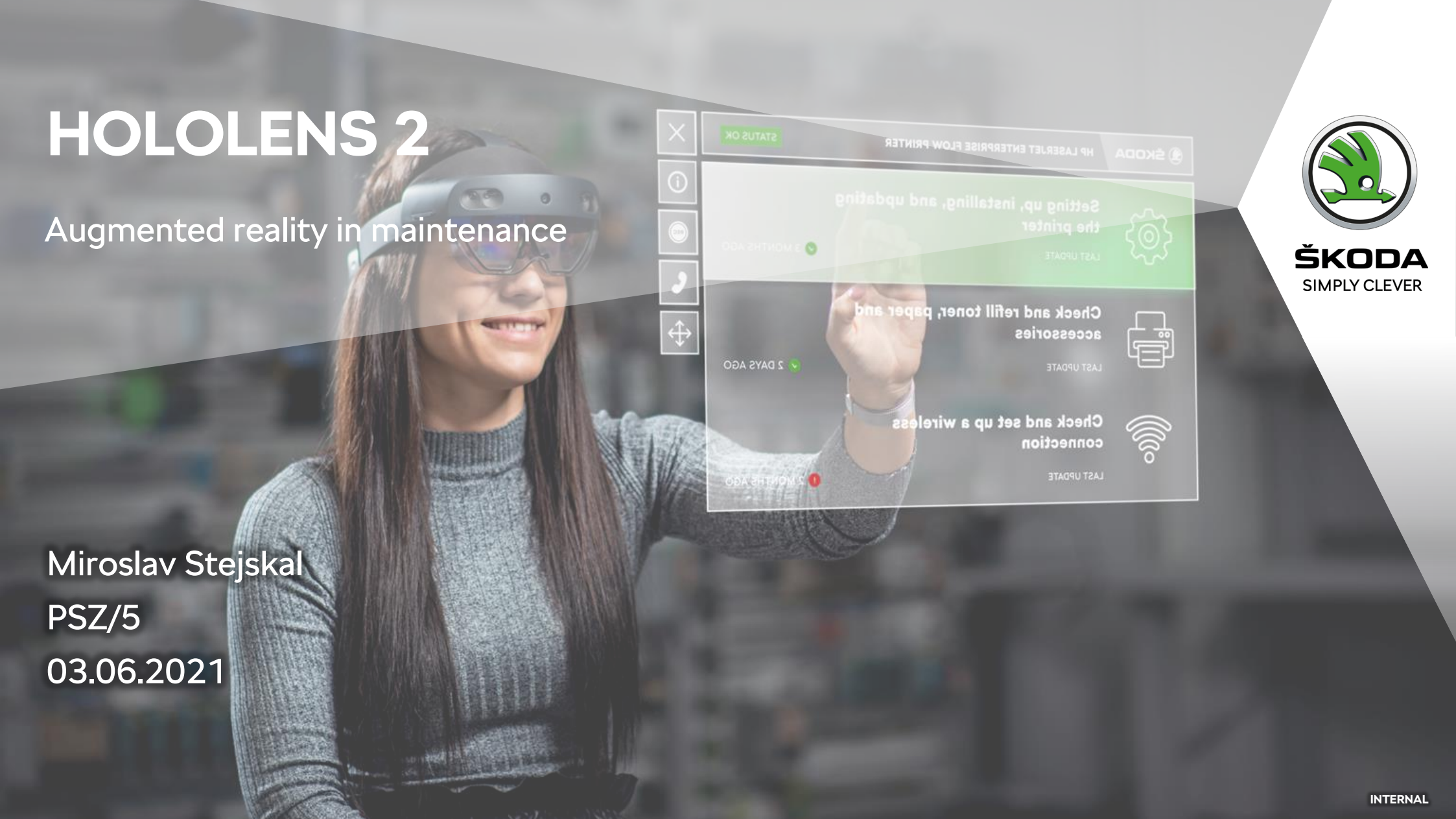
HOLOLENS 2

Augmented reality in maintenance



Miroslav Stejskal
PSZ/5
03.06.2021

ŠKODA
SIMPLY CLEVER

Activity overview

Remote Assist

„Support of users by remote experts in the real time.“

Interactive Checklists

„Virtual tool for guided maintenance and training."

