

## **COMPARISON OF FOUNDRY INDUSTRY IN SLOVAKIA AND CZECH REPUBLIC**

Roland ŠUBA<sup>1</sup>, Ingrida BAJČIČÁKOVÁ<sup>1</sup>, Martin BAJČIČÁK<sup>1</sup>,  
Štefan PODHORSKÝ<sup>1</sup>, Antonín KRÍŽ<sup>2</sup>

<sup>1</sup>SLOVAK UNIVERSITY OF TECHNOLOGY IN BRATISLAVA  
FACULTY OF MATERIAL SCIENCES AND TECHNOLOGY IN TRNAVA  
INSTITUTE OF PRODUCTION TECHNOLOGIES  
ULICA JÁNA BOTTU 2781/25, 917 24 TRNAVA, SLOVAK REPUBLIC

<sup>2</sup>UNIVERSITY OF WEST BOHEMIA  
FACULTY OF MECHANICAL ENGINEERING  
DEPARTMENT OF MATERIALS SCIENCE AND TECHNOLOGY  
UNIVERZITNÍ 22, 301 00 PLZEŇ, CZECH REPUBLIC  
e-mail: roland.suba@stuba.sk, Ingrid.bajcicakova@stuba.sk, martin.bajcicak@stuba.sk,  
stefan.podhorsky@stuba.sk, kriz@kmm.zcu.cz

*Received: 28 August 2020, accepted: 04 November 2020, published: 27 November 2020*

### **Abstract**

*Foundry industry is an important supplier of complex shape parts for other industrial branches. It depends on the development of customer demand in other industries. The current paper compares the structure and sales of foundry industry in Slovakia and Czech Republic.*

### **Key words**

*Foundry, casting, ferrous metals, non-ferrous metals*

### **INTRODUCTION**

Metal castings are used in a wide range of applications, such as parts in cars, trucks, planes, trains, mining and construction equipment, oil wells, pipes, toys, space shuttles, wind turbines, and nuclear plants. Increased need for infrastructure and power generation facilities as well as growth in the automotive industry are driving the foundry products market.

Based on a product system, the foundry products market can be segmented into grey iron, ductile iron, non-ferrous, steel, and malleable iron, and others. In terms of industry type, the foundry products market can be divided into micro, small, and medium-sized industry. Based on the end-use industrial applications, the foundry products market can be split into automotive, sanitary, pipes and fittings, power industry, electrical equipment, machine tools, earth moving industry, and others. The automotive segment accounts for the major share of the market owing to the wide range of applications in automobiles. It is followed by sanitary and pipes and fittings segments [1].

According to the data [2], the European foundry industry produces approximately 20% of the worldwide castings tonnage.

The foundry industries in various countries have various production capacities and employ various number of workers. The former Czechoslovakia had significant production capacities of foundry industry in comparison with other Central and Eastern European countries. After 1993, the independent Slovakia and Czech Republic were created. This paper tries to compare the structure and sales of foundry industry in Slovakia and Czech Republic to reveal their similarities and differences.

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According to [3], the foundry industry in Slovakia in 2015 produced 95,204 tons of castings (46,644 tons of ferrous metals castings in 16 foundries and 48,560 tons of non-ferrous metals castings in 34 foundries).

According to [4], the foundry industry in Czech Republic in 2019 produced 384,500 tons of castings (268,500 tons of ferrous metals castings in 71 foundries and 116,000 tons of non-ferrous metals castings in 37 foundries). The total tonnage of castings is almost by 11 % less than in the previous year. According to [5], the foundry industry in Czech Republic in 2015 produced 405,000 tons of castings in 131 foundries.

The foundry industry in Slovakia is represented by approximately 38 foundries. The foundry industry in Czech Republic is represented by approximately 66 foundries. Some small foundries were not included.

