

BELGIUM SENSORS MANUFACTURER SME









FRANCE
CUTTING TOOL SERVICE
SME

TEKNIKER

SUBCONTRACTORS

# **Doimak**

LEADER: SPAIN
GRINDING MACHINE
MANUFACTURER
SME

**SMART GRINDING 4.0** 

SYNERGY: 3 SME-s FOLLOWING THE SAME PATH (4.0 CONCEPT)



BELGIUM ICT SPECIALIST RESEARCH CENTER







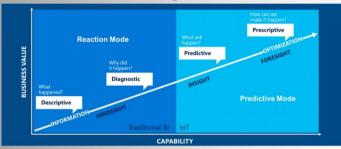






## MAIN GOAL OF THE PROJECT

To develop a multi-technological product that allows the machines to be integrated in the new digital manufacturing paradigms that proposes Industry 4.0



The new era of manufacturing will be marked by highly agile, networked enterprises that use **information and analytics** as skilfully as they employ talent and machinery to deliver products and services to diverse global markets' (McKinsey & Company, 2012)

**KEY 4.0 PARADIGM: From Reaction mode to Predictive mode** 

**KEY FACTORS:** Agile approach to innovation & data driven culture

## Development of a new business model focused to the automotive sector

CELL 4.0

Development of a smart manufacturing cell





**SERVICE 4.0** 

Development of a logistic based industrial service 4.0

#### Benefits for the customer:

Reducing non planned machinery stops, increasing product quality, improving reliability



GRINDING











## SECONDARY OBJECTIVES OF THE PROJECT

Specific automotive solution (Tooling)



M2M Technologies integration: Online measuring / Treacability / Intelligent machine

**Enviromental** inprovements: Tooling hobs Re-use



New business model: **SERVITIZATION** 4.0



**Cost** optimization



Prevention of personal (maintenance and operative) and environmental risks

Increase of the product/service durability and quality













# PROPOSED PROBLEMATIC / CHALLENGE

To provide a Service to automotive sector companies for the sharpening and re-profiling of the gear cutters (hobs)

**AUTOMATIZED INTEGRAL SERVICE** 

# CTMS: Servitization

To offer to the automotive company an automatized pick up and replacement service of the cutter hobs to keep them always fully re-sharpened

# DOIMAK: Integration + Development of the cell

- The cell will be in charge of making the pre/post process **measurements** of the hobs **online** and take the decision of reprofiling or re-sharpening
  - Arranges the complete part movement flow inside the cell (Collaborative robotics)
    - Integrates the marking and traceability equipments through QR code system

# MICROMEGA (Sensors) + CETIC (TIC): Data and communications flow

Arranges the complete sensors, data management and flow through the involved parties (cell manufacturer, service maker and tool end user) ensuring the security and communication protocols in the complete value chain

