MFG204

Volkswagen takes production to the cloud

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re:Invent

aws

Learn how Volkswagen and AWS are implementing the digital production platform (DPP) within the VW Industrial Cloud, a cloud-based industrial digital production platform that is transforming the company's manufacturing and logistics processes to increase plant efficiency and uptime, improve production flexibility, and improve vehicle quality. The DPP brings together real-time data from all of the Volkswagen Group's 120+ manufacturing plants to manage the overall effectiveness of assembly equipment, as well as tracking parts and vehicles. Learn more about the use cases to analyze critical production data to glean insights, pinpoint operational trends, improve forecasting, and streamline operations

Agenda

| Automotive Innovation

| Digital Production Platform

| Strategic Alliance — VW/AWS

| Deep Dive

| Next Steps

The automotive industry is changing

Key changes to the product ...

Electrification
More options by brand, greater charging network

Connectivity
Always connected, the ultimate endpoint

Autonomous
Greater capabilities, steady (if slow) progress

Shared
Variety of modes, consistent user experience

... driving us to re-think production

Manufacturing
Increased efficiency across all domains
(Production & Supply Chain)

This is the kind of challenge we're built for

For 25 years Amazon has designed and manufactured smart products and distributed billions of items across our global network

We use cutting-edge automation, IoT, machine learning and AI, and robotics, all with cloud at its core

Amazon continuously transforms itself to drive customer delighting goals like Cashierless Convenience, 1-Day Shipping, and Net Zero Carbon Shipments

We just needed to find the right partner ...

BREAKING NEWS

"Volkswagen emerged again as the world's number one automaker"

"Limited edition electric Volkswagen sells out before launch"

"VW Streamlines Tech Operations in $8B Plan"

"Volkswagen and Ford join forces in $7b Argo AI alliance deal"

"Porsche Taycan reservations surpass 30,000 ahead of world debut"

Volkswagen at a glance

1 Group

12 Brands

122 factories

Volkswagen Group

664,496 employees (2018)
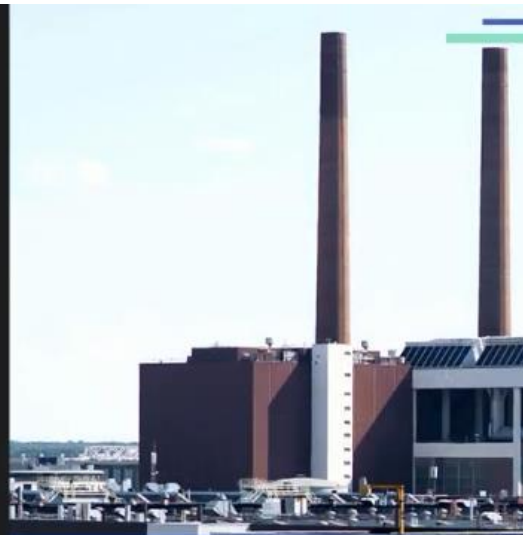
11.018 million vehicles (2018)

€235.8 billion revenue (2018)

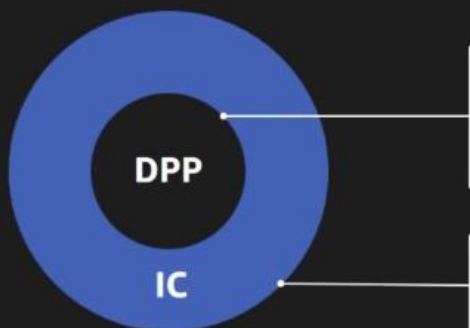# Transforming automotive production and supply chain

With the **Production Strategy 2025**, we've set an ambitious goal to achieve a **30% increase** in productivity until 2025 compared to 2018.

How will we realize this vision?

A flexible, comprehensive digital platform reduces information disparity and democratizes innovation

DPP

IC

Volkswagen Group suppliers + additional partners

We need a powerful IoT platform to kick start innovation in manufacturing and production ...

