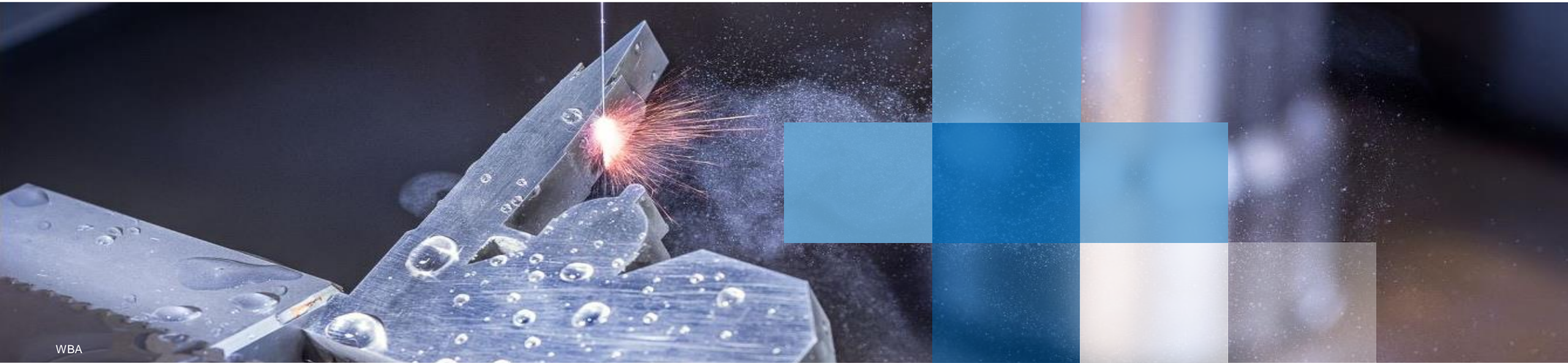




**WBA
WERKZEUGBAU
AKADEMIE**



WBA

Sector-Wide Benchmarking Analysis of the South African Tooling Industry 2022

Comparison of Benchmarking Results 2020 to 2014

Sector-Wide Benchmarking Analysis 2020: Presentation of benchmarking results



-
- 1 Introduction

 - 2 Approach
 - 3 Benchmarking Results
 - 3.1 Market
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WBA Tooling Academy: Tool making competence made in Germany

Who we are

- **Central point of contact** for tool shops
- Close **collaborator with institutes** of the RWTH Aachen University and the Fraunhofer-Gesellschaft
- **25 employees** with organizational and technological focus on tool making
- Dedicated demonstration tool shop
- Execution of approx. **50 consulting projects** per year
- Initiator and leader of approx. **10 research projects per year** with partners from our network

Who our partners are



Where we come from

Powered by:

WZL | RWTH AACHEN UNIVERSITY

Fraunhofer IPT

What is our mission

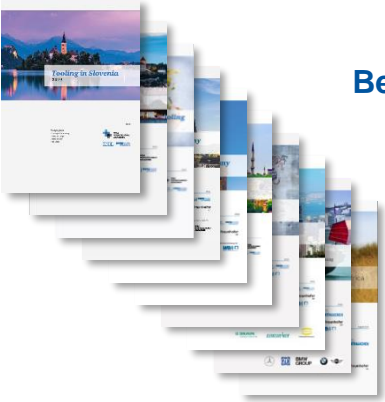
- Establish **successful business strategies** and enhance **operational excellence** for our customers
- Share **insights** on future business and market developments and latest technological enablers
- Connect our **partners** for multi-level cooperation
- Qualify **personnel** for current and future challenges

WBA Tooling Academy: International references of the WBA within the past three years



International activities

- 37** international industry projects within the past three years
- 28%** international share of turnover
- 18** countries with activities involving the WBA



- Benchmarking
- Market research
- Supplier identification
- Competence analysis
- Strategy

Some of the participating tool shops



The WBA has high international expertise and a deep knowledge in international tooling markets

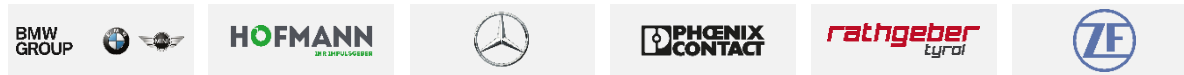
Community: Members of the WBA Tooling Academy