## **Doimak**

# CONSORTIUM > PARTNER 1 : DOIMAK (LEADER)

#### **DOIMAK'S FUNCTION:**

CELL 4.0 INSTALLER AND PROJECT MANAGEMENT LEADER





**CURRENT FUNCTION: GRINDING MACHINE MANUFACTURER** 

**Leading workpackages** 

**WP1: CELL 4.0** 

WP4: TRIAL/LAB 4.0

**WP5: COORDINATION AND MANAGEMENT** 

Task 1.1: Definition of the complete grinding cell

Task 1.2: In-Process measuring

Task 1.3: Robotics

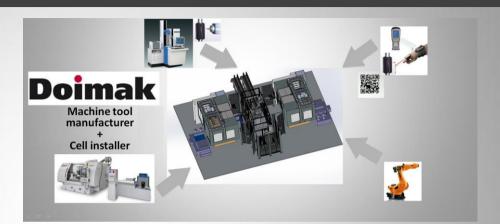
Task 1.4: Marking and traceability

Task 1.5: Maintenance, HMI & Operating

Task 1.6: Safety management & Security cell

Task 4.1/4.2: Trial platform / LAB 4.0

Task 4.3: Grinding 4.0 extrapolation to other products & services







**M2M TECNNOLOGIES** 

**Task 5: Project activities coordination** 



## CONSORTIUM > PARTNER 2 : CTMS

#### **CTMS'S FUNCTION:**

CREATE A NEW CUTTING TOOL MANAGEMENT SERVICE BUSINESS MODEL. SERVICE 4.0





**CURRENT FUNCTION: CUTTER HOB PROFILING & SHARPENING** 

Leading workpackages WP2: SERVICE 4.0

WP4: TRIAL/LAB 4.0

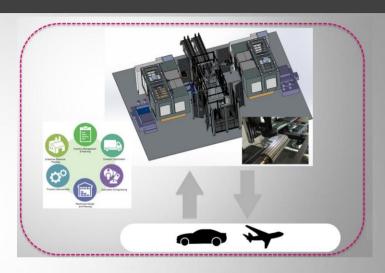
Task 2.1: Logistics based business model definition

**Task 2.2: Resource management** 

**Task 2.3: Production and maintenance services** 

**Task 2.4: Traceability services** 

Task 4: Trial platform / LAB 4.0



FUTURE OFFER: COMPLETE CUTTING TOOL FULL AUTOMATIZED GRINDING SERVICE





**PRODUCTION / SERVICE 4.0** 





### CONSORTIUM > PARTNER 3 & 4 : MICROMEGA & CETIC

#### **MICROMEGA & CETIC'S FUNCTION:**

INTEGRATE THE SENSOR AND ICT TECHNOLOGIES FOR DATA MANAGEMENT AND CONNECTIVITY TO RUN THE SERVICE PLATFORM AND MANUFACTURING CELL





**CURRENT FUNCTION: CUTTER HOB PROFILING & SHARPENING** 

**Leading workpackages** 

**WP3: COMMUNICATION / CONNECTIVITY 4.0** 

WP4: TRIAL/LAB 4.0

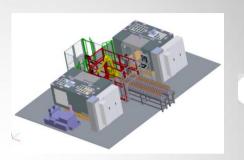
**Task 3.1: Communication Protocols** 

Task 3.2: Cibersecurity. Data protection & Safety

Task 3.3: Data Management.

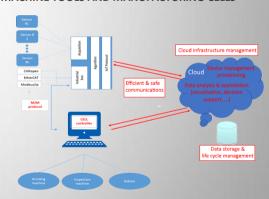
**Task 3.4: Connected App-s and Artificial Vision** 

Task 4: Trial platform / LAB 4.0





FUTURE OFFER: FULL DATA, COMMUNICATION AND REAL TIME MONITORING FOR MACHINE TOOLS AND MANUFACTURING CELLS



**COMMUNICATIONS/ CONNECTIVITY 4.0** 





KEY PARTNERS

Materials & logistics
 R&D investment and subcontracting
 Technical assistance: Guarantee and travels
 Promotion and marketing: fairs, catalogues, website, customers visits.

Fixed costs

Structure maintenance costs: Light, water, phone, net service.

. Coatings, oils, grinding wheels, diamonds, diamond wheels.

Software and license (ERP, Microsoft, ...)
 Salaries and social security expenditures

Plant machinery amortization
 Materials & logistics

R&D investment and subcontracting
 Technical assistance: Guarantee and travels
 Promotion and marketing: fairs, catalogues, website, customer visits.