Digital Production Platform (DPP)
- Combines data of all machines, plants and systems
- Cloud-based platform essential to scale up new applications rapidly across the world

Industrial Cloud (IC)
- Based on the DPP, the Industrial Cloud will be an open industry platform and ecosystem
- Global supply chain with over 1,500 suppliers and partner companies to be integrated

We needed to do it differently this time

Lower risk through COTS (Commercial off-the-Shelf) model

One-way, static buyer-supplier relationship

Purchase complete platform, keep it closed, hire integrator

Our standard approach

Shape the technology, not purchase it

Lead and get to value as quickly as possible

Create a community of peer-partners to build with

Taking a different path

We needed the right **partner**

...be able to **develop and launch complex use cases** in an industrial setting

...provide **pathbreaking solutions** for the ecosystem-participants and show the **willingness to conquer industry-whitespaces**

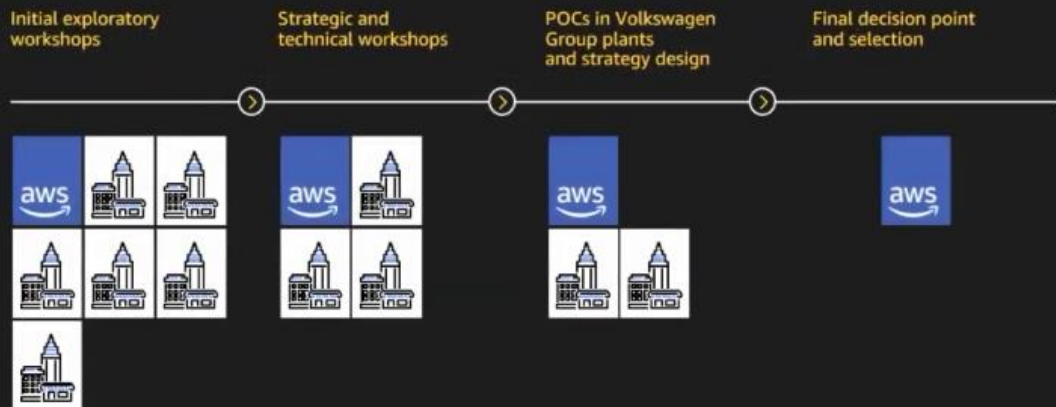...understand the **IC as the enabler** to drive innovation in the automotive industry

...commit to a **long-term partnership** to establish and grow the ecosystem

...engage in an **eye-level partnership** with balanced rights and responsibilities

Success in selecting our transformation partner

Volkswagen Group evaluated a variety of potential partners during 12-mth process

Initial exploratory workshops	Strategic and technical workshops	POCs in Volkswagen Group plants and strategy design	Final decision point and selection

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The unique value of our partnership

VOLKSWAGEN GROUP | **aws**

Volkswagen Group	OUR ALLIANCE	AWS
Diverse Production landscape	Global Scale	Cloud Leader
Deep Supplier Integration	Rapid Co-development	On-premises/Cloud Services
Complex Mechanical Systems	Manufacturing, ML, and IoT Expertise	IoT Solutions/ML Innovations
Production Knowledge Base	Commitment to Thinking Big	Digital Native With Global Physical Operations

We work backwards together with AWS

AWS Mechanism

DIGITAL PRODUCTION PLATFORM
aws | VOLKSWAGEN GROUP

Press release

SEATTLE & WOLFSBURG, GERMANY--(BUSINESS WIRE)--Sept. 30, 2019--Today, Amazon Web Services, Inc. (AWS), an Amazon.com company (NASDAQ: AMZN), and the Volkswagen Group (VW Group) announced the availability of the Digital Production Platform (DPP).

The DPP provides foundational platform services, spanning the public cloud to the edge, that integrate and process data from machines and production systems on the shop-floor in a federated data layer and provides a set of standardized interfaces for software applications.

We deliver short term ROI on use cases, while developing long term platform value

