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**Industry 4.0 and IQRF®**  
November 30, 2016, Liberec



**MICRORISC s.r.o.**



# MICRORISC

**CZECH**

**TECHNOLOGICAL**

**WITH CLEAR VISIONS**

**ORIENTED TO MANUFACTURES**

**INNOVATIVE**

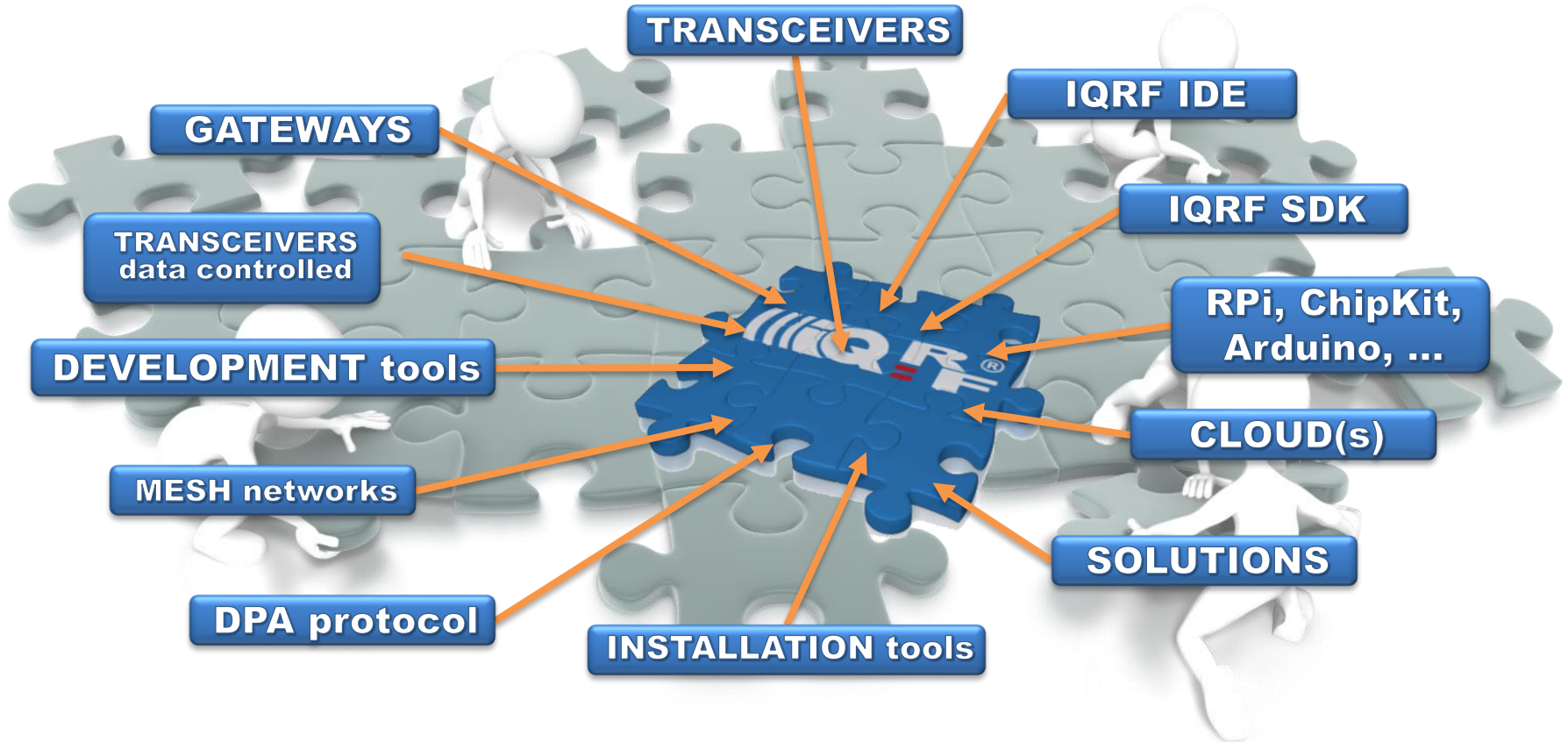
**GLOBAL**

**... ENABLING FUTURE INNOVATION®**

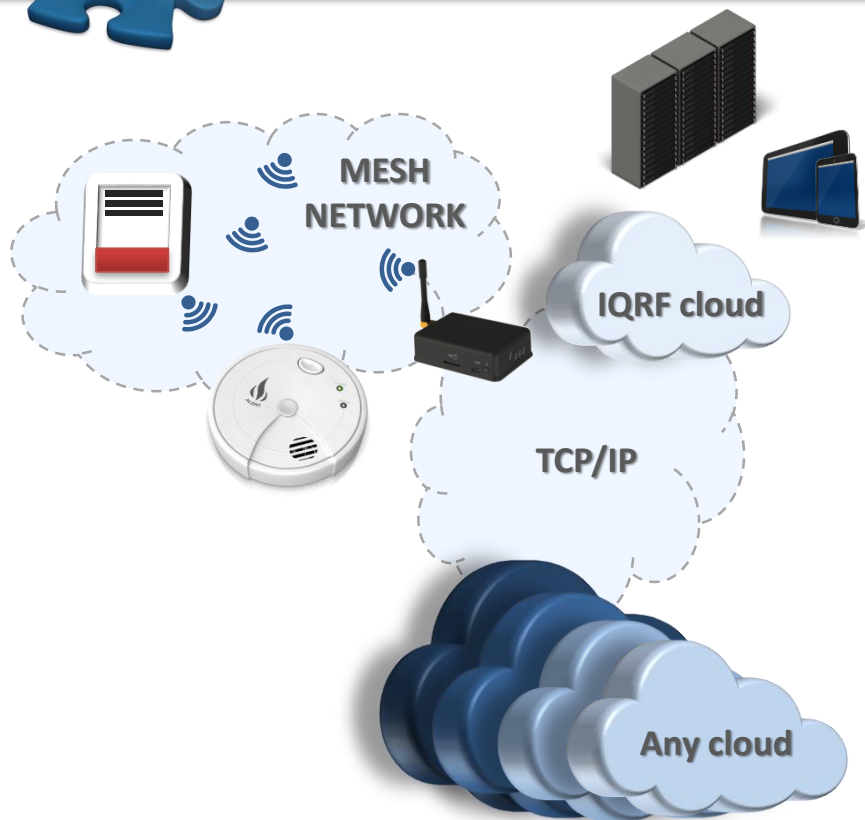




2004 - 2016



# Where we are now – components view



**TR module** enabled devices to talk. Easily. Together and reliably.

**TR module with OS** **FREE** **IQMESH** **FREE**

**DEVELOPMENT tools** enabled easier application development.

... sets, kits, shields

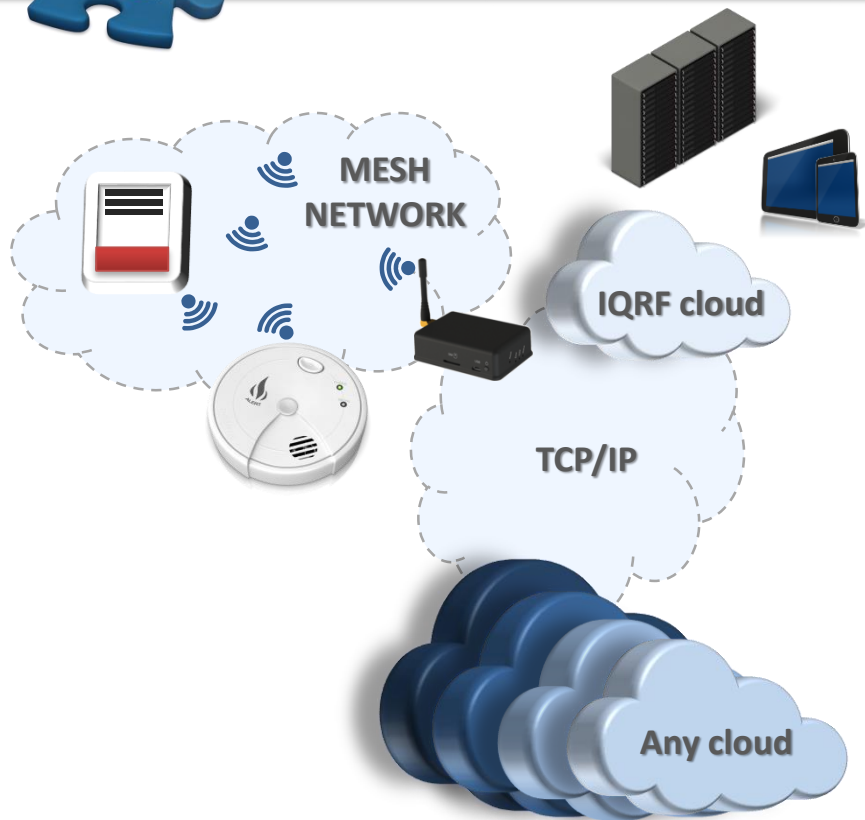
**IQRF IDE** enabled programming, debugging, simulations, later on also management of TRs and gateways, networks visualisations, cloning, backing up, restoring, OTA