- Innovation
- New technology
- Microsoft device

Year savings

170 Tsd. EUR

BENEFITS

Remote Assist

- Support of users by remote experts in the real time
- Quick action
- Saving in travel costs
- Ergonomic
- Idea for ŠKODA: **Glasses sharing**

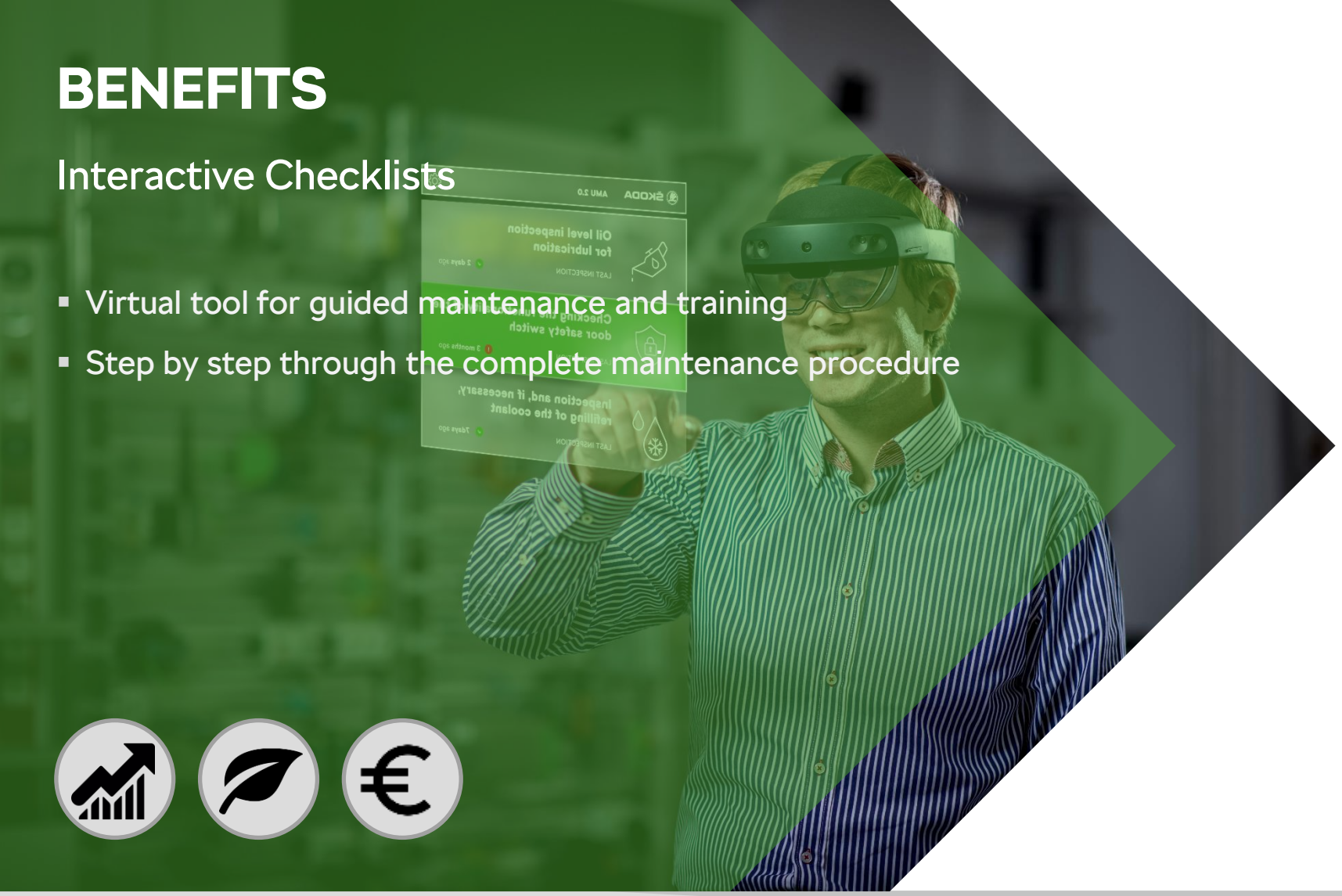
Estimated profit

90 Tsd. € / year

BENEFITS

Interactive Checklists

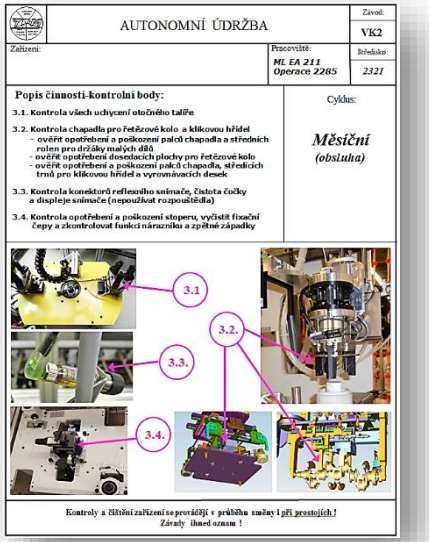
- Virtual tool for guided maintenance and training
- Step by step through the complete maintenance procedure



Estimated profit

80 Tsd. € / year

INTERACTIVE CHECKLIST (TPM)



AUTONOMNÍ ÚDRŽBA

Závod: VK2

Zařízení:

Pracoviště: ML EA 211 Operace 2285

Středisko: 2321

Popis činností-kontrolní body:

Cyklus: *Měsíční (obsluha)*

3.1. Kontrola všech uchycení otočného talíře

3.2. Kontrola chapadla pro řetězové kolo a klikovou hřídel
- ověřit opotřebení a poškození palců chapadla a středních rolen pro držáky malých dílů
- ověřit opotřebení dosedacích plochy pro řetězové kolo
- ověřit opotřebení a poškození palců chapadla, středících trnů pro klikovou hřídel a vyrovnávacích desek

3.3. Kontrola konektorů reflexního snímače, čistota čočky a displeje snímače (nepoužívat rozpouštědla)

3.4. Kontrola opotřebení a poškození stoperu, vyčistit fixační čepy a zkontrolovat funkci nárazníku a zpětné západky

Kontroly a čištění zařízení se provádějí v průběhu směny i při prostojích !
Závady ihned oznam !

Kontrola, čištění světelné závory
Kontrola, oprava kabelů a ukostření
Kontrola funkce snímačů
Kontrola, vyčištění, seřízení brzdy pohonů
Kontrola, dotažení konektorů
Kontrola, dotažení svorkovnic motorů
Kontrola programu a parametrů LJU
Kontrola tagu RFID
Kontrola poruchového majáku
Kontrola mechanických prvků palety
Kontrola, oprava ořechů

16.000 checklists already digitalized in SAP in the form of simple list

Around **60.000 controls** done every year

Migrate/enhance **selected** checklist for usage with Hololens

Focus on most
- frequent checklist
- checklist on most expensive machines
- highest onboarding demand

TO REMEMBER

- Build on **existing processes and infrastructure** (SAP PM, AMU application, TPM methodology)
- **Realistic implementation** where needed and having positive impact (not blind for a fancy new technology)
- Once created can be used for **existing checklists** (via import)
- **Not limited only for production** (dealer training, customer checklist etc)
- Truly NEXT LEVEL ŠKODA (Engage, Explore, Expand)

THANKS FOR YOUR ATTENTION!

ŠKODA
SIMPLY CLEVER

Contact person:

Miroslav Stejskal

Backup

HOLOLENS 2 – AUGMENTED REALITY DEVICE

Business case DRAFT (EUR)

			2021	2022	2023	2024	2025	Total
Remote assist	Costs	HW acquisition	(35.000)	(35.000)				**(70.000)**
		Licence	(5.000)	(10.000)	(10.000)	(10.000)	(10.000)	**(45.000)**
	Savings	100x remote call pa.	15.000	90.000	150.000	150.000	150.000	**555.000**
Interactive checklist	Costs	Application development and service	(50.000)	(140.000)	(60.000)	(60.000)	(60.000)	**(370 000)**
	Savings	Reduced training time		200.000	200.000	200.000	200.000	**800.000**
Other apps (AR tooling…)			….	…	…	…	…	…
		Total	**-75.000**	**105.000**	**280.000**	**280.000**	**280.000**	**870.000**

HOLOLENS 2 – USE CASE REMOTE ASSIST

Savings	
Travel cost (tickets,...)	500 – 2.000 EUR
Accommodation (hotel,...)	100 – 200 EUR
Work (labor costs,...)	500 – 1.000 EUR
Total	**1100 – 3200 EUR**

Costs	
HW (MS Hololens 2)	3.500 EUR
Licence (MS Remote Assist)	500 EUR/year

1.500 EUR
Estimated savings per user session
(one remote call)

Augmented reality in maintenance with HoloLens 2

Potencial Benefits*:

Improved knowledge transfer and **reduced training time by 50%** of a new maintenance employees

Time reduction **3 - 9 month**	**Number of new employees per year** **15**	→	Potencial value add per year **170 000 EUR**

Reduced time in creating new technical documents like guides for preventive maintenance or TPM, **reducing effort by 60%**

Time reduction **8 hours**	**Number of new guides** **100-200**	→	Potencial value add per year **30 000 EUR**

* ***Based on Forrester study The Total Economic Impact™ Of PTC Vuforia*** (Cost Savings And Business Benefits Enabled By Industrial Augmented Reality)

VOLKSWAGEN
AKTIENGESELLSCHAFT

Augmented Reality Remote Support for Production Ramp-up Management and Maintenance
Project profile

1. Problem

Production Ramp-up
- Permanent need for a variety of long distance trips (China, America) before SOP
- High costs due to travel costs and intense binding of expert resources

Maintenance
- Limited availability of external machine manufacturers or maintenance experts from other plant locations
- High costs due to downtimes and long waiting times, especially if external experts needed

2. Project Scope

Production Ramp-up
- Use of AR smart glasses to remotely support ramp up from Germany and to avoid production problems at an early stage