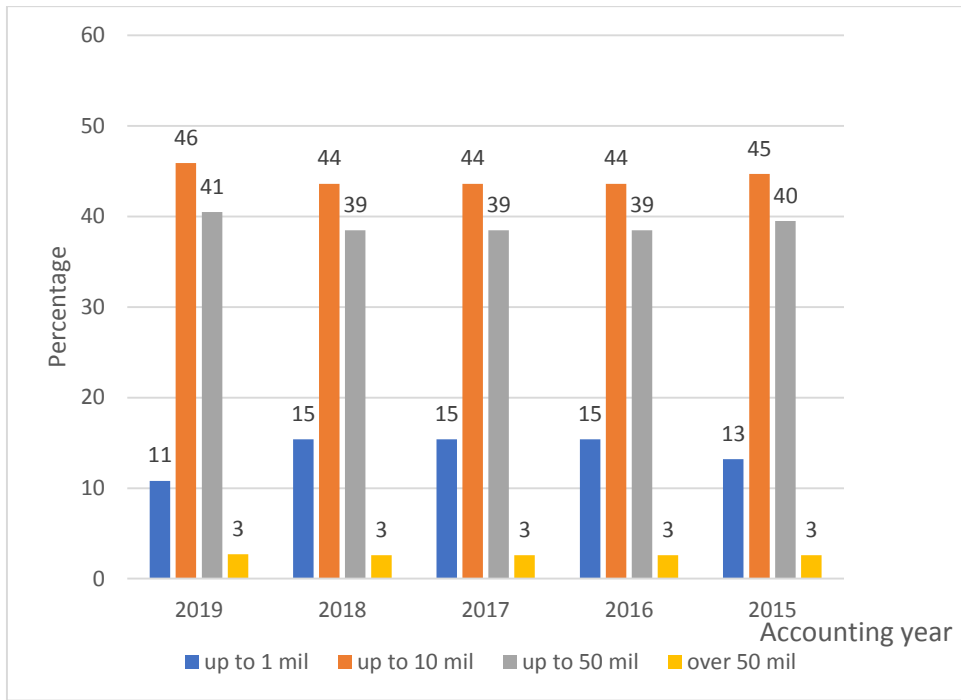
The information about the moulds and casting techniques used in various foundries and about the metals cast in various foundries were compiled from their websites. The information about their revenues were compiled from websites [6, 7].

Figure 1 shows percentage distribution of revenues of foundries in Slovakia. The data are for 38 foundries. In 2015, one foundry was not included (established in 2016) with usual yearly revenue up to 1 million Eur. For 2019, the revenues of two foundries are still unavailable; their usual yearly revenue was up to 1 million Eur.

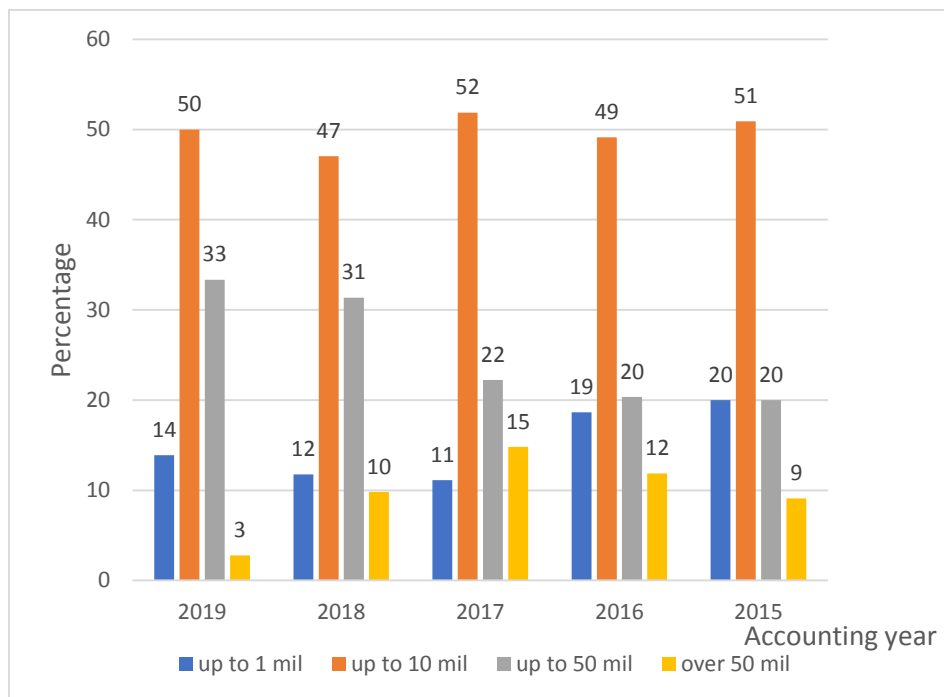
Figure 2 shows percentage distribution of revenues of foundries in Czech Republic. The data are for 66 foundries, but many of them did not provide their revenues in registry in certain years. The real number of foundries in the graphs are usually from 51 to 59, with exception of 2019 where the data were available only for 36. The graph illustrates the increasing percentage of foundries with revenues from 10 up to 50 million Eur.