**DCTR module** running HW profile based on DPA protocol enabled direct access to device's peripherals. It **further accelerated development** and provided **interoperability**.

**IQRF SDK** with SW libraries enabled faster development of apps and together with shields provided excellent toolset for devices and platforms – RPi, Chipkit, Arduino, ...

**IQRF GWs** provided immediate access to IQRF cloud. New concept of open gateways provides easy access to any cloud.

# Where we are now – features



**IQRF enabled things talk** together, understand to each other and cooperate.

**IQRF partners** deploy those things talking by the same language and make great products, making our lives better.

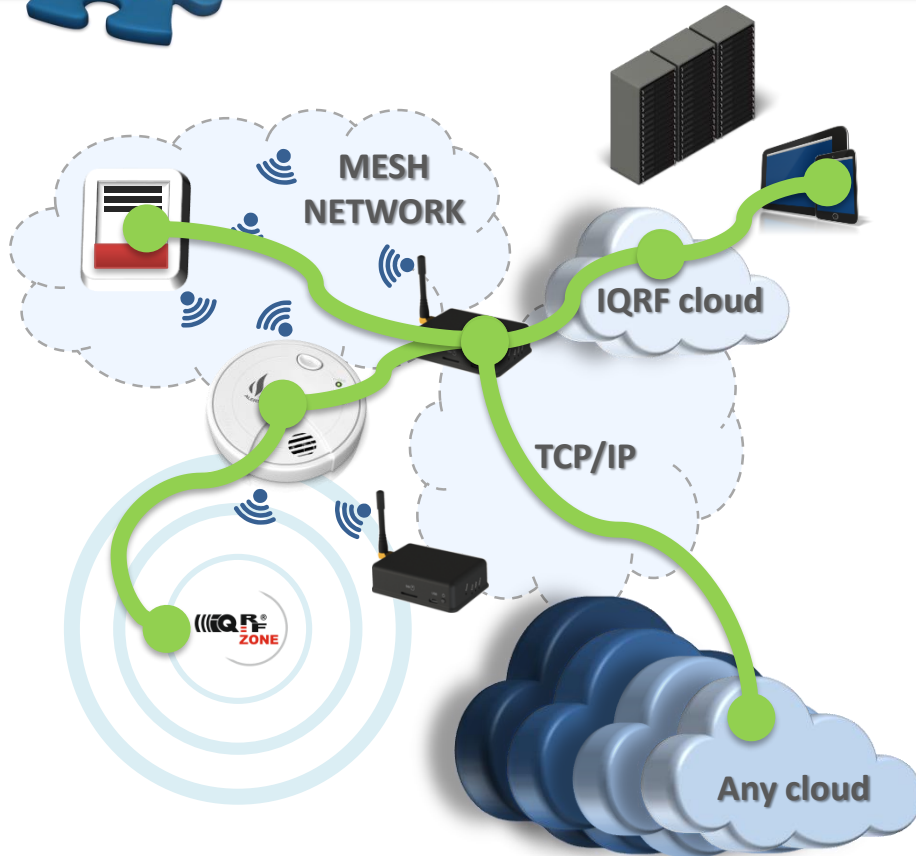
**12 years on the market** gave us great opportunity to prove and continuously improve the concept.