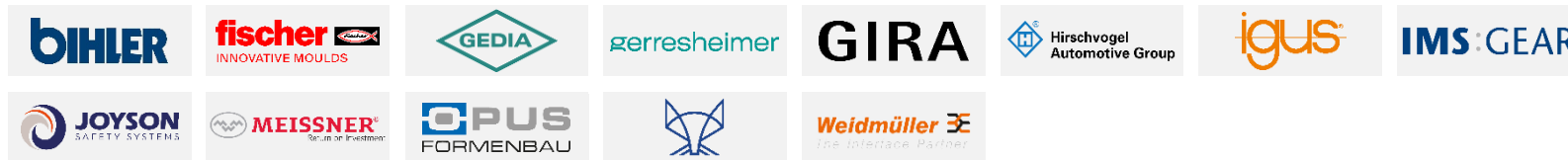
Toolmaking tool shops

Cooperation members

Premium



Business



Basis

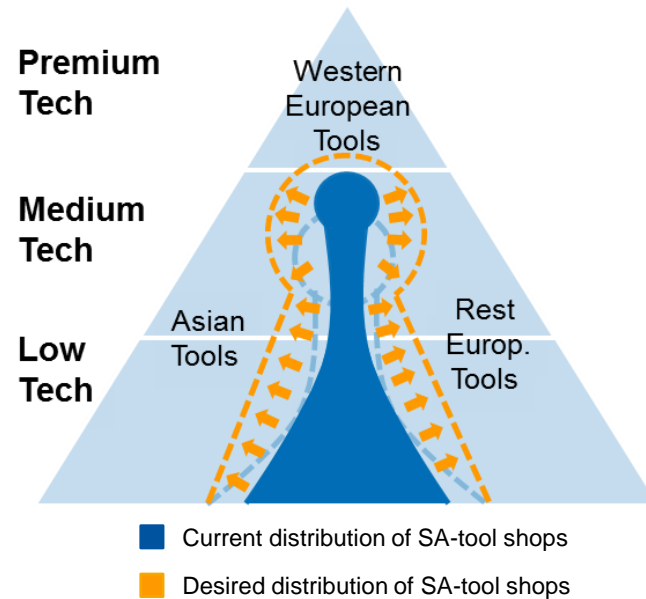




The PtSA and WBA partnership was established in 2009 to conquer challenges of the South African tooling industry

Challenges

The South African tooling industry faces multiple challenges to withstand international competition



The goal is to strengthen the South African tooling industry to make it internationally competitive

Industrialization framework

To conquer challenges of the South African tooling industry the SA industrialization framework was created in joint efforts



The industrialization framework addresses the specifics of the South African industry

The PtSA and WBA partnership has generated unique market solutions supporting a growing number of tool shops



Market solutions

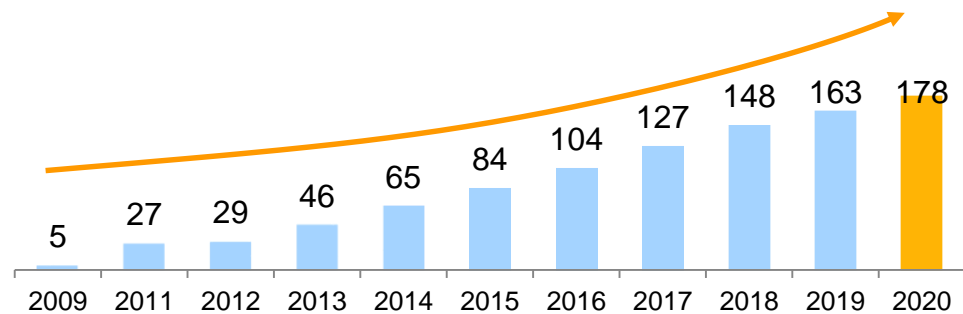


The market solutions are supported by international market knowledge and best practice company examples compiled by the WBA in Germany