Figure 3 shows comparison of the total revenues of foundries in Slovakia and Czech Republic, and Fig. 4 shows comparison of average revenues of foundries in Slovakia and Czech Republic. The year 2019 was exceptional for foundries in Czech Republic because of lacking revenues from many foundries. The revenues of foundries in Slovakia hugely increased owing to an aluminium castings foundry with share of 29 % from the total revenues in 2019.

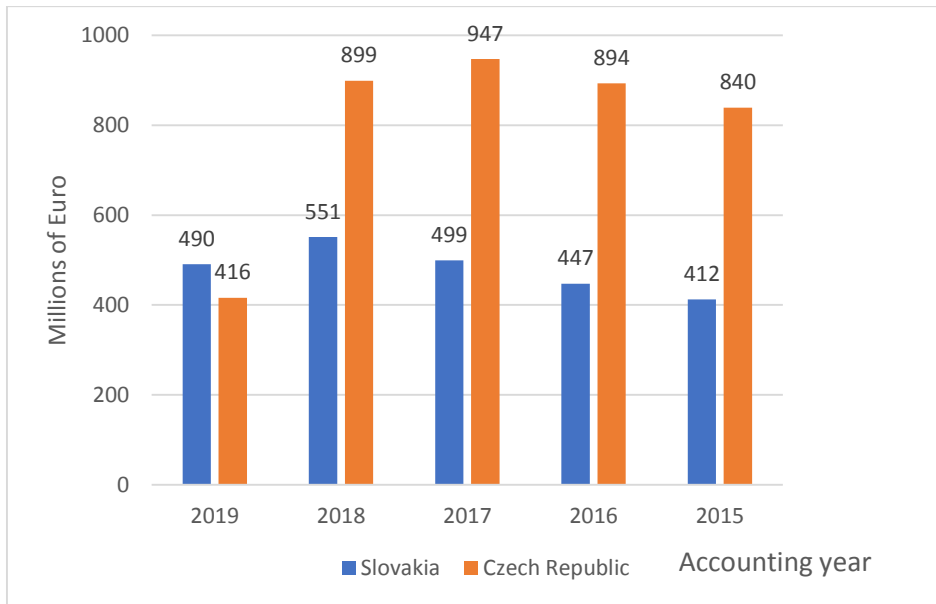
Figure 5 shows percentage distribution of the casting techniques used in 67 foundries in Czech Republic and in 38 foundries in Slovakia. The total summary is more than 100 percent in both cases because many foundries use more than one casting technique. The low pressure die casting (LPDC) and high pressure die casting (HPDC) are mainly used to cast aluminium alloys. The squeeze casting is used by one foundry in Slovakia for aluminium castings. The rheocasting is used by one foundry in Czech Republic for aluminium castings. Centrifugal casting is used to cast copper alloys into dies (2 foundries in Slovakia and 5 foundries in Czech Republic) and zinc alloys into silicone moulds (1 foundry in Slovakia and 3 foundries in Czech Republic).



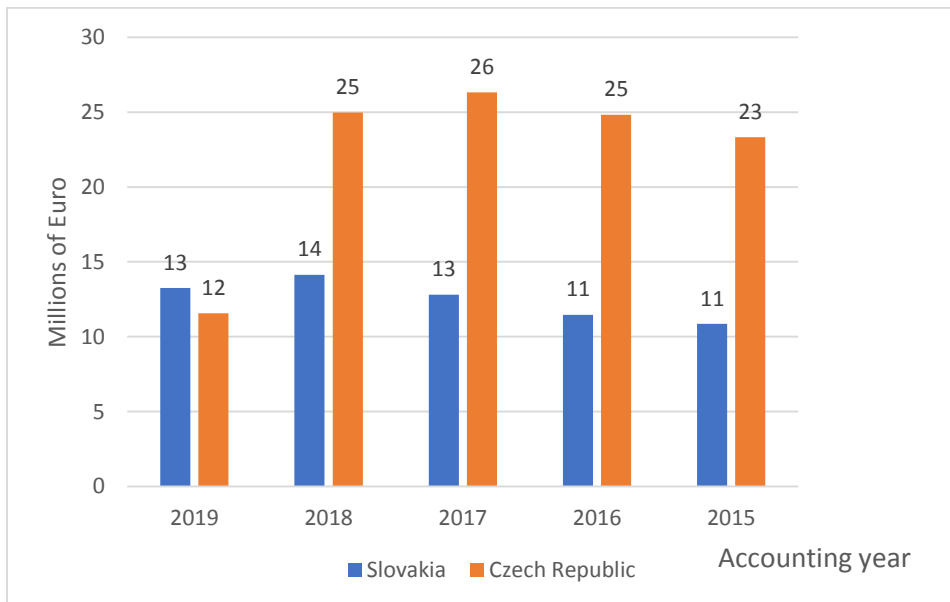
**Figure 1** Percentage distribution of revenues of foundries in Slovakia