**Extra low consumption** enables realization of **real** battery operated applications working for years. **TX: 500 MB/AA cell**

**Reliability and robustness** together with **~20 kb/s bit rate** enables realization of RT control applications.

**Security based on AES encryption** together with dynamic keys exchange and packets consistency protection qualify IQRF for usage in data sensitive and control applications.

# Where are we going to?



**IQRF.zones** combine robustness and reliability of IQMESH network with fast responses in star based networks. 1+ km2

**IQRF DPA** more interoperability easier, more functionalities, support for IQRF.zones, automatic network

**IQRF IDE** to support multiplatformed development even of the lowest layers

**IQRF SDK** extend support, provide complete services to manage IQRF mesh networks and IQRF.zones

... all that to enable **OPEN GATEWAYS** and achieve **freedom** to chose services and cloud provider.

**INDUSTRY 4.0** in IQRF production from July 2016

**DCTR chip** to get IQRF modules from different vendors

**IQRF Alliance** will be IQRF Alliance, independent on MICRORISC

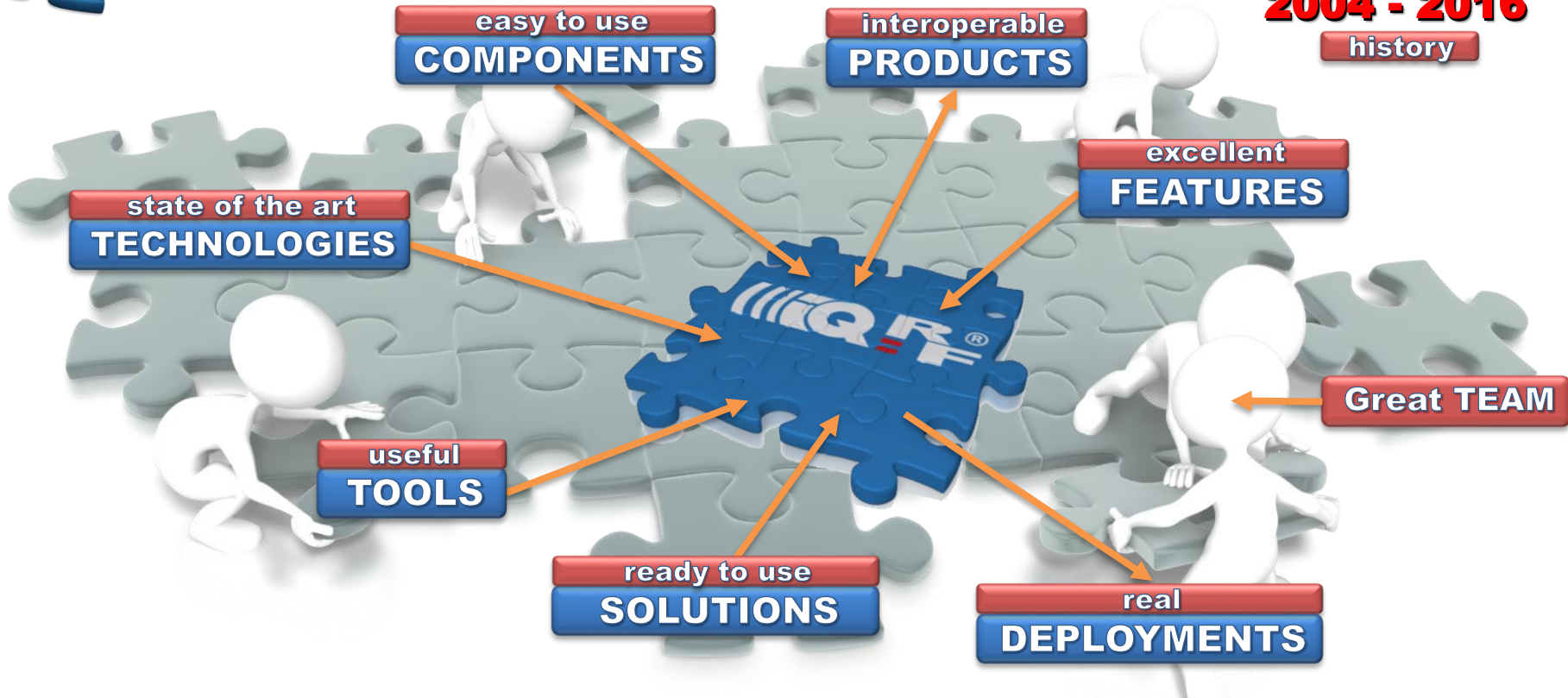