Industry consulting



Intervention projects and benchmarking profile



Sector-Wide Benchmarking Analysis 2020: Presentation of benchmarking results



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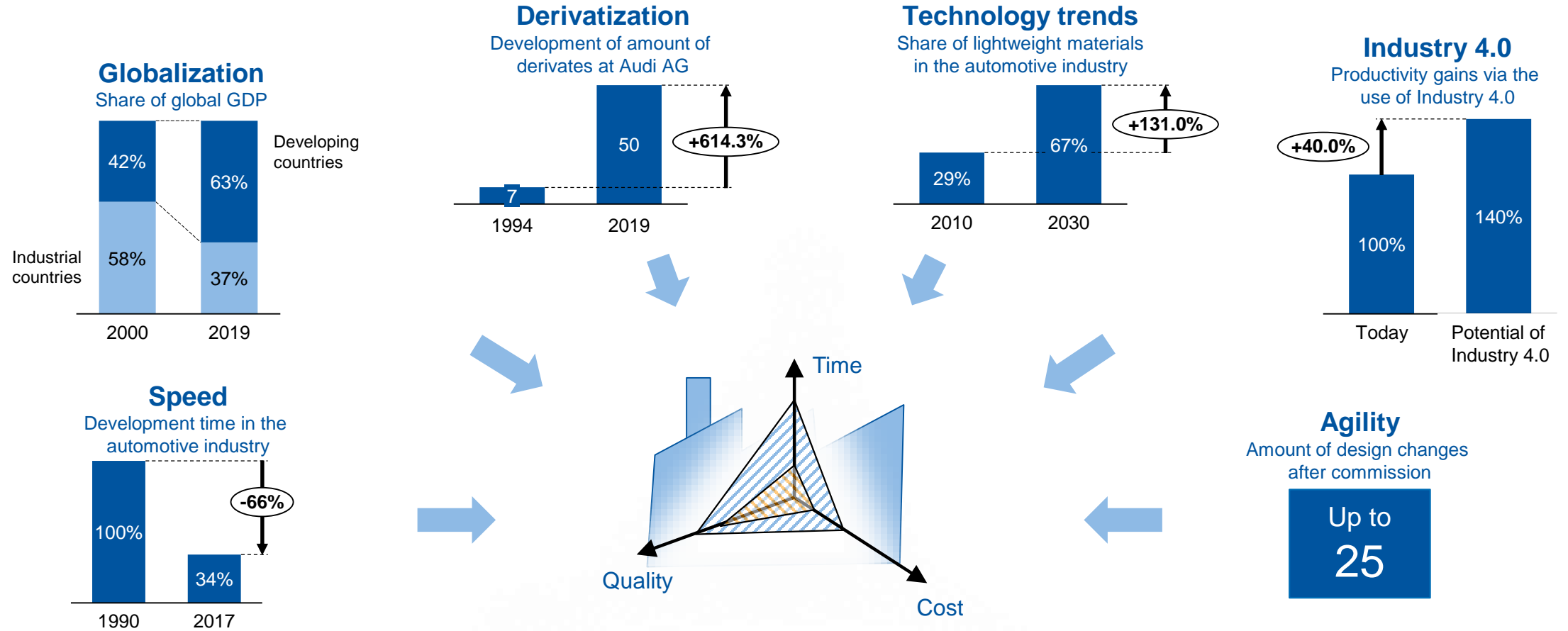
3.4 Resources

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Trends in the producing industry put severe pressure on tooling company`s forcing them to enhance time, quality and costs



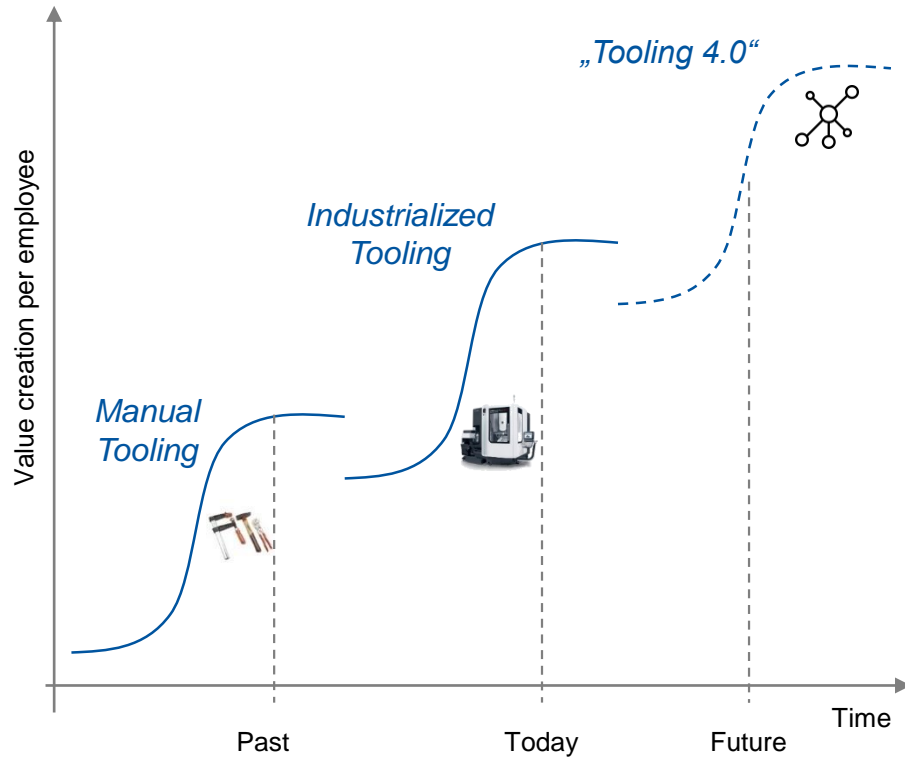
Are you prepared for todays and future challenges?

