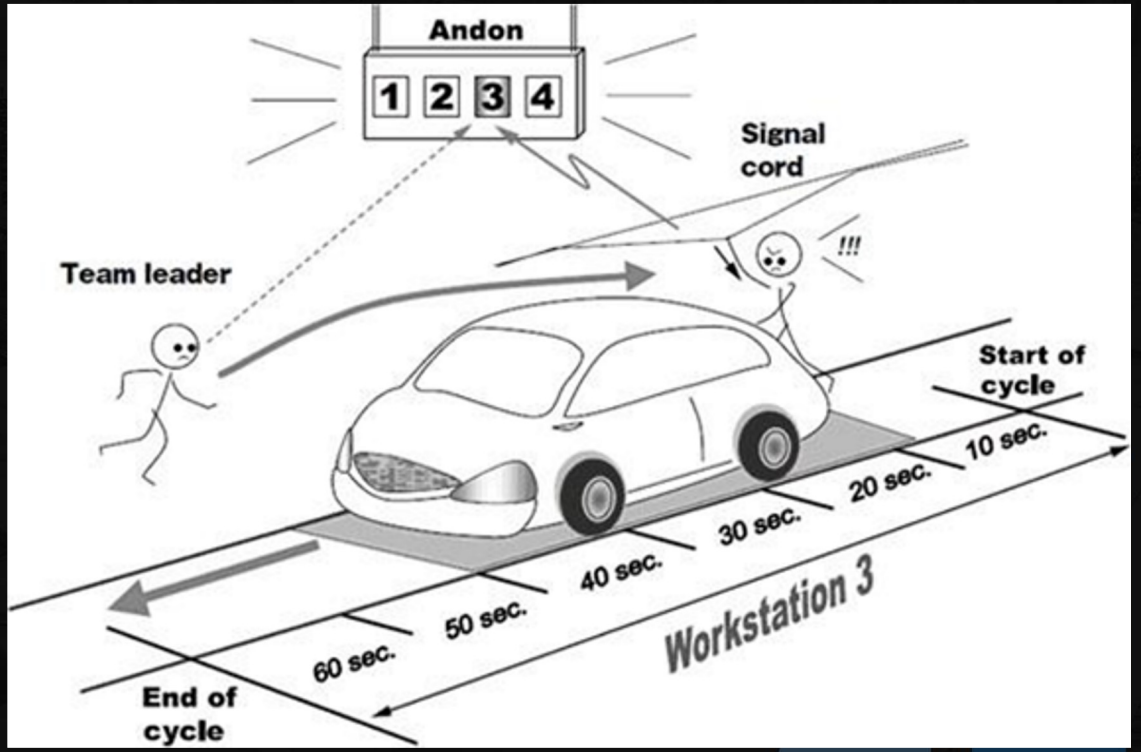
Identify
out-of-standard condition

↓

Contain problem

↓

Solve problem



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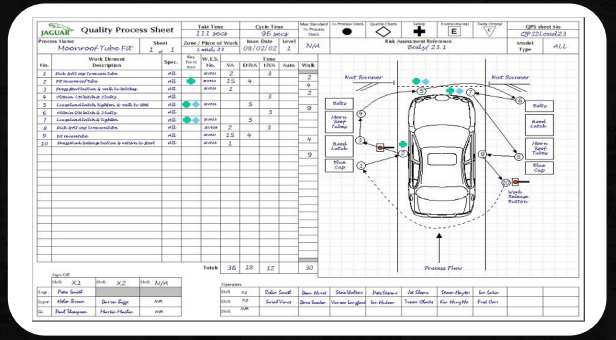
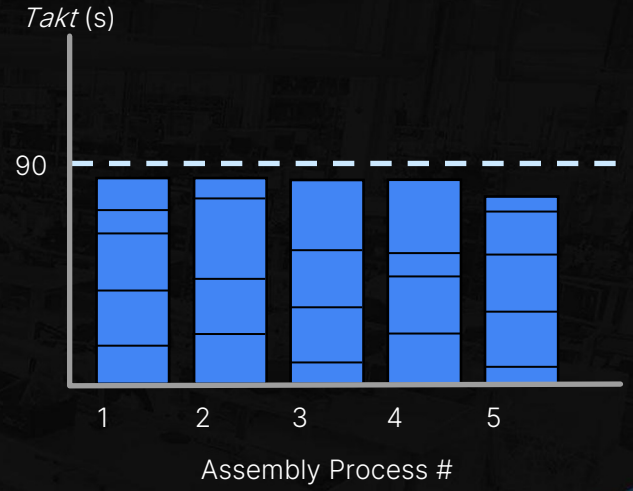
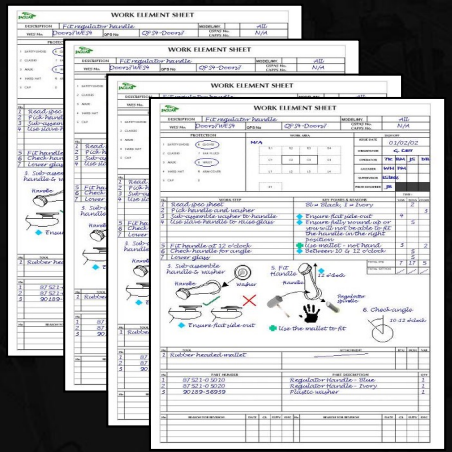
Standardized work = Foundation for continuous improvement



Standardized work chart

Detail of each process step





Work element sheet

Detail of the elements of each process step

Stack chart (*yamazumi*)

A visual tool for balancing processes

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History according to industry 4.0: Digital technologies

Where are the people?!?

Industry 1.0
Mechanized

Industrial revolution begins: Centralized factories, steam power runs machines.