# IQRF® ... technology for wireless communication



**2004 - 2016**

history



easy to use

**COMPONENTS**

interoperable

**PRODUCTS**

excellent

**FEATURES**

**Great TEAM**

real

**DEPLOYMENTS**

ready to use

**SOLUTIONS**

useful

**TOOLS**

state of the art

**TECHNOLOGIES**

**Huge ecosystem for IoT based on mature wireless mesh technology**



**IQRF® umožňuje věcem komunikovat.  
Tedy i strojům či výrobním nástrojům.**



**... ENABLING FUTURE INNOVATION®**



**DEPRAG**



**DEPRAG**



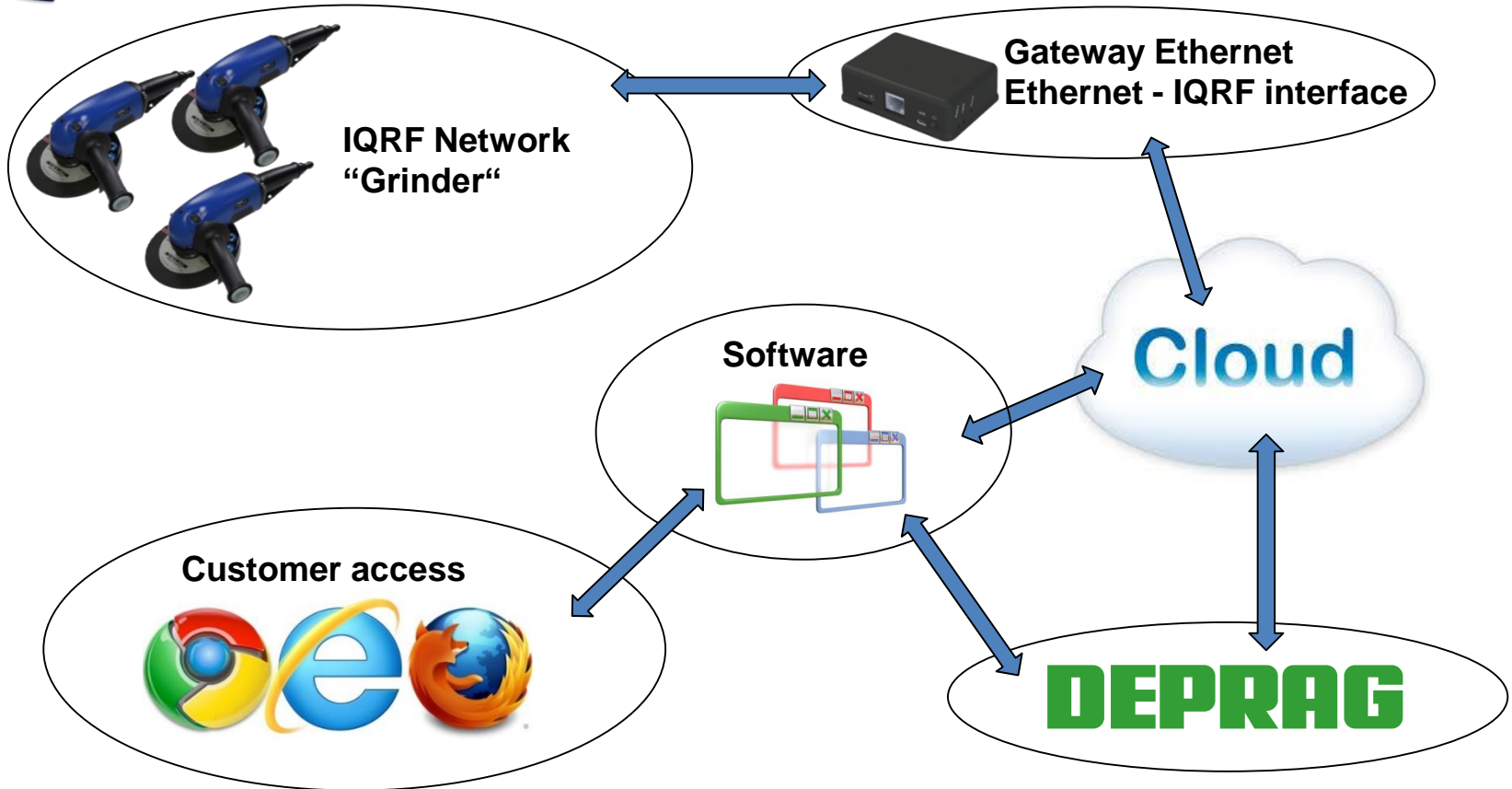
## Zakázkový komunikační modul:

- Generátor napětí
- Lithiová baterie
- Vnitřní paměť
- Hodiny reálného času
- Řídící MCU
- Senzorika pro monitorování
- IQRF OS + aplikace
- Bezdrátová komunikace v ISM pásmu (868 MHz / 916 MHz / 433 MHz )





**DEPRAG INDUSTRIAL INTELLIGENT TOOLS**





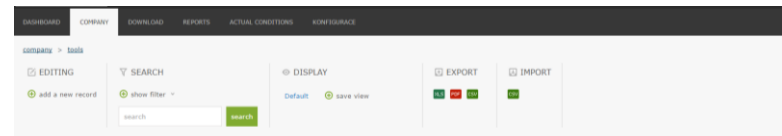
## Informace o:

- Pracovních procesech
- Rychlosti broušení
- Efektivitě broušení
- Pracovním vytížením
- Pracovních zvycích
- Aktuální situaci
- ...