Source: Bischoff (2007), PWC (2015), IAB (2017), Audi (2019), McKinsey (2010), Foster (2013)

Successful tooling company`s have managed to constantly adapt to emerging challenges

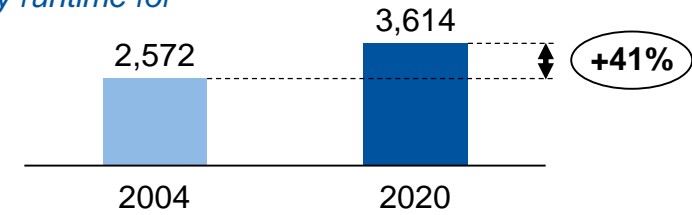


The evolution of tool manufacturing

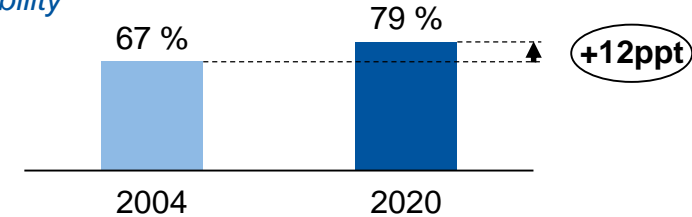


Constant development within German tooling

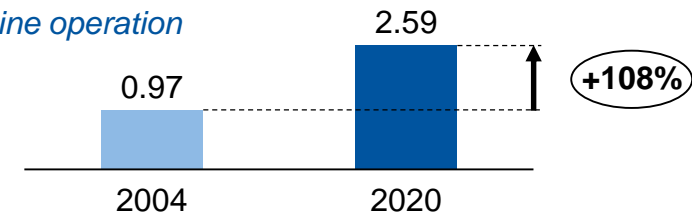
Average yearly runtime for milling [h/a]



Due date reliability



Multiple-machine operation for milling



Tool and die making tool shops have to continuously adapt strategies, processes and technologies to ensure future competitiveness

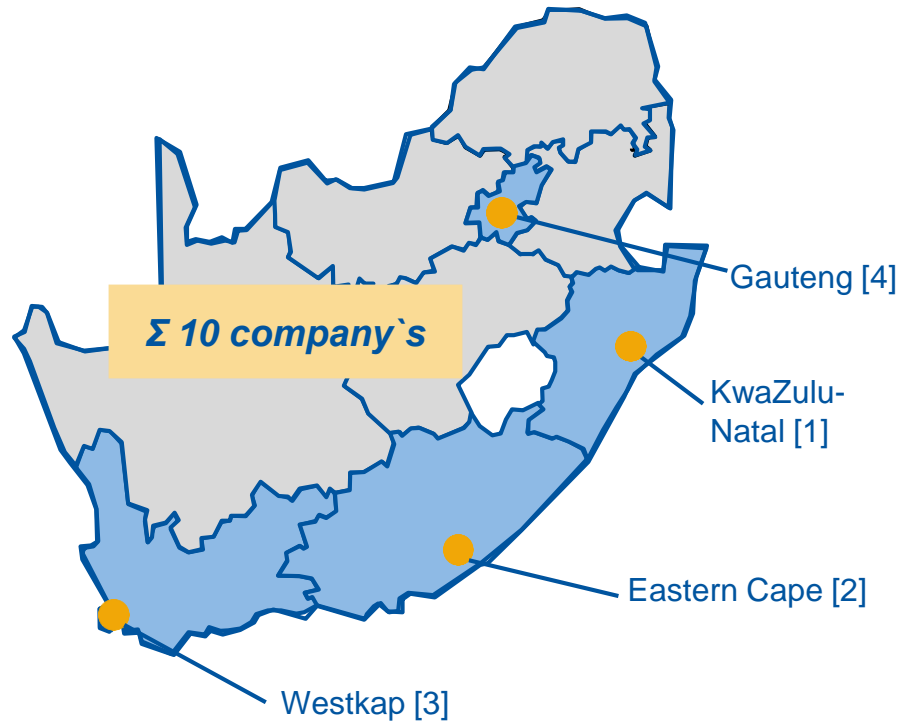
Benchmarking 2020: The majority of the participating company`s is located in the Eastern Cape