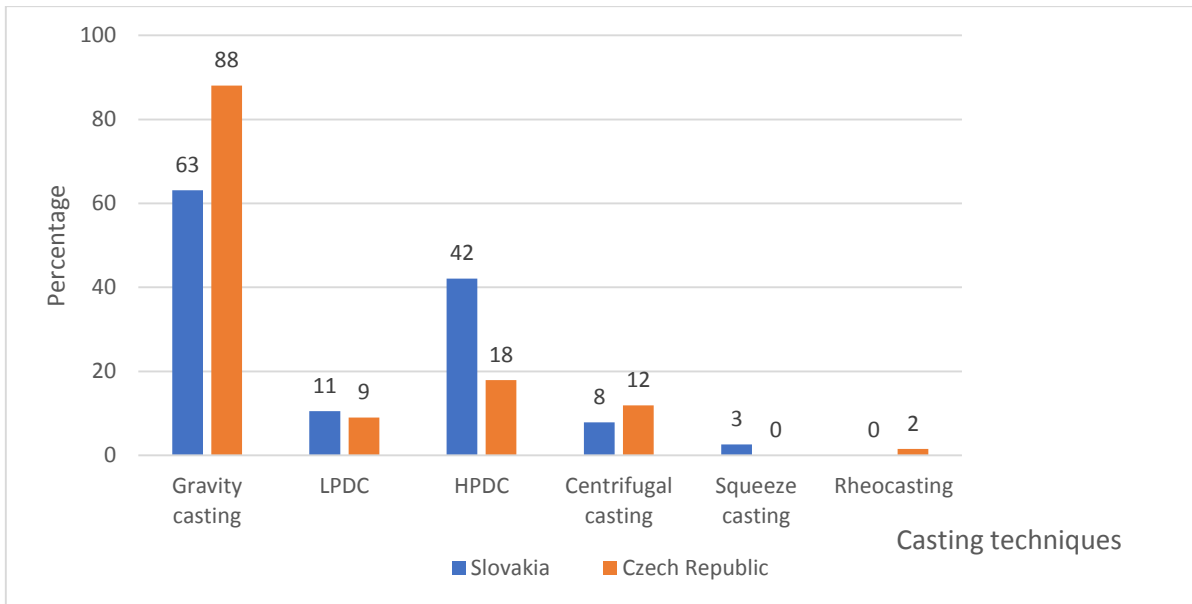
**Figure 2** Percentage distribution of revenues of foundries in Czech Republic