Industry 2.0
Mass

Electrically powered big automated equipment, moving assembly line.

Industry 3.0
Automated

Programmable controllers, IT controls processes, integrated CAD/CAM fixed robots.

Industry 4.0
AI + Connected

Big-data networked machines, cloud computing w/AI, data analytics, cobots, closed-loop control systems.

Industry 5.0
Humans Connected

Human-computer collaboration, global connectivity, creative people problem solving.

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People continue to be the future.

Technology must also EMPOWER people.

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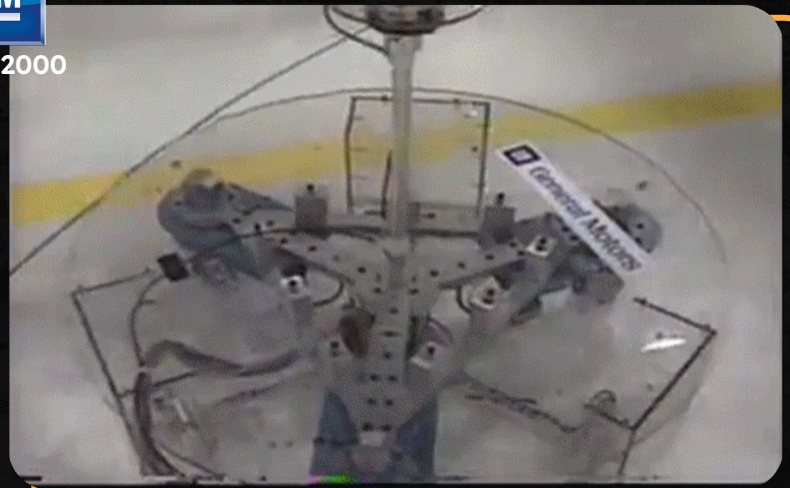
Empower physically and cognitively

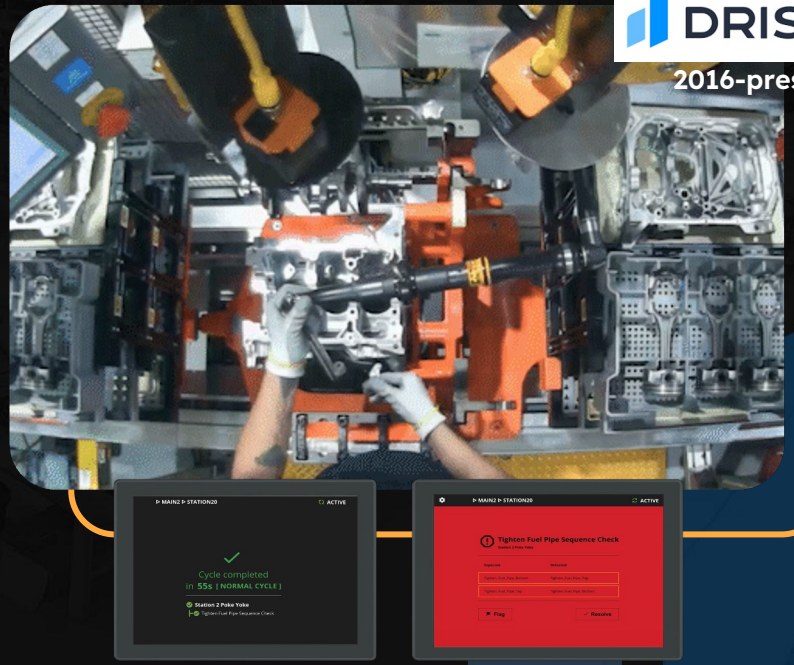
Cobots physically aid humans

1994-2000



Video analytics cognitively aids humans

2016-present



Enterprise AI on a unique & new dataset of people at work

1

Capture video

Drishti captures and stores video from **every workstation**.

2

Create data

Drishti uses AI to turn the video into streams of cycle and/or action **data**.

Action recognition

3

Deliver insights

Data (backed by video) and TPS insights are delivered to those who can take action.

4

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Drishti's action recognition at work

DRISHTI

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4

Vertically integrated; real time

Improve production

Manufacturers ultimately use Drishti's data and people with developed problem solving skills to drive continuous improvement.