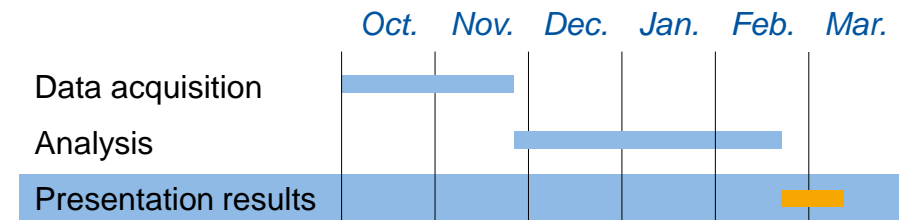
Overview benchmarking 2020

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Timeline



tool shops

- Visit of 15 tool shops in 4 provinces
- Product range consists of die casting, injection molding, punching dies, hot forming and cold forming

Goals

- Derivation of measures to improve the competitive position of the company`s as well as the sector
- Acquisition of a representative sample of South African tool shops



The benchmarking is carried out both at the WBA in Germany and on-site in South Africa with the company

Phase 1: Questionnaire (QN)

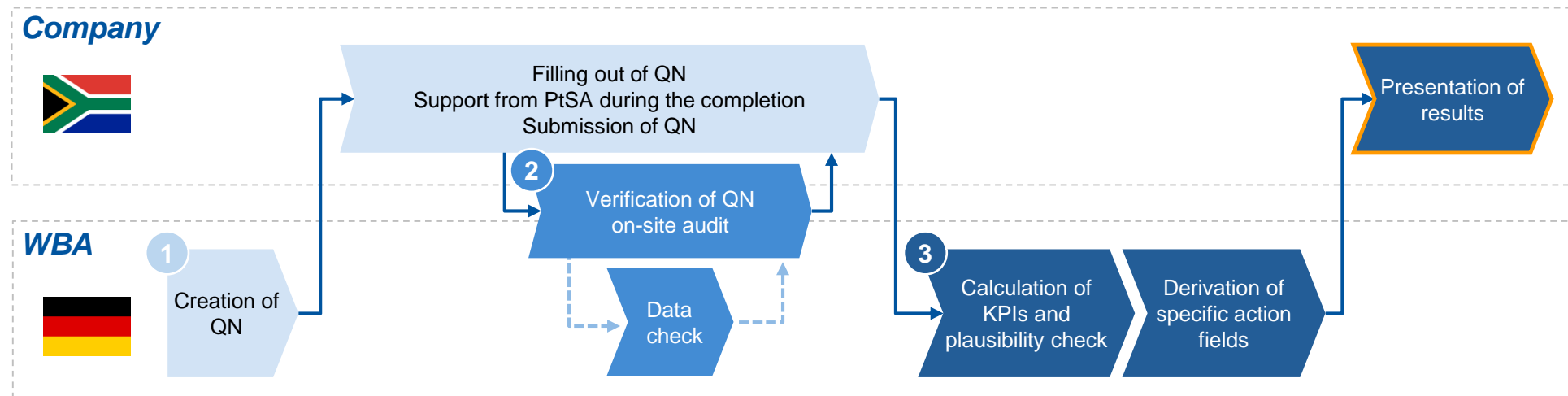
- Questionnaire (QN) to be filled out by the company
- Remote support by WBA experts if required

Phase 2: On-site workshop

- On-site audit – quick check and validation of key benchmarking areas
- Evaluation of shopfloor & process flows, discussion with shopfloor employees, ...
- Discussion of open points in benchmarking questionnaire

Phase 3: Benchmarking report

- Presentation of KPI results in comparison to direct competitors and best international tooling tool shops
- Best practice exchange and first hand expert touchpoints
- Discussion of necessary action fields for further improvement



The benchmarking procedure is based on a trustful and efficient collaboration with the tool shops