**Figure 3** Comparison of total revenues of foundries in Slovakia and Czech Republic

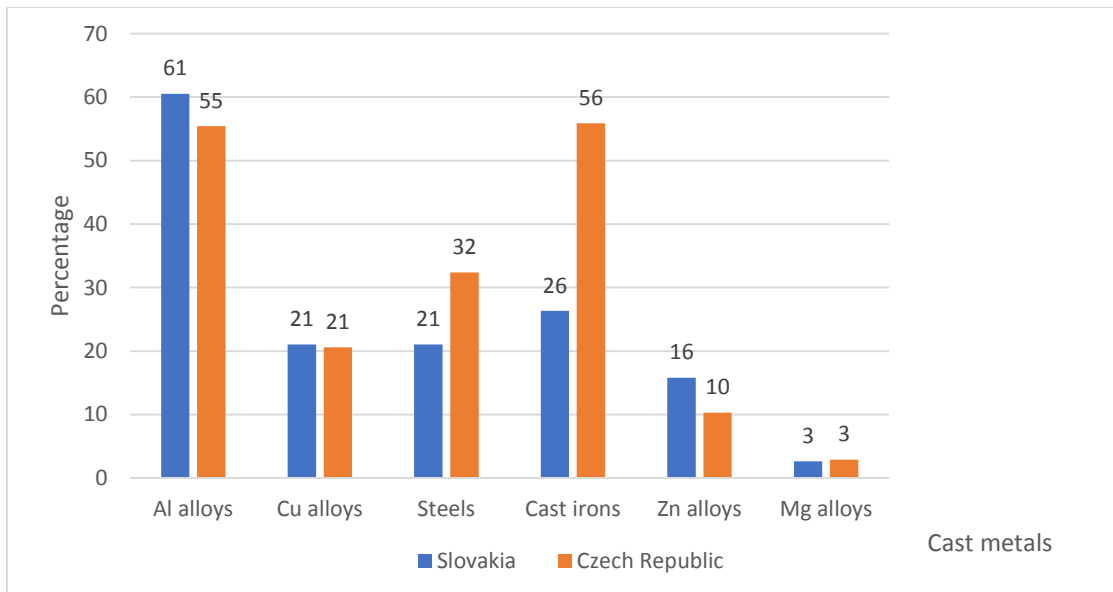


**Figure 4** Comparison of average revenues of foundries in Slovakia and Czech Republic



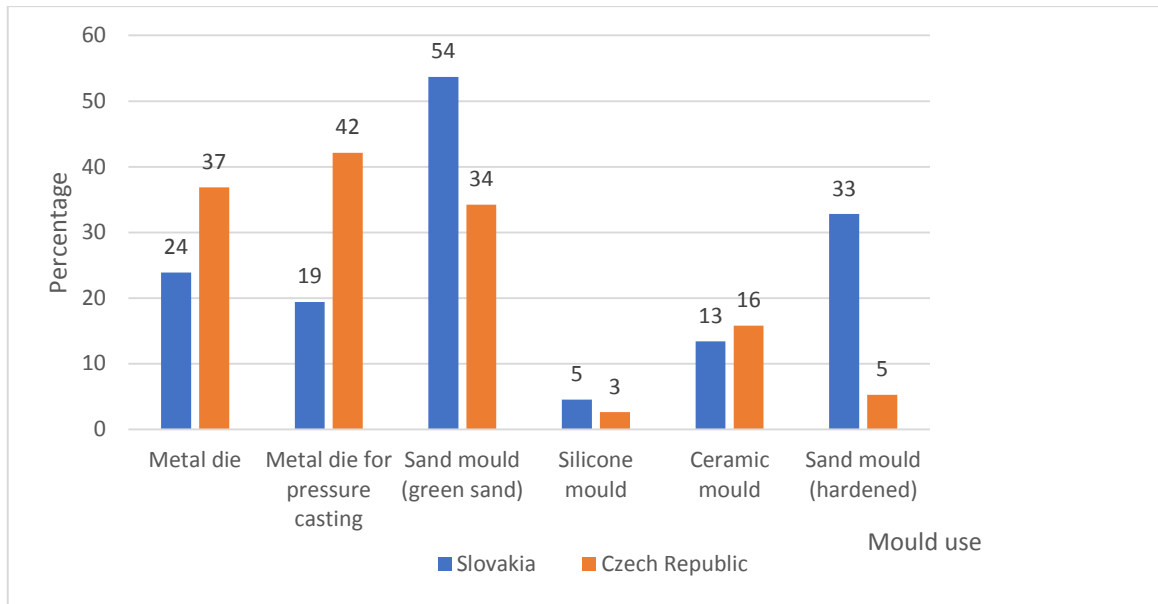
**Figure 5** Percentage distribution of casting techniques used in foundries in Slovakia and Czech Republic

Figure 6 shows percentage distribution of foundries in Czech Republic and in Slovakia casting various metals and alloys. The total summary is more than 100 percent in both cases because many foundries use more than one type of alloy.