CUSTOMER SEGMENTS

CUSTOMER RELATIONSHIP

## **COOPERATION PROJECT BUSINESS CANVAS**

#### " ORDER ACTIVITIES: IK4-TEKNIKER Technological Grinding Machine/cell design Offers high precision and After sales service: Grinding process software/contr · 24 h. Technical assistance Research center > Main partner. reliability CNC grinding Market niche (special threading High quality & precision assembly machines, solutions & services Technical support and assessment applications and others) . High relevance in R&D projects Mechatronic designs Automotive and auxiliary sector Technical and commercial offers Relationship/contact type: . foftware applications Satisfies clients that demand: Forused in clients that are CNC interface Coordinated assistance (through following customized Customized service & solutions FFM simulation 2<sup>nd</sup> ORDER ACTIVITIES: central management, CRM) applications. Grinding process know how Metrology Purchase management Dedicated personal assistance Mainly to SME-s that cannot Integral production support Manufacturing and outsourcing through 3 persons sustain the investments for the AFM-INVEMA (Machine tool Easy to use concept latest technological trends. CO-CREATION: Search of synergies assotiation) Collaboration activities: ough R&D project partnership and Main characteristics of DOIMAK Safety regulation ustomers that want to merge products and services: KEY RESOURCES CHANNELS to INDUSTRY 4.0 paradigms Designs modularity ntellectual: Process Know how · Cell integration R&D Collaborative partners AD, Electronics, CNC, Languages Main focus in European and US Diffusion channels Latest technologies (R&D) urrent partners (CTMS, market . that are actually (Communication & Info) Own <u>custom CNC</u> software MICROMEGA others) Human: R&D dedicated SME Own media: Website. leading the 4.0 strategy. . Fureka/Furostars programs catalogues, showroom, fairs, CDTI/CENIT programs Structure: Assembly plant Regional programs (GAITEK...) nachinery, software/hardware · Non exclusive agents: With or without local service Funding: R&D projects, banks COST STRUCTURE REVENUE STREAM . Structure maintenance costs: Light, water, phone, net service, . Grinding machines / cells / solution SALES: 70% . Software and Scense (CAD Siemens · Salaries and social security expenditures · After sales service (out of guarantee): Repair, maintenance, spare parts. Variable costs · R&D projects leading and participation: 6% Marhine tool elements nurchase and outsourring · Plant machinery amortization

VALUE PROPOSITIONS

KEY PARTNERS	KEY ACTIVITIES	VALUE PRO	POSITIONS	CUSTOMER RELATIONSHIP	CUSTOMER SEGMENTS	
OERLIKON-BALZERS > Main parnner. Calaboration activities: Calaboration activities: R R R R R R R R R R R R R R R R R R R	1"ORDER ACTIVITIES:  - Sharpening bols, cutters and broaches - Re-profiling hole - Re-profiling hole - Full service ("pay per piece") for gare cutting tools and broaches.  2x <sup>ed</sup> ORDER ACTIVITIES: - Purchase gear cutting tools and services - Seal gear cutting tools and services - Gear quality controls for customers Hobs design, and cutting parameters.	Offers high qual re-profiling and solutions & serv piece" service (i services and too Satisfies clients  • Customized ser  • Sharpening profile integral gear pi	coating tools, vices. "Pay per ncluding all vls). that demand: rvice & solutions	Consultant/Assistant/Partner:  - 24h Technical assistance  - Technical support and suscement on their process.  Relationship/contact type: - conditional sustainance treephone, - email. Whatelyo, Ships - bedicated personal sistance through 2 persons	Directed to:  • Automotive and auxiliary sector • Aeronautics • Wind power • Mechanical workshops  Customers that want to reduce their tools cost, and increase the quality of their final products (mainly gears).	
Spanish market developing	KEY RESOURCES			CHANNELS	-	
Technical support     Technical support     R&D Collaborative partners     Current partners (DOIMAK,     MICROMEGA, others)     Eurostars programs	Intellectual: Process Know how, gear knowledge, CAD, CNC, Languages Human: R&D dedicated SME Structure: Manufacturing plant, machinery, software/hardware Funding: Banks, R&D projects	Main character products and see • Quality control • Transport by or • Short delivery: • Latest technole • Own custom to software • Own custom correcommendati	rvices:   certified   urselves   times.   ogies (R&D)   ols design   utting parameters	Diffusion channels (Communication & Info)  Own media: Website, mailing, catalogues, showroom, visits and tests.  Non_exclusive agents: With or without local service		
	COST STRUCTURE			REVENUE STREAMS		