TPS + AI

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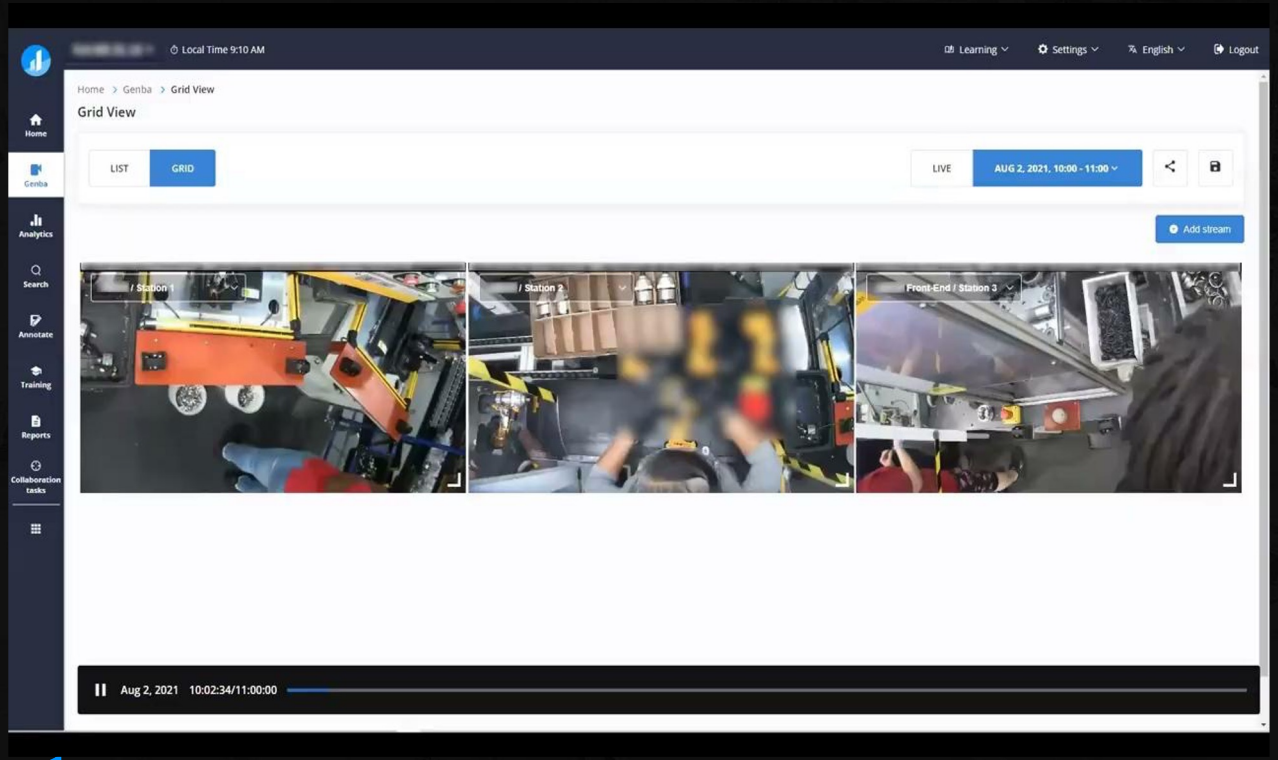
Use case 1: Improve traceability



- Video search
- Root cause analysis

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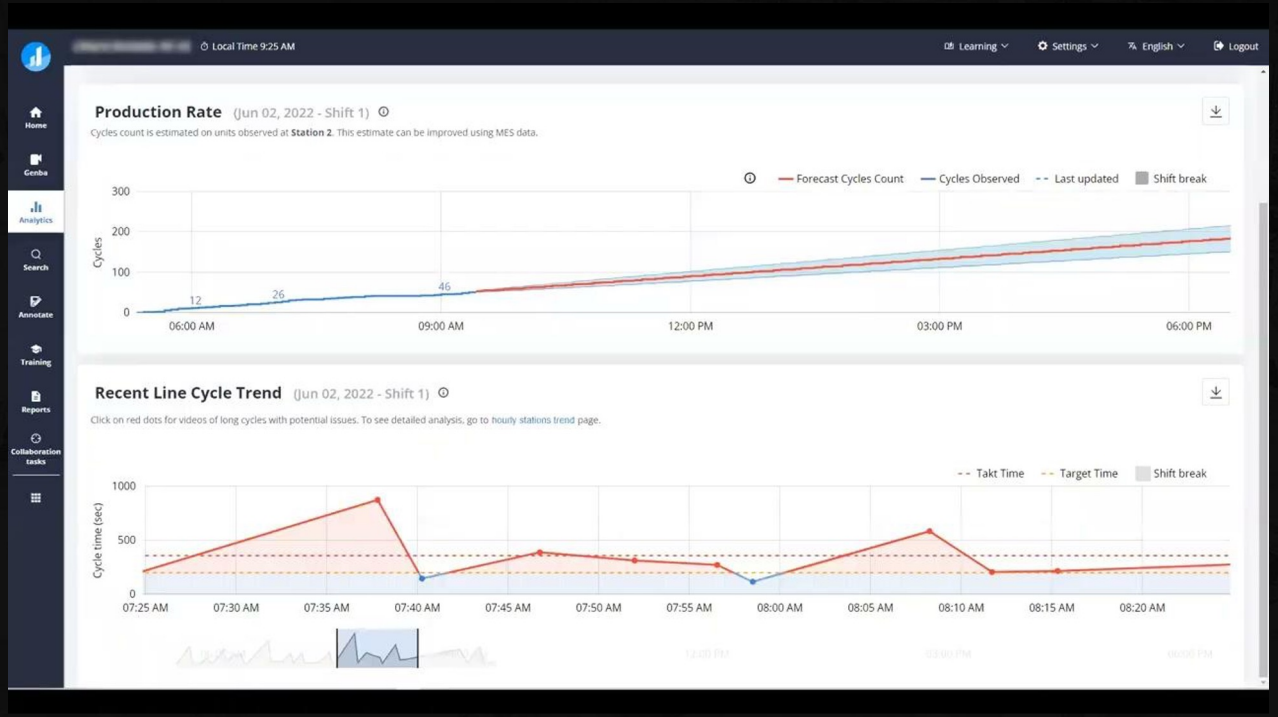
Use case 2: Increase line efficiency



- Better line balancing and lower variability
- More efficient kaizen events
- Faster standardized work analysis
- Richer shift handover/passdown
- Faster recovery from line stoppages
- Accelerated NPI (new product introduction)