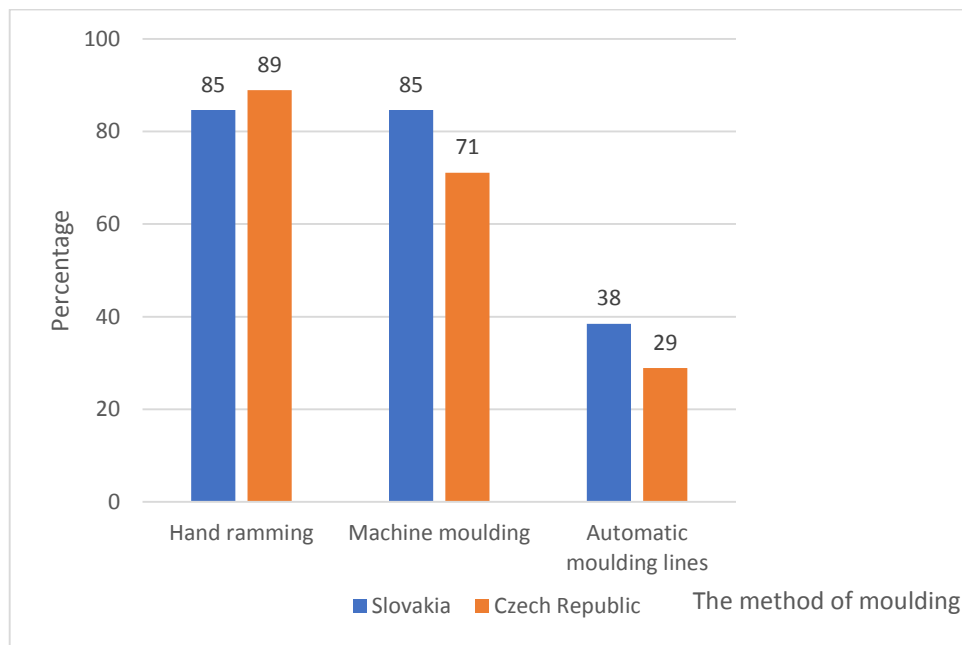
**Figure 6** Percentage distribution of foundries in Slovakia and Czech Republic casting various metals and alloys

Figure 7 shows percentage distribution of foundries in Slovakia and Czech Republic using various moulds and dies. In Czech Republic, 8 foundries use ceramic moulds for investment casting and 2 foundries expendable polystyrene pattern. In Slovakia, 6 foundries use ceramic moulds for investment casting. The total summary is more than 100 percent in both cases because many foundries use more than one type of mould or die.



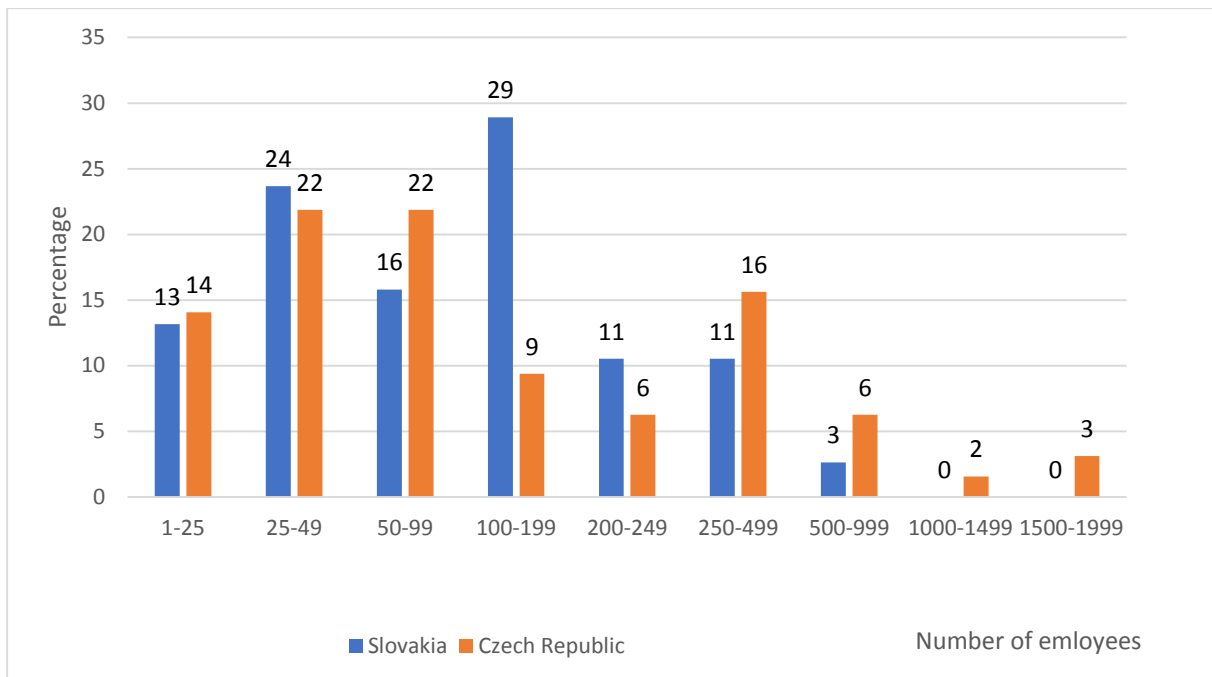
**Figure 7** Percentage distribution of foundries in Slovakia and Czech Republic using various moulds and dies