Sector-Wide Benchmarking Analysis 2020: Presentation of benchmarking results



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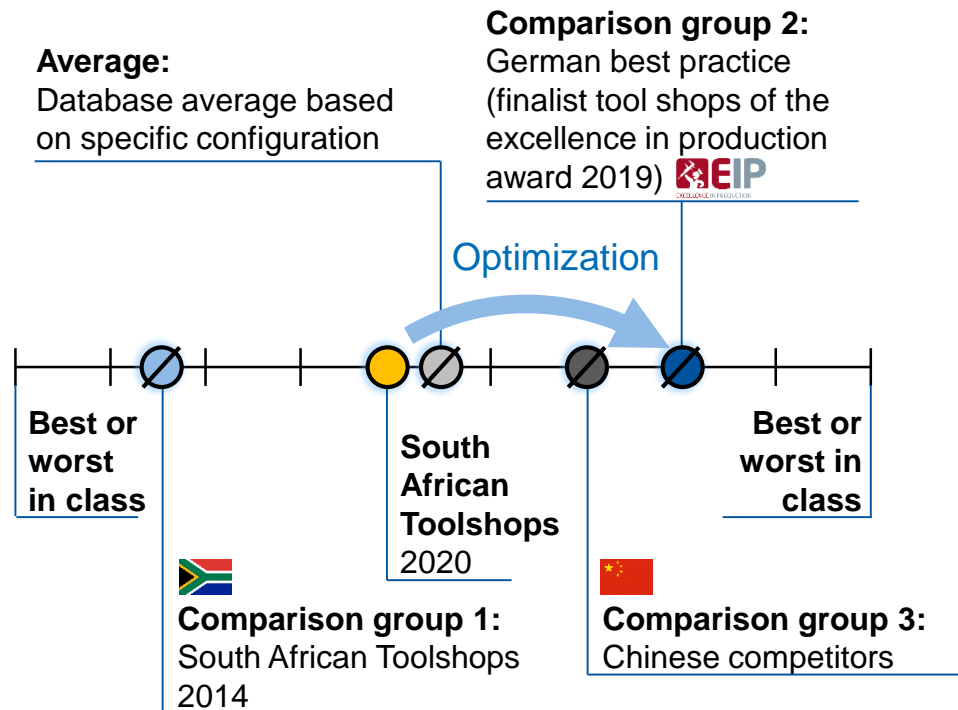
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Benchmarking is an efficient tool to compare yourself with competitors



Presentation of benchmarking results



Lessons learned from benchmarking results

- Identification of own position in reference to competitors
- Analysis of market potential
- Identification of desired position
- Derivation of measures to achieve the target position
- Access to expertise on best practices

The identification of strengths and potentials of the tool shop is a key result of the benchmarking and basis for a solid strategic orientation