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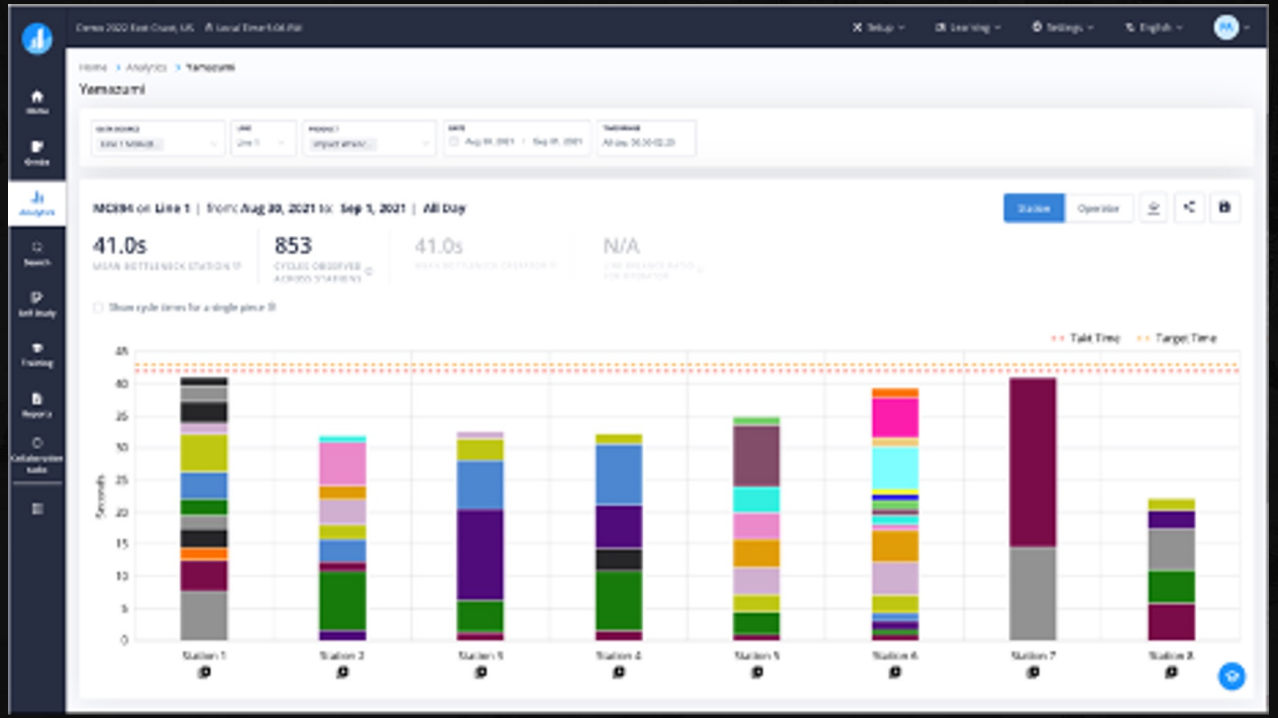
Use case 2b: Increase line efficiency



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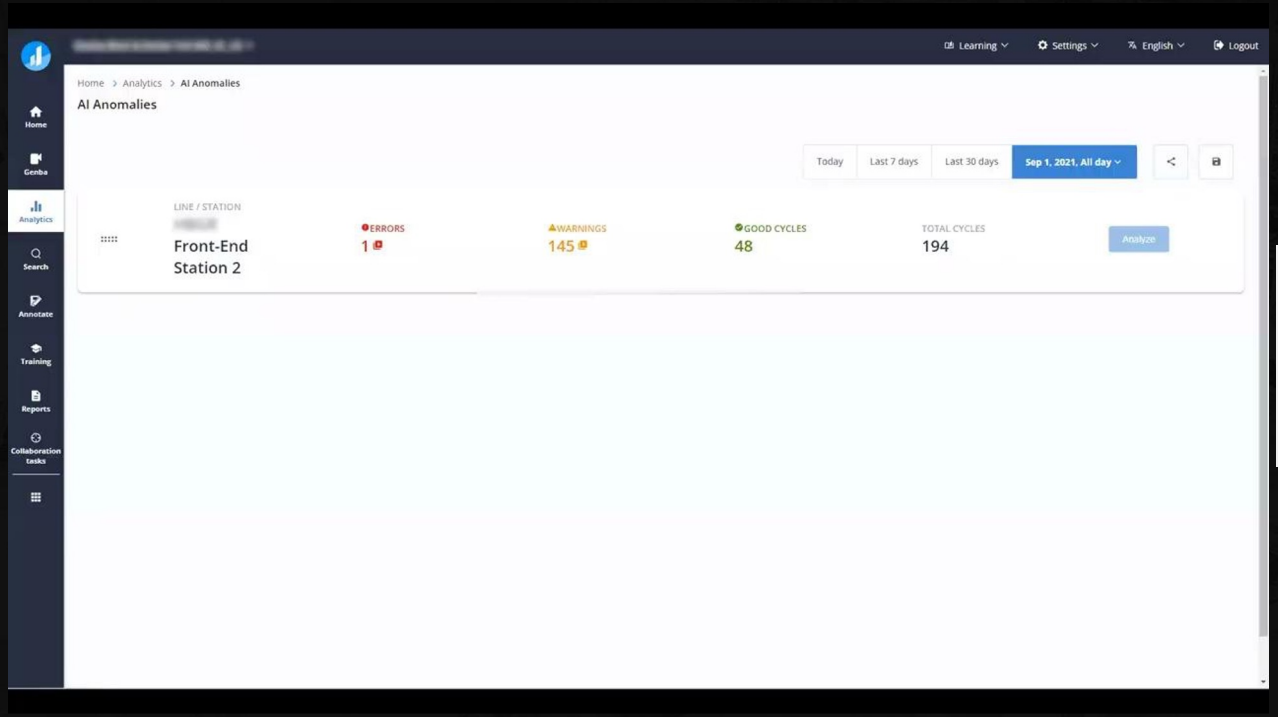
Use case 3: Reduce assembly defects



- On-the-job and *a priori* guidance and training
- Quick decision making with insightful data
- Focused countermeasure design
- Better design for manufacturability
- Deeper context via digital collaboration with video