USE CASES

Part Localization

Predictive Maintenance

Press Optimization

Energy Efficiency

Digital Shop Floor Management

Our platform backlog is driven by demand from use cases

DPP Platform Services

aws | VOLKSWAGEN GROUP

USE CASE — Press shop optimization

Increase Press Shop Efficiency
Location: Wolfsburg, Germany
User: Press Operator

Goal: Reduce scrap, increase throughput and stroke rate

USE CASE — Digital shop floor management
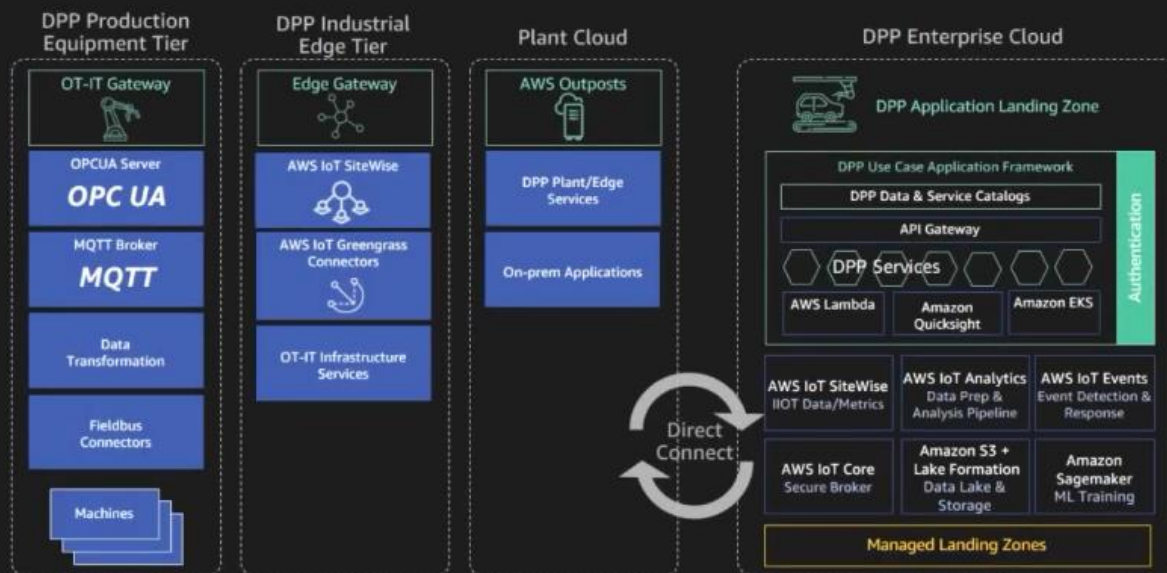
Measure equipment effectiveness
Location: Polkowice, Poland
Chemnitz, Germany
User: Plant Manager

Goal: Standardize & monitor Overall Equipment Effectiveness (OEE) for cylinder production line

The foundation digital platform spans key production and supply chain capabilities

DPP Production Equipment Tier

- OT-IT Gateway
- OPCUA Server — **OPC UA**
- MQTT Broker — **MQTT**
- Data Transformation
- Fieldbus Connectors
- Machines

DPP Industrial Edge Tier

- Edge Gateway
- AWS IoT SiteWise
- AWS IoT Greengrass Connectors
- OT-IT Infrastructure Services

Plant Cloud

- AWS Outposts
- DPP Plant/Edge Services
- On-prem Applications

Direct Connect

DPP Enterprise Cloud

- DPP Application Landing Zone
- DPP Use Case Application Framework
  - DPP Data & Service Catalogs
  - API Gateway
  - DPP Services
    - AWS Lambda
    - Amazon Quicksight
    - Amazon EKS
- AWS IoT SiteWise — IIOT Data/Metrics
- AWS IoT Analytics — Data Prep & Analysis Pipeline
- AWS IoT Events — Event Detection & Response
- AWS IoT Core — Secure Broker
- Amazon S3 + Lake Formation — Data Lake & Storage
- Amazon Sagemaker — ML Training
- Managed Landing Zones
- Authentication