Figure 8 shows percentage distribution of foundries in Slovakia and Czech Republic using various moulding techniques. The foundries using ceramic moulds are not included. The total summary is more than 100 percent in both cases because many foundries use more than one method of moulding.



**Figure 8** Percentage distribution of foundries in Slovakia and Czech Republic using various methods of moulding

Figure 9 shows percentage distribution of foundries in Slovakia and Czech Republic according to number of employees.



**Figure 9** Percentage distribution of foundries in Slovakia and Czech Republic according to number of employees

## DISCUSSION

The percentage distribution of revenues of foundries in Slovakia shows that the highest number of foundries have revenues from 1 to 10 million Eur and few of the foundries have revenues over 50 million Eur. In Czech Republic, again the highest number of foundries have revenues from 1 to 10 million Eur, but the percentage of foundries over 50 million Eur is almost three times higher because of larger foundries. The year 2019 in the graphs for Czech Republic is a bit extraordinary because of lacking data from many foundries. This apply also for the total revenues and average revenues. The average revenues of foundries in Czech Republic are almost two times higher than in Slovakia.

The percentage distribution of casting techniques in Slovakia and Czech Republic has some similarities and also some significant differences. Many foundries in both countries use more than one casting technique. The number of foundries using gravity casting is significantly higher in Czech Republic. In Slovakia, there is significantly higher number of the foundries using high pressure die casting.

The percentage distribution of foundries casting various metals and alloys in Czech Republic and in Slovakia is quite different. Many foundries in both countries use more than one type of alloy. The largest difference is in steels and cast irons where more foundries in Czech Republic produce steel and cast iron castings.

The percentage distribution of foundries using various moulds and dies in Slovakia and Czech Republic has many significant differences. The foundries in Slovakia use sand moulds either from green sands or hardened in much larger scale. The foundries in Czech Republic use metal dies in a much larger scale. Many foundries use more than one type of moulds. Some of them use even four types.

The percentage distribution of foundries using various moulding techniques in Slovakia and Czech Republic is quite similar. Large amount of foundries use two or even three moulding techniques.

In Slovakia, the largest amount of foundries employ up to 199 employees. In Czech Republic, the largest amount of foundries employ up to 99 employees. None of the foundries in Slovakia has more than 999 employees. In Czech Republic, 4.7 % foundries have more than 999 employees.

## CONCLUSION

The foundry industries in Slovakia and Czech Republic show many similarities and many differences. Both are interconnected in a large scale with automotive industry as their biggest customer, and both are oriented on export in a large scale. The total tonnage of castings decreased in 2019 in comparison to 2018. This can be interconnected with increasing demands for lightweight components and increasing use of non-metallic materials.

The year 2020 with worldwide COVID-19 restrictions and increasing unemployment will have negative impact not only on automotive industry but on its whole supplier chain. This negative impacts will be present even in 2021. The achievement of the pre-crisis level of production will require several years.

## Acknowledgement

Authors gratefully acknowledge the support from KEGA 007STU-4/2018 Grant *Multimedia tools for teaching foundry technology and its content optimization in the countries of the Visegrad group*.

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## ORCID

Roland Šuba	0000-0001-6351-2108
Ingrida Bajčičáková	0000-0001-9021-2450
Martin Bajčičák	0000-0001-9779-3294
Štefan Podhorský	0000-0003-1275-4363
Antonín Kříž	0000-0001-8188-6621