- První spuštění
- Informace o údržbě
- Historie použití, pracovníci
- Pracovní vytížení
- Celkové náklady na údržbu
- Spotřeba vzduchu



< předchozí GAQ818-230BX(E5) documents for tools | další >

WORKED		WORKERS - HISTORY		SERVICE COSTS - HISTORY		BASIC PARAMETERS		OTHER PARAMETERS	
parameter	value	worker	date	type of service	price (Σ 1 191 Kč)	parameter	value	parameter	value
hours worked, total	206.23 hour	Josef	31.12.2016	Mazivo	525 Kč	name	GAQ818-230BX(E5)	classification	
hours worked, load	206.23 hour	<a href="#">Show more</a>		Kontrola těsnosti převodovky	666 Kč	type	Bruska úhlová GAQ818-230BX	date of introduction into production	1.1.2016
total air consumption	23758.02 m <sup>3</sup>			<a href="#">Show more</a>		serial number	16/70122250	last service date	6.6.2016
						weight	4.40 kg	last registration - date	9.6.2016
						speed	8000.00 rpm	end of warranty	0.0.0000
						diameter of grinding wheel	180.00 mm	service - total costs	1191 Kč
						air consumption	2.50 m <sup>3</sup> /min		
						power	2300.00 W		

#### WORKED

parameter	value
hours worked, total	206.23 hour
hours worked, load	206.23 hour
total air consumption	23758.02 m <sup>3</sup>

#### WORKERS - HISTORY

worker	date
Josef	31.12.2016
<a href="#">Show more</a>	

#### SERVICE COSTS - HISTORY

type of service	price (Σ 1 191 Kč)
Mazivo	525 Kč
Kontrola těsnosti převodovky	666 Kč
<a href="#">Show more</a>	

#### BASIC PARAMETERS

parameter	value
Name	GAQ818-230BX(E5)
type	Bruska úhlová GAQ818-230BX
serial number	16/70122250
weight	4.40 kg
speed	8000.00 rpm
diameter of grinding wheel	180.00 mm
air consumption	2.50 m <sup>3</sup> /min
power	2300.00 W

#### OTHER PARAMETERS

parameter	value
classification	
date of introduction into production	1.1.2016
last service date	6.6.2016
last registration - date	9.6.2016
end of warranty	0.0.0000
service - total costs	1191 Kč






## FAST FILTERS

[all tools](#)[online](#)[offline](#)[service](#)[failure](#)interval  Days

## SEARCH

[+ show filter](#)

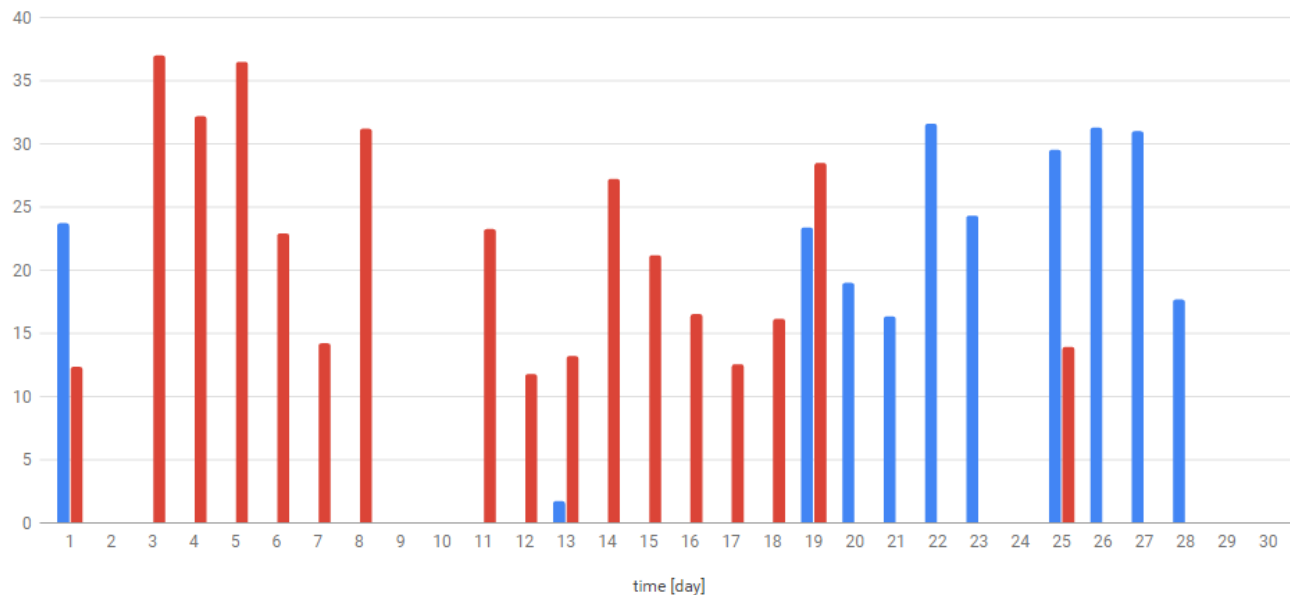
- **Stav**
- **Neustálá kontrola rychlosti**
- **Nepřetržitý monitoring stavu**
- **Doporučené servisování dle aktuálního stavu**
- **Varování v případě problémů**

	tools	name of worker	condition	company	hours	loaded	service
1	<a href="#">GAQ818-230BX(E9)</a>	František Broušivý	OK		50.49	30.5.2016 7:20:32	19.5.2016 9:10:19
2	<a href="#">GAQ818-230BX(E5)</a>	Josef Novák	OK		206.23	9.6.2016 3:29:36	6.6.2016 8:27:01
3	<a href="#">GAQ818-230BX(87)</a>		OK		612	30.3.2016 0:00:00	 2.6.2016 13:30:13



## Srovnání efektivity

effectivity  
[%]



subject

- effectivity
- optimal speed
- air consumption - total
- air consumption - average
- work load
- worked time
- Temperature history
- Battery status

group by

- tools
- worker

time span

- day
- week
- month
- year

april 2016

choice of tool

- GAQ818-230BX(E9)
- GAQ818-230BX(E5)
- GAQ818-230BX(87)

cancel choose

GAQ818-230BX(E9)