Sector-Wide Benchmarking Analysis 2020: Presentation of benchmarking results



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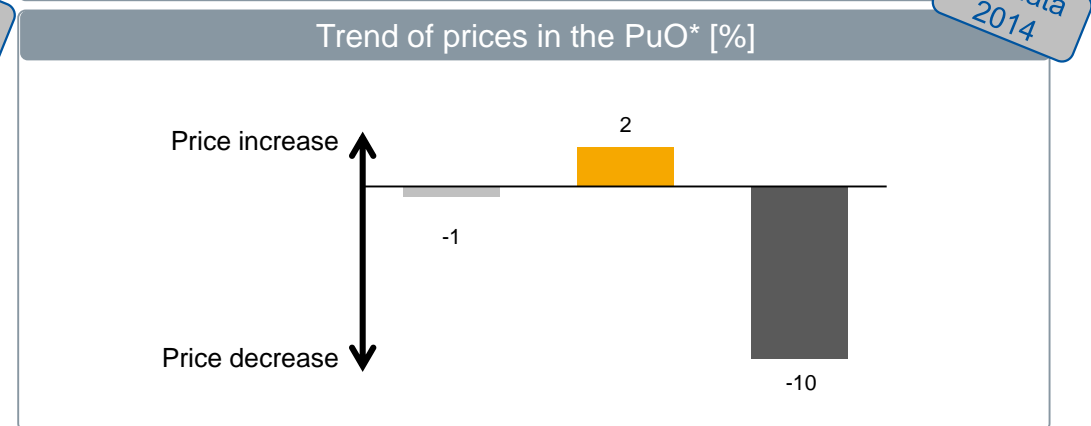
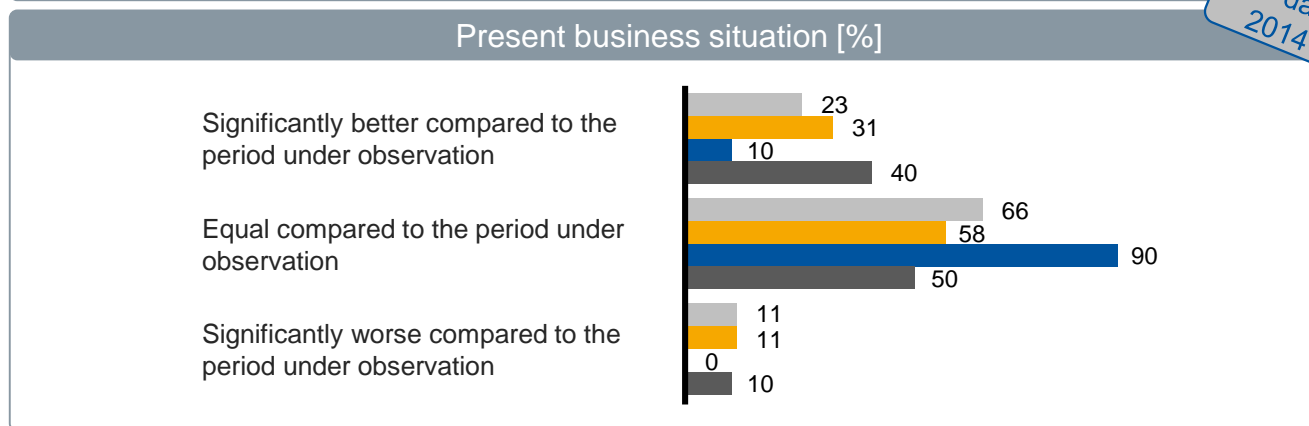
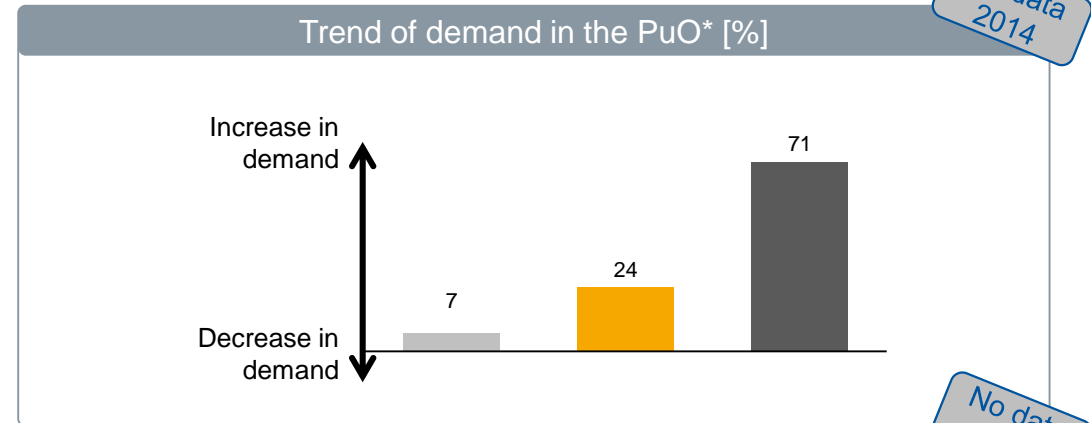
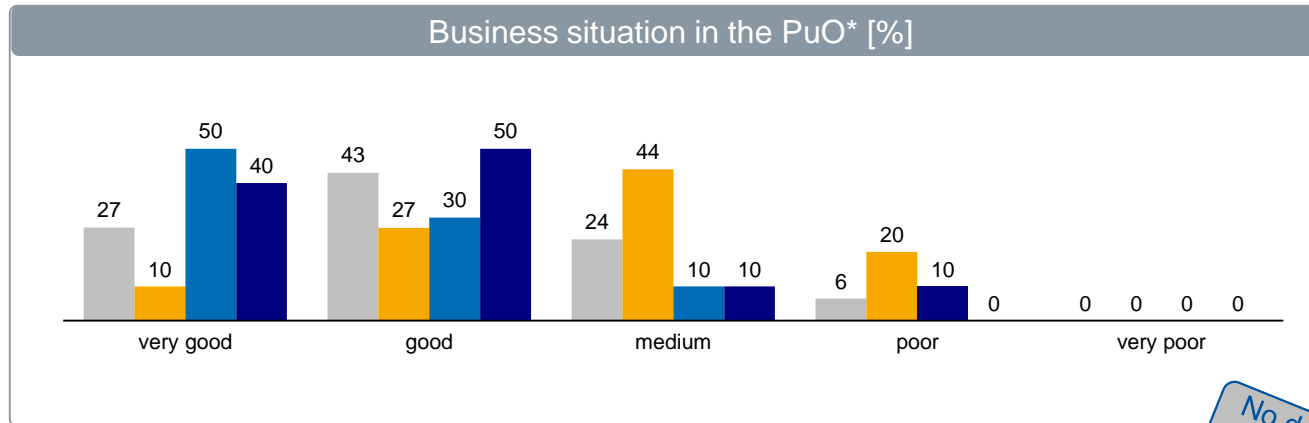
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Market: Business situation and overall economic structure