Let's take a look at production

Let's take a look at production

How a car is made.
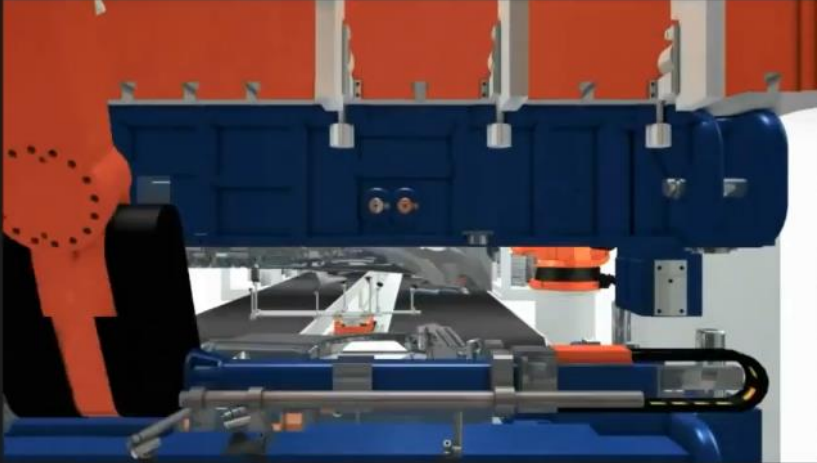Part 2
The Press Shop

Let's take a look at production

Let's take a look at production

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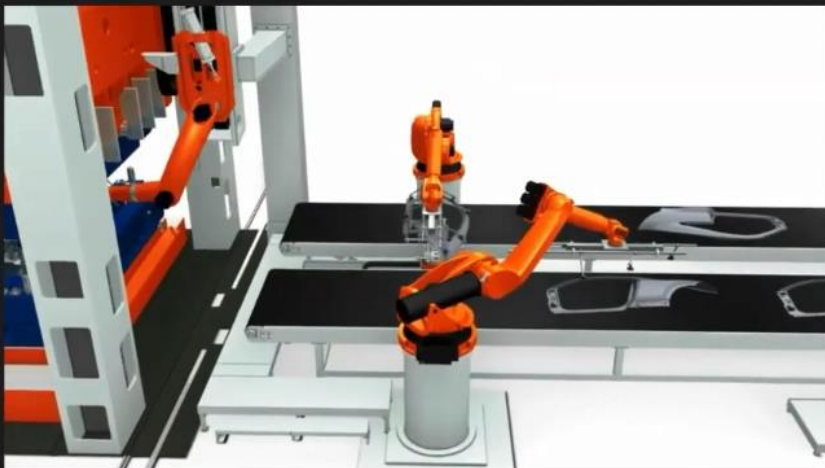## Let's take a look at production

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Innovating on DPP Together

$$f(innovation) = (arch \times org)^{(mechanisms \times culture)}$$

*Innovation is a function of **architecture** and **organization** amplified to the power of **mechanisms** and **culture**.*

	Definition	Focus Area	DPP Implementation Approach
Architecture	A structure that supports rapid growth and change	Self Service	Create specific wikis and marketplace to enable builders
		Microservices	Require API/microservices based architectures for all use cases
		Building Twice	Permit some duplication to make decisions faster
Organization	Small and empowered teams that own what they create	Pizza Teams	Establish single-threaded leaders with small, agile, autonomous teams
		Bar Raising	Establish business and technical KPI and regular reporting cadence
		Operate What You Build	You build it, you operate it. Incents code quality, ownership, highest standards
Mechanisms	Important behaviors that facilitate innovative thinking	PR/FAQ	Work Backwards from Customers. Build PR/FAQ for all new services
		Narrative	Support ideas with facts, anecdotes, and other concrete data
		Correction Of Error	Failure is a learning opportunity. Reward sharing lessons learned, not blame.
Culture	Focus on builders and providing an environment where they can build	Leadership Principles	Embrace LPs with an emphasis on bias for action
		Builders	Provide freedom and tools for builders to experiment
		Two Way Doors	Make 2-way door decisions quickly. Avoid 1-way doors.

DPP drives sustainable innovation across People, Processes, and Technology

Insights — Democratize Development

Easier, More Powerful Analytics Tools

Data

Solutions

Connect More Equipment/ Systems — Value

DIGITAL PRODUCTION PLATFORM

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Multi-tenant, secure, and scalable

Spans cloud to the edge

New microservices

Standardized data layer

Common interfaces

Process and machine data integration

Come talk with us

	Manufacturing Lounge Leadership meet and greet	**IOT339** Architecture Deep Dive
What		
Where	Aria Level 3, Ironwood Foyer	MGM, Level 3, Premier Ballroom 313
When	Wednesday, December 4, 3:00 PM-5:00 PM	Wednesday, December 4, 1:45 PM–2:45 PM
Who	Sarah Cooper — Alliance Manager / Thomas Wirtz — DPP Account Manager / Nihar Patel — EVP Strategy & New Business	Pascal Hahn — SR SDM DPP Platform Team / Dr. Uwe Wieland — SR SDM DPP Platform Team

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We're also hiring

Come work with us to build the future of manufacturing

We're looking for all types of software engineers and product leads

Search digital production platform on our job sites for more information

AWS Job Keywords: DPP

https://www.amazon.jobs/en

https://www.volkswagen-karriere.de/en.html

AWS/VW Joint Development Center
Berlin, Germany

Related breakouts
Dive deeper and learn more

	General manufacturing sessions	
MFG402	Asset condition monitoring with AWS Industrial IoT services	Wed, 08:30
MFG201	Optimizing Aerospace manufacturing operations & supply chain with AWS	Wed, 13:45
MFG203	Modernizing pharmaceutical manufacturing with IoT and AI/ML	Wed, 16:45
MFG202	Building on AWS: The architecture of the Siemens MindSphere platform	Thu, 12:15
MFG401	Predictive maintenance with AWS industrial IoT services	Thu, 13:00
MFG302	Manufacturing reference architecture deep dive	Thu, 16:00

Thank you!

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