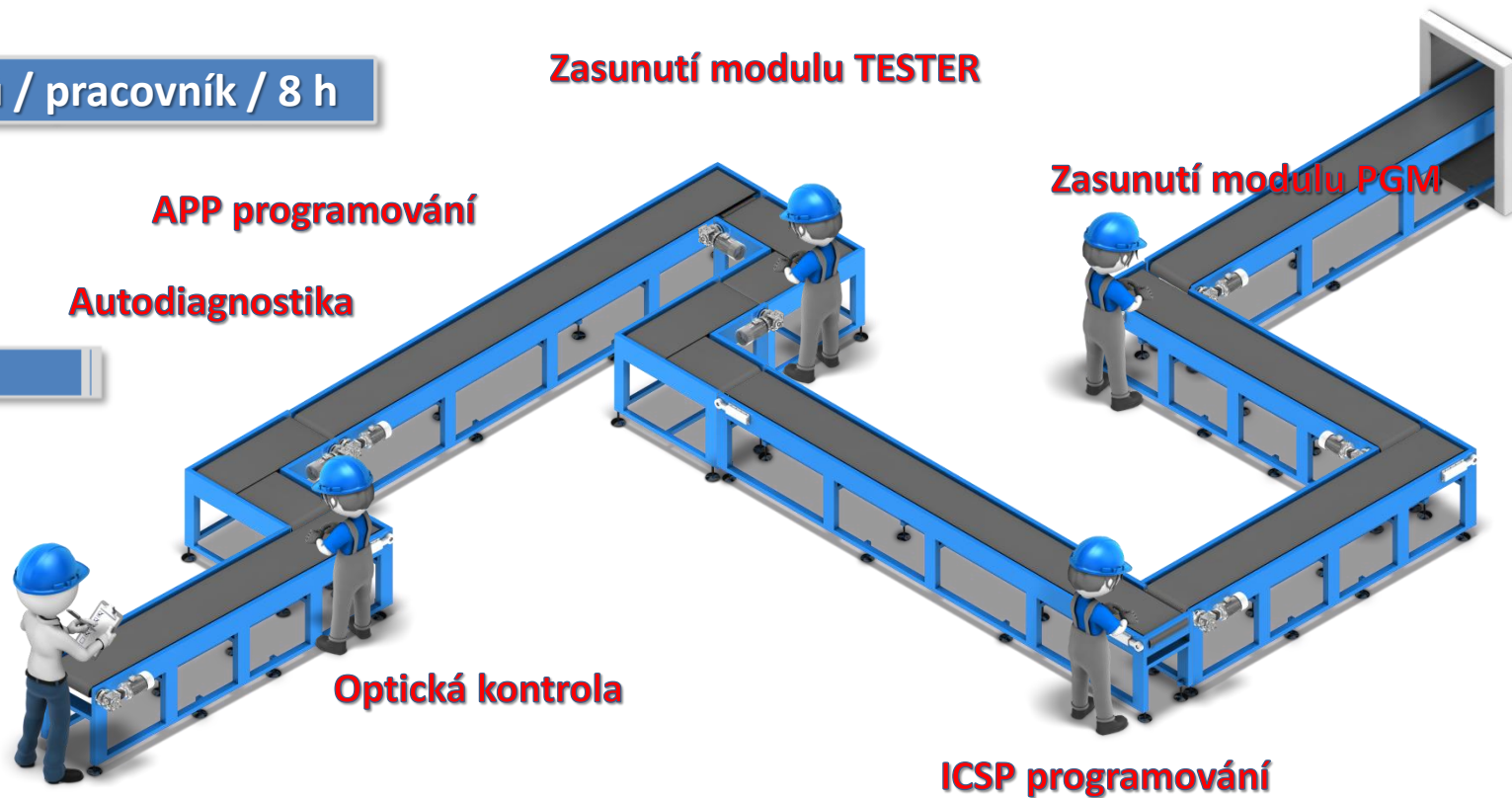
GAQ818-230BX(E5)