Maintenance
- Use of AR smart glasses to remotely guide employees on site in order to maintain/repair machines and resolve technical problems in real-time

3. Expected Results

- Established technology that
  - Creates an augmented reality to provide the employee as user with needed information
  - Transfers data from expert (external/internal at other location) to user via smart glass
  - Supports user remotely in real-time
  - Causes time savings due to real-time support as well as cost savings due to omitted travels and downtimes

4. Benefits

- **Direct monetary savings:** reduction of costs caused by production downtimes, reduction of travel expenses
- **Time savings:** reduction of downtimes and waiting times, faster maintenance times
- **Higher availability of company resources:** increase of machine availability, ramp-up and maintenance experts
- **Reduced environmental impact:** fewer business trips
- **Higher human satisfaction:** faster available expert support, cognitive relief of employees

5. Stakeholder

- **Product Owner:** K-PPX/I
- **IT Delivery:** K-FIBP-2/1, K-FIMB/4
- **Project partner:** PMA, I/PX-P1, CMS-P1/4, KTN/WO
- **Involved brands and plants:**
  - **Brands:** Volkswagen, Audi, Group Components, Kraftwerk
  - **Plants:** Wolfsburg, Salzgitter + remote locations worldwide

6. Finance

- **Savings**
  - Production ramp-up: Short-term reduction of 10% travel costs for Audi China (€230k p.a.); Long-term potential for ramp-up management VW (€2m p.a.)
  - Maintenance: Tbd
- **Costs**
  - Costs for hardware devices (HoloLens2): €4k per piece
  - Costs for operation & software: Tbd

7. Timeline

- **Project start:** Q2 / 2021
- **Project end:** Q2 / 2023
- **Milestones:**
  - AR device approval Q4/2021
  - First remote support pilot Q4/2021
  - Re-usable solution for production ramp-up and maintenance Q2/2022
  - Scaling and roll-out implemented remote support solution Q2/2023

8. Base Data

- WA-Nr.:
- „IT-Projektkategorie“: TRANSFORM
- „IT Projekttyp“:
- „IT-Projektklasse“:
- Relevant platform: Microsoft Dynamics 365 or similar

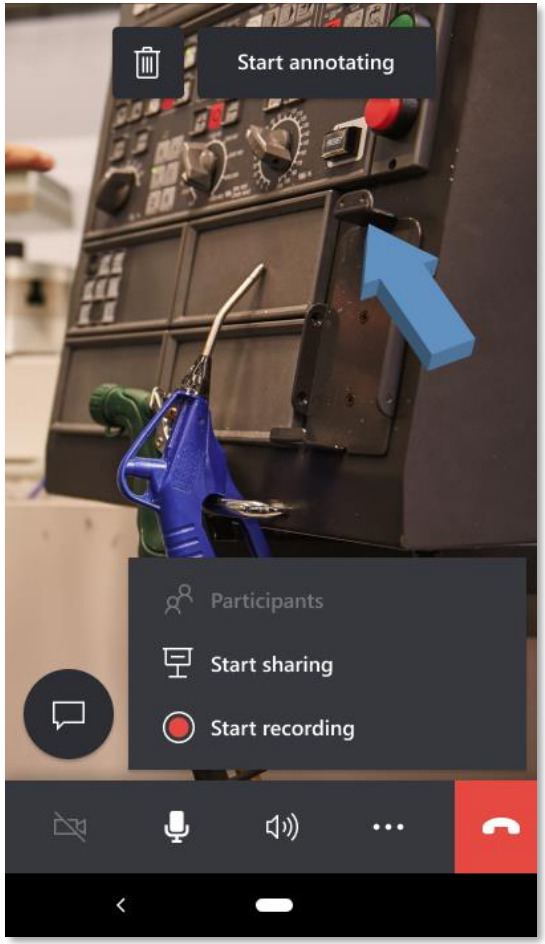
Testing of augmented reality glasses in PFK

positive

- Stability and mounting on the head
- During the technical intervention "free maintenance hands"
- Possibility to use remote technical support with current travel restrictions
- Good sound
- It is possible to perceive simultaneously both the image from the glasses and the surrounding environment, including sounds

negative

- Poor quality of the transmitted image with Remote Assist compared to the recording of cameras that can capture glasses *
- Sometimes slower response
- Weaker contrast in stronger lighting
- So far impossibility of personalization (need for calibration for each user)
- For some users, headache, blurred vision, dizziness with prolonged use



NEXT STEPS – connection to Wi-Fi ŠKODA:

- Assigning a standard Computer Name to glasses ✓
- Setting FW transmissions and registration in DNS ✗
- Uploading security certificates into glasses ✗
- Additional quality tests of the transmitted image during Remote Assist ✗

* The required transmission speed according to the manufacturer is at least 40 Mbit / s. During testing max. 5 Mbit / s.