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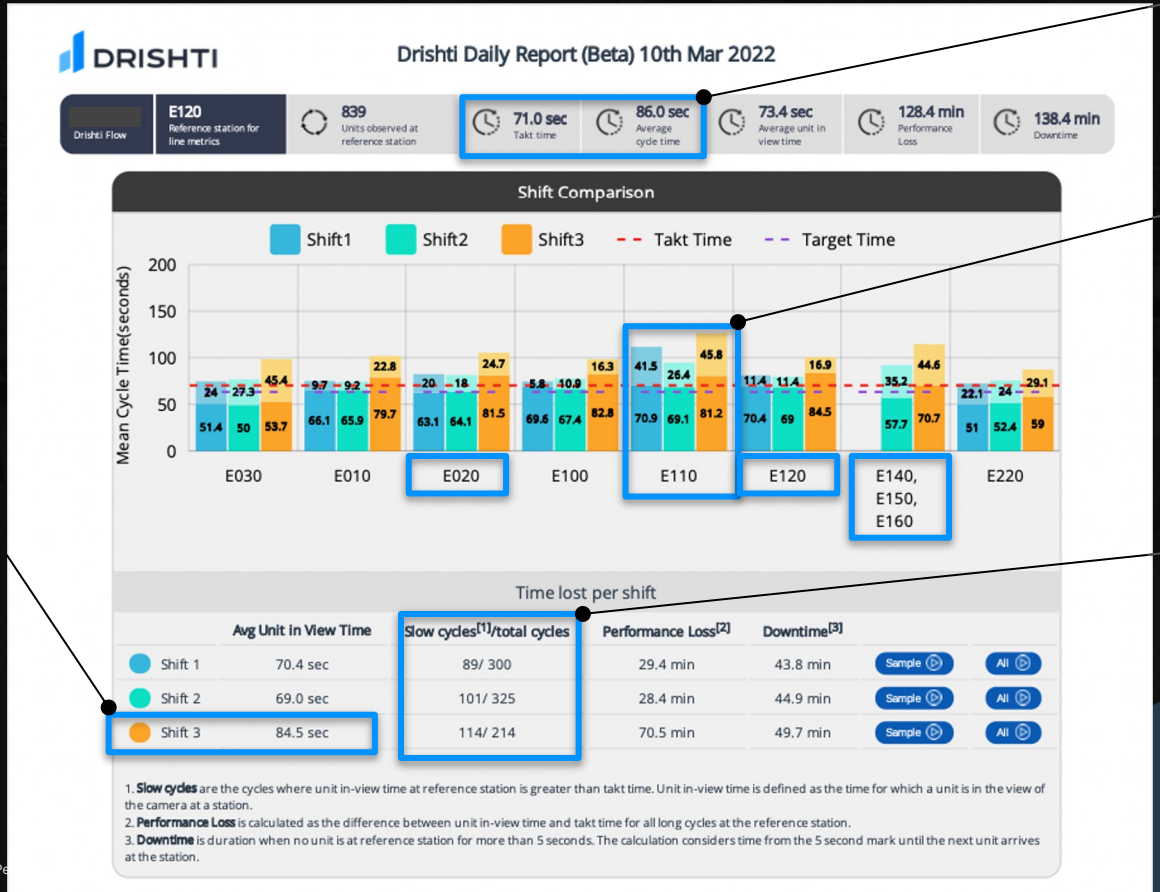
Use case 4: Solve problems with specific shift data

Run a kaizen every day, instead of once a year!



OBSERVATION:
Long cycle time
21% longer than *takt*

OBSERVATION:
Bottleneck station
~112-127s
79% over cycle

1 Address bottlenecks
- E110
- E140/150/160
- E020

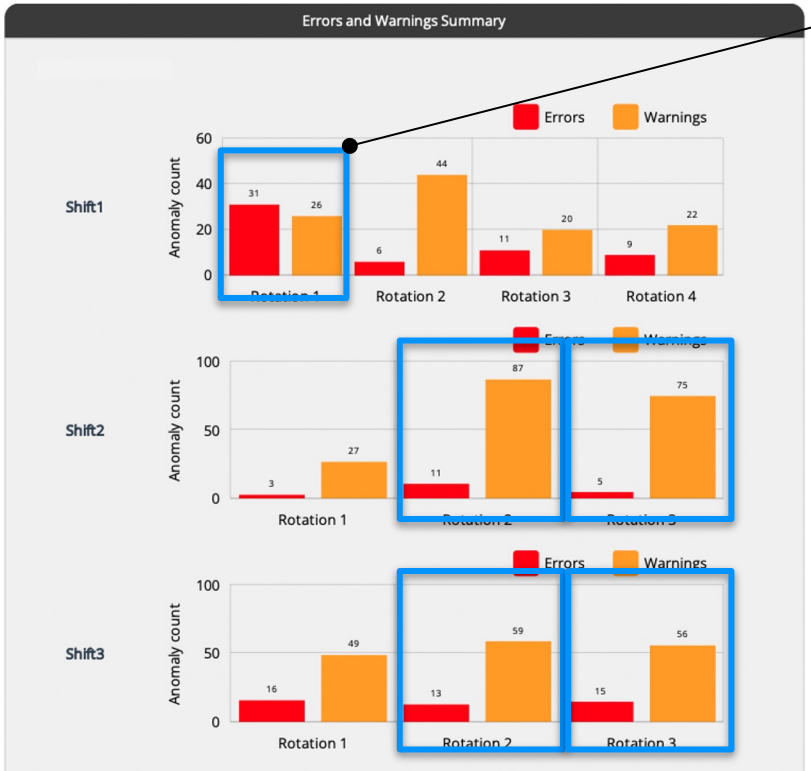
OBSERVATION: 30-50% of cycles are slow

2 Reduce % slow cycles

OBSERVATION:
Shift 3 is slow

3 Tune up Shift 3

Use case 5: Identify whom to train and on what



Line	Station	Errors	Warnings	Good Cycles	Total Cycles
	E220	120 (13.0%) All	465 (50.4%) All	337 (36.6%) All	922 (100%) All