· Sharpening and re-coating tools: 65%

· Re-profiling hobs: 15%

"Payper piece" service: 20%

Volled Combe     Volled Comberage     Volled C	r RESOURCES  al: Electronic, software and automation reny skilled R&D team ilinary)	thanks to our t  Full service: From manufacturing  Customer need  Customization  Fast solution d  Partnership to	ces _ vibration vices omk customization echnology toolbox om R&D to	Strong partnership     Collaborative projects     Fast reaction  CHANNELS  Diffusion channels	Directed to:  Production machine manufacturers  Segments:  Wind energy  Machine tools  Compressors  Safety at work	
Main customers Intellectur  * votificiomasi  * AMMOS Roundress  * AMMOS Human: v  * AMMOS Human: v  * Ot Wind grand-decision  * Grand-decision  * Ammos Human: v  * Intellectur  * Intelle	al: Electronic, software and automation ery skilled R&D team olinary)	Customization     Fast solution de     Partnership to	evelopment			
world collable     world co	software and automation ery skilled R&D team slinary)	Customization     Fast solution de     Partnership to	evelopment	Diffusion channels		
Fixed costs:  Infraestructures+Production materials + Deve	& electronics), testing anufacturing of electronic			Direct marketing     International R&D programs (EEC)     Internet platform     Distribution network		
• Infraestructures + Production materials + Deve	COST STRUCTURE			REVENUE STREAMS		
Variable costs:  • Parts procurement for production process	elopment softwares		High pre     Product	and conditioning units for wind to ecision mechanism for telescopes; ts and services for the reduction of st work ((vibration dosimeter): 109	25% vibrations: 15%	



KEY ACTIVITIES	KEY RESOURCES	REVENUE STREAMS
Applied Research in ICT (non profit)     Helping local companies grow based on exploitation of results of research	Human: 42 Researchers (8 PHD) Intellectual: expertise in the following domains: Software engineering Complex algorithmic Low energy Embedded systems Wireless protocols and techniques for embedded systems Cloud computing and distributed systems management ICT tools for scalable data analysis (BigData)	Public funding of Råd projects (Walloon and EU) By design, no more than 50% of CETIC funding can come from Walloon funded RåD projects Consultancy and prototyping for companies

#### **GRINDING 4.0 PROJECT** as a whole WILL RESULT in:

- VALUE PROPOSITION: Offering a complete 4.0 fully automated and connected grinding cell & service.
- CUSTOMER RELATIONSHIP: The key factor will be based in the endcustomer experience as a I/O data management.
- CUSTOMER SEGMENTS: Mostly directed to EU and US automotive markets, that want to engage to Industry 4.0 paradigms.

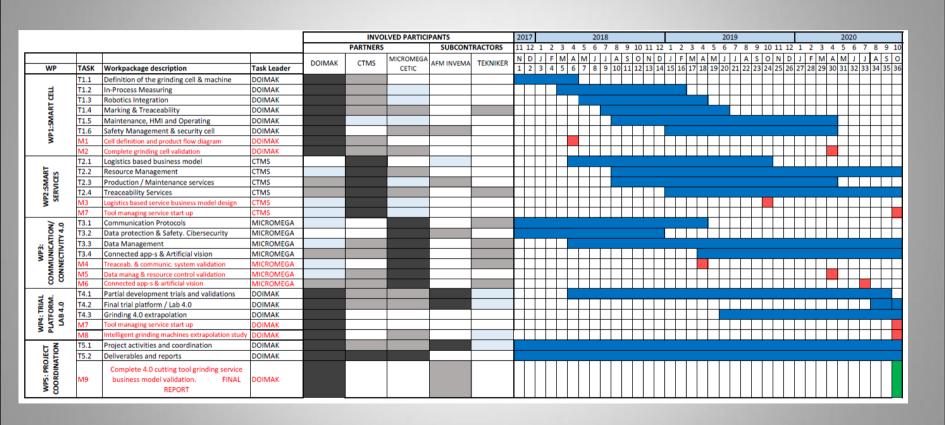
#### **Doimak**



#### WORK PACKAGE DISTRIBUTION / INVOLVED PARTICIPANTS / GANTT PLANNING



















#### PROJECT RESULTS EXPLOTATION

#### TIME TO MARKET: Within 12 to 20 Months

#### **FUTURE KEY PARTNERSHIPS:**



- DOIMAK + MICROMEGA + CETIC: Future smart manufacturing machines and cells will be created for <u>different nature</u> <u>grinding processes</u> and customers.
- •DOIMAK + MICROMEGA : Future developments will be envisioned in vibration sensors and other type of sensors.

• MICROMEGA & CETIC: The automation and connectivity services experience will be extended to other machine tools and other industries applications

#### **DIFFUSION:**

- Platform showrooms to potential customers
- Media diffusion (Website, demostrative videos...)
- Fairs (EMO, GRINDTECH...)
- Clusters & machine tool congress