# I 4.0 ve výrobě IQRF modulů





400 modulů / pracovník / 8 h



APP programování

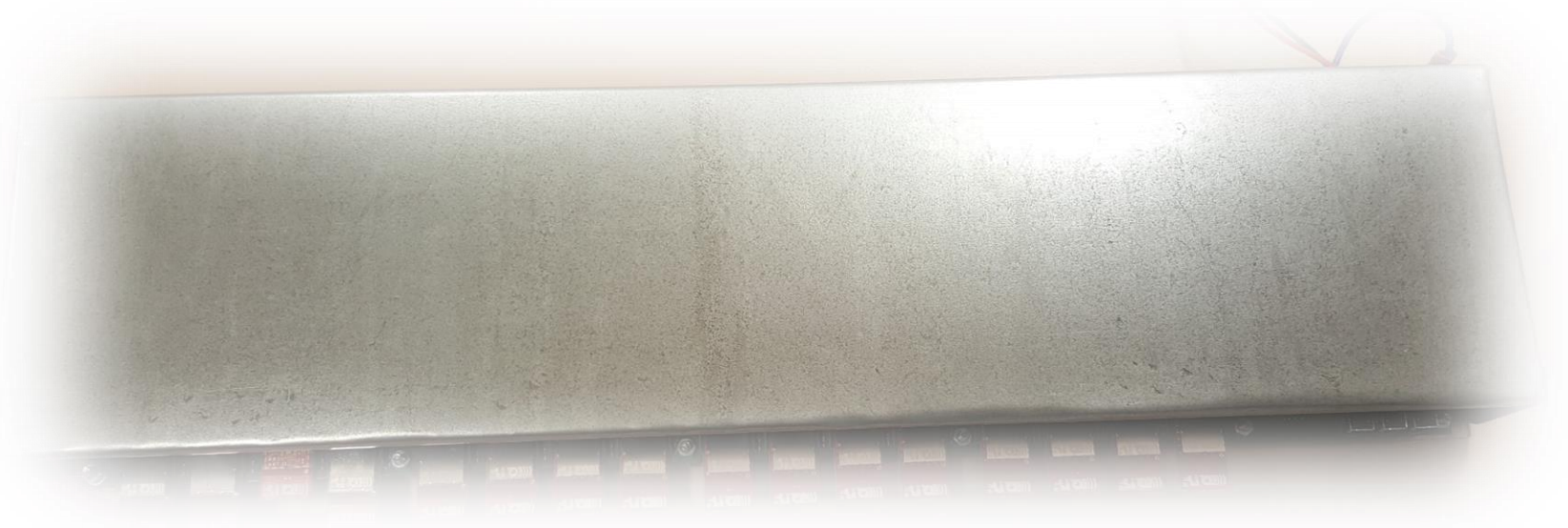
Autodiagnostika

Optická kontrola

Zasunutí modulu TESTER

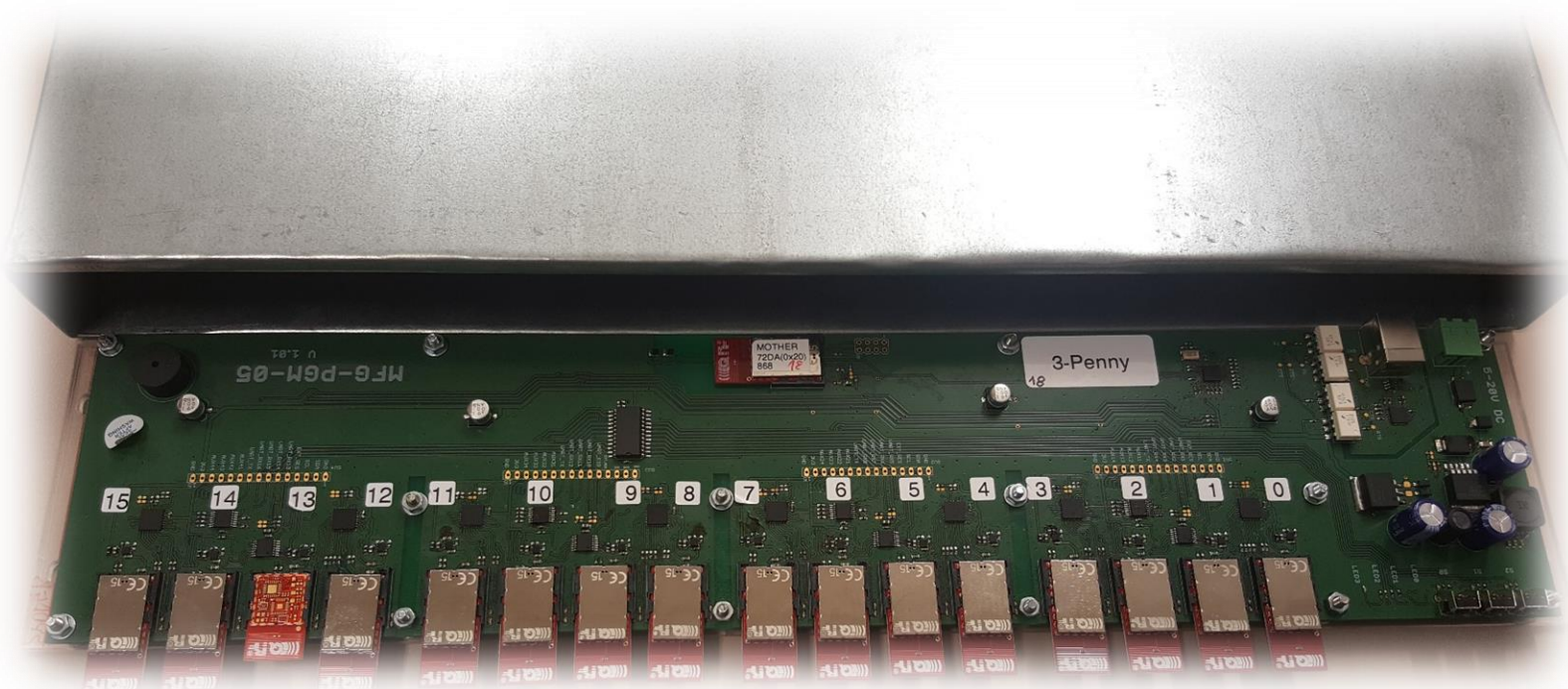
Zasunutí modulu PGM

ICSP programování



**A tak jsme 9 měsíců v našem R&D vyvíjeli tuto věc ...**

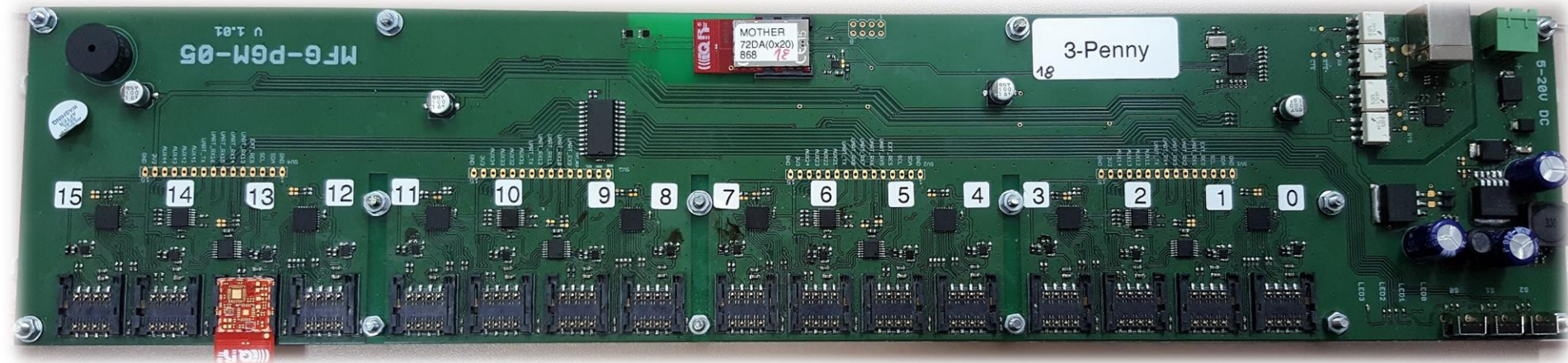






# I 4.0 ve výrobě IQRF modulů

**Programování OS, programování APP, konfigurace, autodiagnostika, diagnostika, logování do IS**



**4000 modulů / pracovník / 8 h**

**Detailní testy**

**Detailní logy**

**Produktivita +900%**



A 3D rendering of several white, stylized human figures working together to assemble a large, light gray puzzle. The puzzle is composed of