OBSERVATION:
Some rotations have significant execution issues
<Errors, Warnings>

Train operators

4

- S1R1
- S2R2
- S2R3
- <S3R2, S3R3, S3R1>

Use case 6: Identify the root causes of health & safety issues

Sep 23, 2020: S1R1

COMUNICADO DE SEGURIDAD

Reporte Inicial – CHEP III		Tipo de Accidente	FTOV Ensamble LB

Información Básica

Fecha	23 Septiembre 2020	Personal Involucrado	Operadora	Compañía	Ford
Turno	Primer	Parte Lesionada	Hombro Derecho	Área	Long Block
Hora	9:00 a.m.				
Tarea Asignada	Rutinaria				
Tipo de Actividad	Torque tornillos Front Cover				

Ubicación del Accidente: Op. 3080

Descripción del Accidente:

Operadora sufrió compresión de hombro derecho entre kit box y herramienta cuando extendió brazo para tratar de alcanzar motor que ya estaba en movimiento, ya que liberó motor antes de concluir con la actividad de su operación. Estado y Error: Complacencia / ojos y mente no en la tarea.

Se le brindó tratamiento en servicio médico, empleada es dada de alta apta para laborar con restricción.

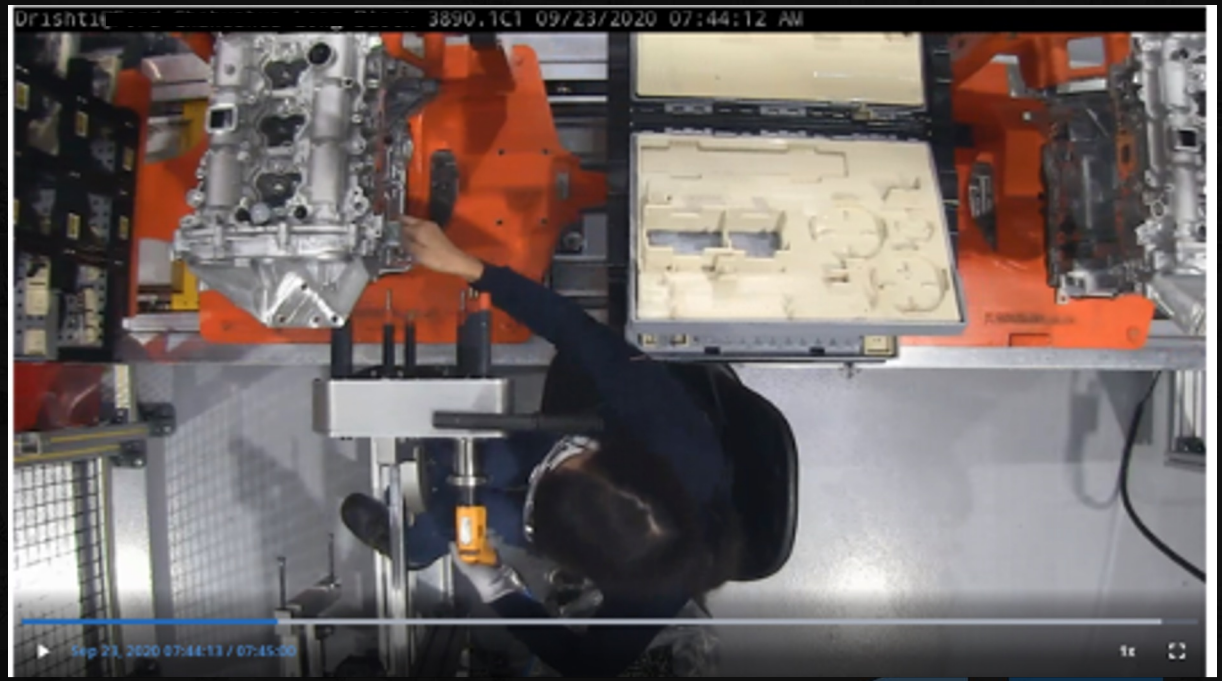
INVESTIGACION EN PROCESO

¡NADA ES TAN IMPORTANTE, NI TAN URGENTE, QUE NO PUEDA SER HECHO CON SEGURIDAD!

Imagen ilustrativa simulando evento

¡Recuerda, la Seguridad es Responsabilidad de TODOS!