many interlocking pieces, some of which are already in place, while others are being held or moved by the figures. The scene is set against a plain white background.

## Industry 4.0 ... lehký závěr





**PLNÁ  
AUTOMATIZACE?**

**INVESTICE**

**EKONOMIKA**

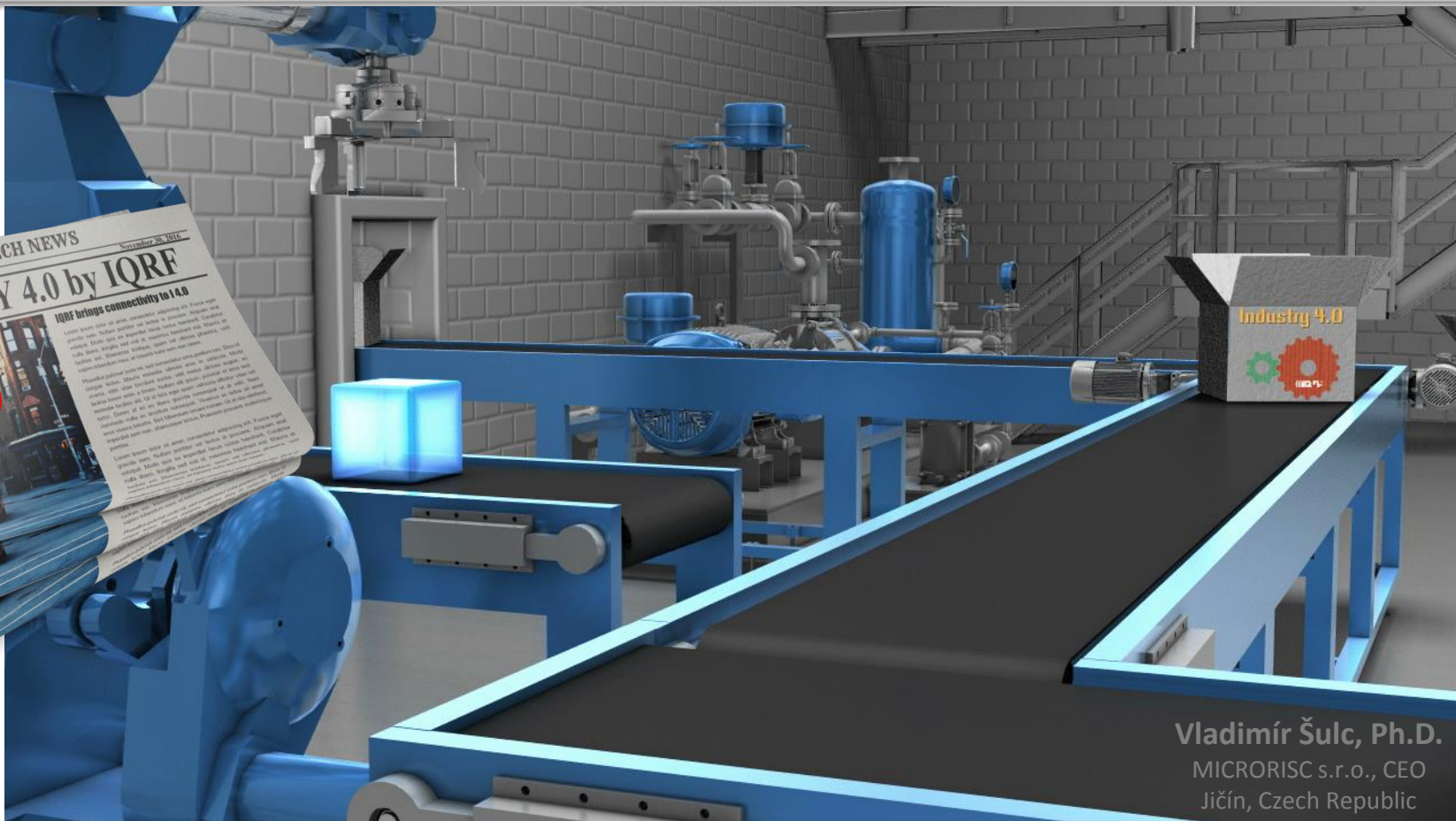
**ÚČELNOST**

**PROCESY**



A 3D illustration of several white, stylized human figures working together to assemble a large puzzle. The puzzle pieces are light gray and arranged in a large, irregular shape. The figures are positioned around the puzzle, some leaning over to place pieces, others standing nearby. The background is a plain, light gray surface.

**A na samý závěr ...**



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