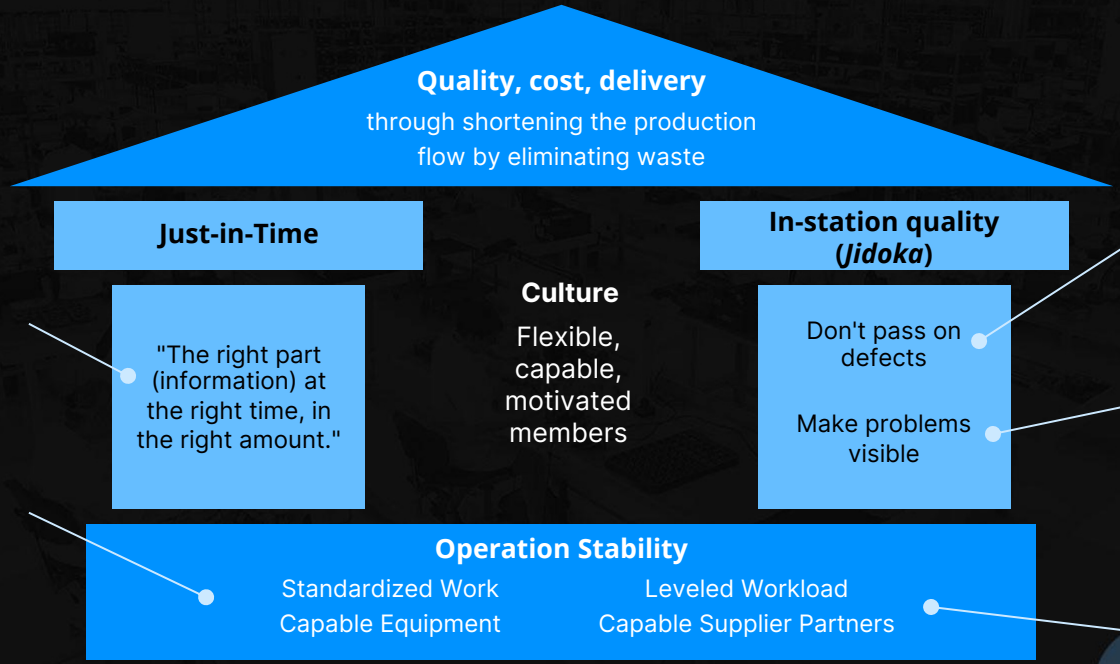
Sep 23, 2020: S1R1



Drishti builds on TPS with AI

Moving the focus from data creation to experimentation and problem solving using data

Make better decisions, faster



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Support 1-piece flow identify bottlenecks

DRISHTI
Supports development & training

DRISHTI
Coach in real time, based on standardized work

DRISHTI
Smart andon with better, faster information

DRISHTI
Understand deviations from standardized work & yamazumi charts to aid in problem solving

Credit: "The Toyota Way," Jeffrey Liker

DRISHTI

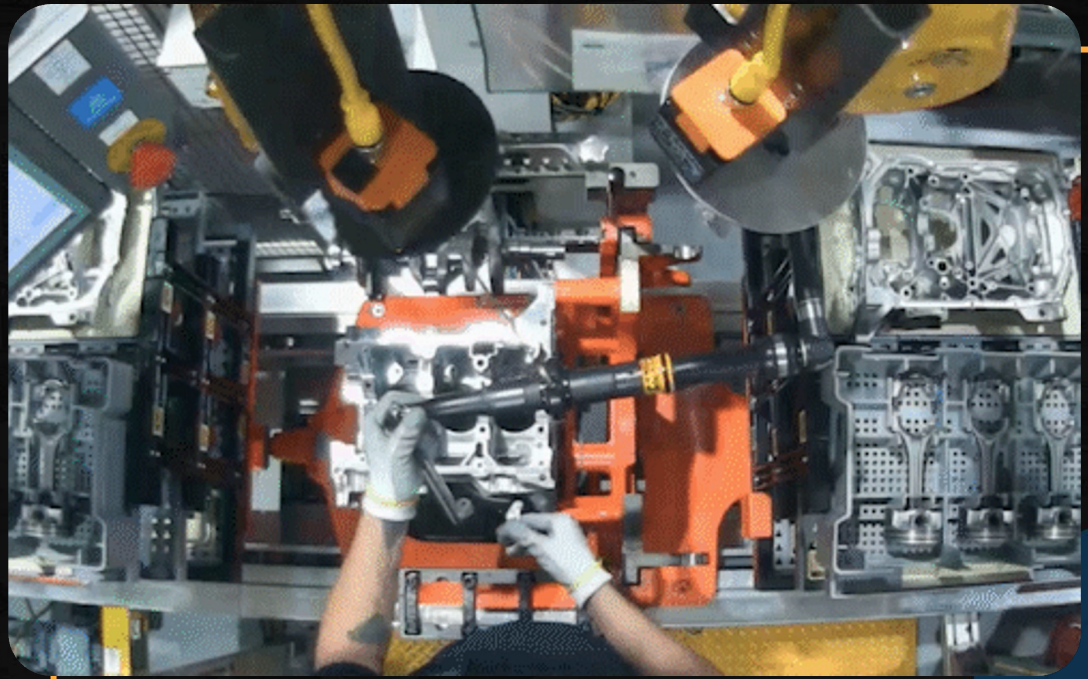
11%
increase
in efficiency

30%
reduction
in defects

15%
reduction
in scrap

50%
reduction
in training time

$K
saved
per defect report



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“This volume and quality of data is valuable as Toyota embraces **AI-powered production** for a data-driven world.

“We see Drishti’s technology as a way to help everyone in the factory.”

TOYOTA

Akiharu Engo
General Manager, Powertrain Quality — worldwide

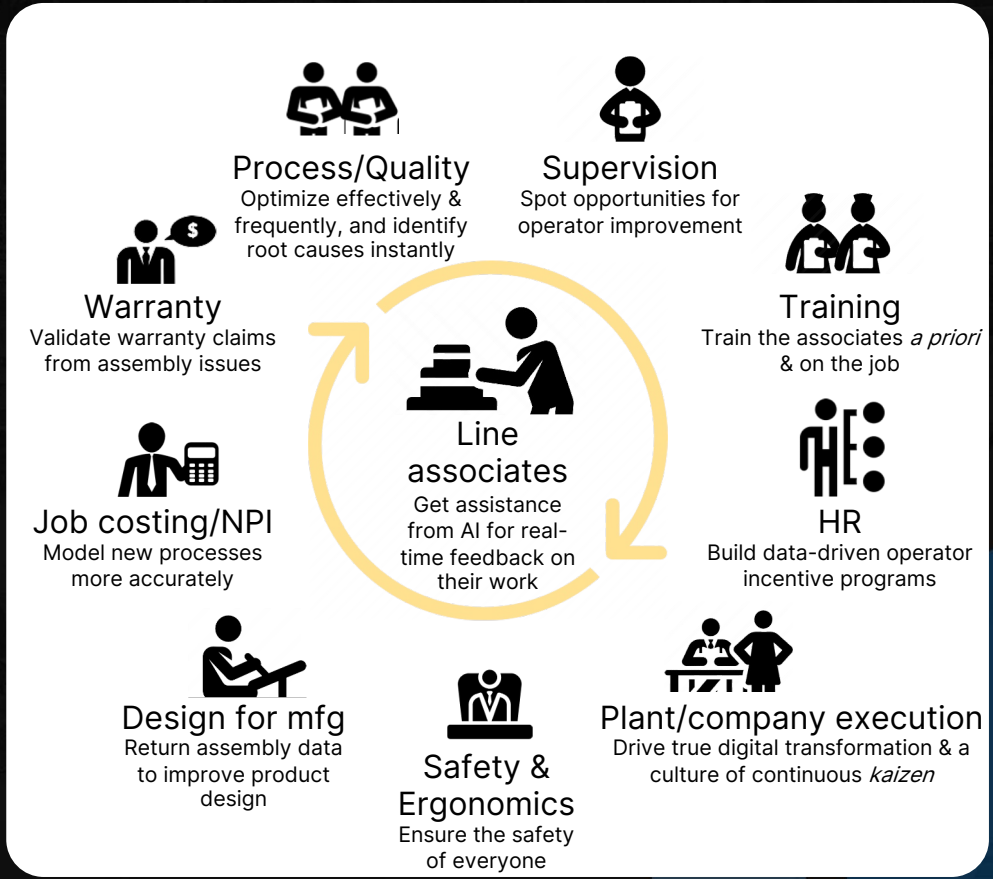
Quoted in a Drishti press release

DRISHTI

Drishti's vision

Drishti's video-backed dataset is used across an entire organization, helping everyone make better decisions.

Wherever people are at work.



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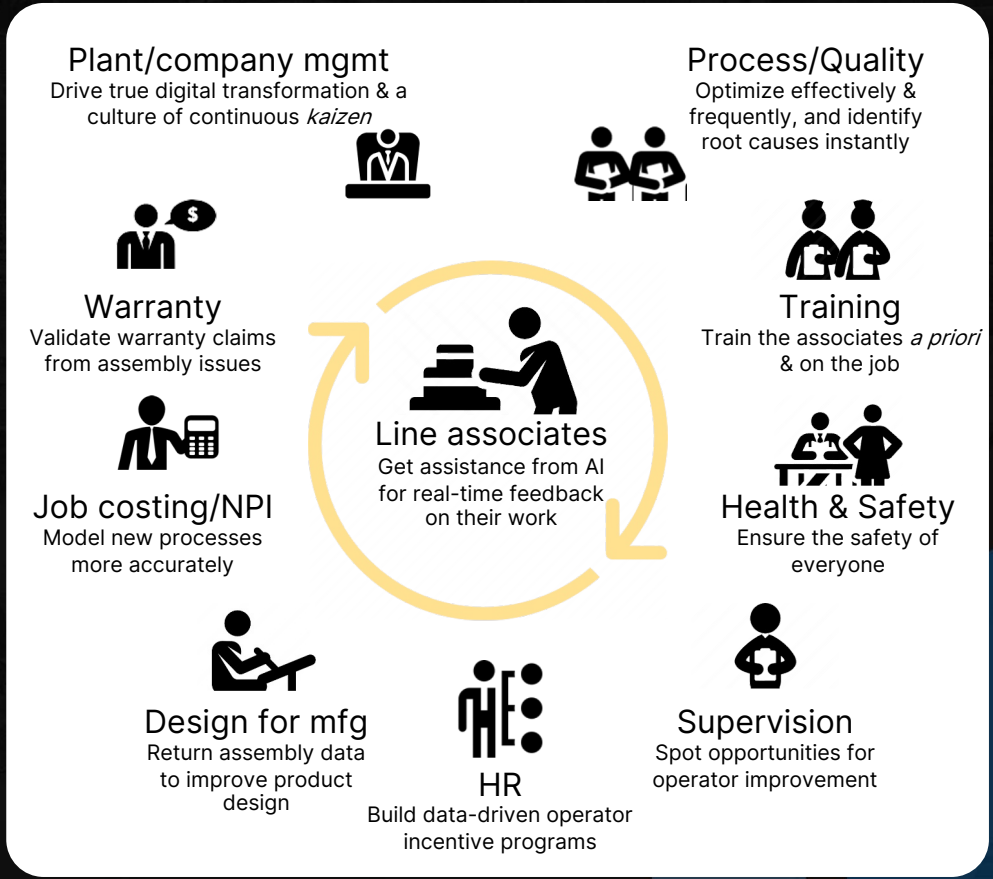

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Drishti works with the world's most advanced manufacturers

3 of the top 10 auto OEMs
6 of the top 10 auto tier ones
2 of the top 5 cardiovascular device manufacturers

Auto • Electronics • Medical devices • Tools •
Industrial goods • Other discrete manufacturers

9.5+M hours of video and data (and counting)
Drishti has the largest assembly dataset in the world.

MANUFACTURING LEADERSHIP COUNCIL
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"A revolution in TPS"

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TOYOTA · Ford · NISSAN
DENSO · ZF · HELLA
Continental · AISIN · faurecia
APTIV · WABCO · Milwaukee
Edwards · Abbott Vascular · Baxter
BOSCH · Electrolux · StanleyBlack&Decker
Micron · AO Smith · L3HARRIS
McKinsey & Company · KEARNEY · Deloitte.

Investing in us

a16z · Alpha Intelligence Capital · BGV
EMERGENCE · HELLA VENTURES · Kauffman Fellows
Micron · PRESIDIO VENTURES · SOZO VENTURES
SRI International · TOYOTA VENTURES

People continue to be the future.

Automation creates exponential value when **HUMAN and MACHINE** work together.

DRISHTI

Q&A

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Fellow, ASME & SME
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Email: info@drishti.com | Visit: www.drishti.com