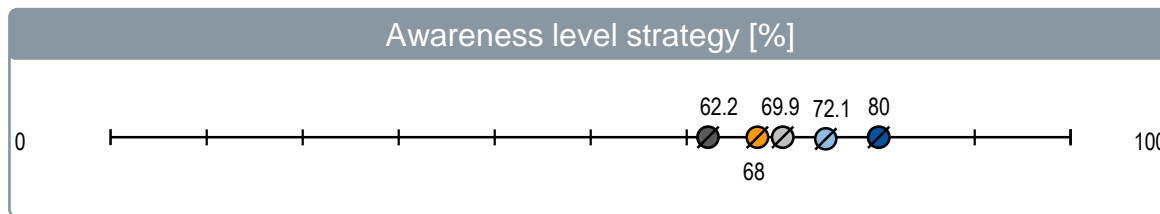
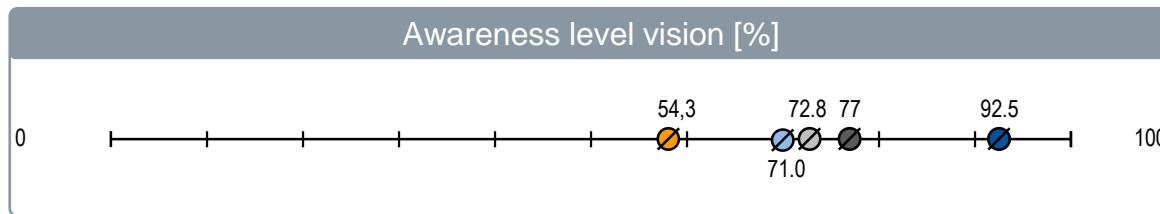
*PuO: Period under Observation

So far the overall business situation of South African tool shops in 2020 is evaluated as consistently medium – due to an increasing national & international demand, the future situation strives for growth potential

● Average
 ● South Africa 2020
 ● German best practice
 ● Chinese competitors

Source: Analysis according to the questionnaire

Market: Strategy – self-assessment



Findings

- The awareness level of existing visions and strategies is low compared to international competitors and has falling back behind the level of 2014
- Some tool shops are still missing both vision and strategy – defining a company specific vision and strategy helps to set the company focus among all entities
- Integrating the vision and strategic focus of a company into the work culture increases the corporate identity of employees – this is a strength of international best practice tool shops

South African tool shops have a very low awareness level of the companies vision in 2021 which has visibly decreased since 2014 – With Chinese competitors falling behind the strategy awareness in South Africa has developed similar to the vision in the past 6 years

Market: Appearance



No data
2014

Market presence [%]

A focused range of service and tools allows to go in-depth on a certain topic and become an expert for certain special requirements.

33,8 %

The wide range of tools is selectively expanded with service.

26,0%

Practically every service or product which the customer requires is delivered.

40,3 %

0 20 40 60 80 100

Customer spectrum [%]

The tool shop only cooperates with one or a small number of strategic partners.

31,9 %

Besides a few strategic partners, other customers are serviced, too. The focus is on new customers with the potential to become future partners.

55,6 %

No customer accounts for a significant percentage of turnover. A lot of customers are serviced.

12,5%

0 20 40 60 80 100

Findings

- A focused product portfolio with the possibility to individualize modules according to customer requirements allows for a maximum of flexibility and a limited necessity for resources – offering every product requested by customers requires high flexibility, which goes hand in hand with increased resource consumption
- South African tool shops offer customer-specific products in a broad product range in 2020 – Wide range of offered products decreases the optimal use of capacities and increases the complexity in terms of economical planning
- New customers are highly relevant for tool shops in 2020 – Expanding its product portfolio and customer base in the near future lowers dependencies on orders of the current main customer
- In addition, an expanded customer base allows tool shops smoothing of available capacities in the future

Sector-Wide Benchmarking Analysis 2020: Presentation of benchmarking results



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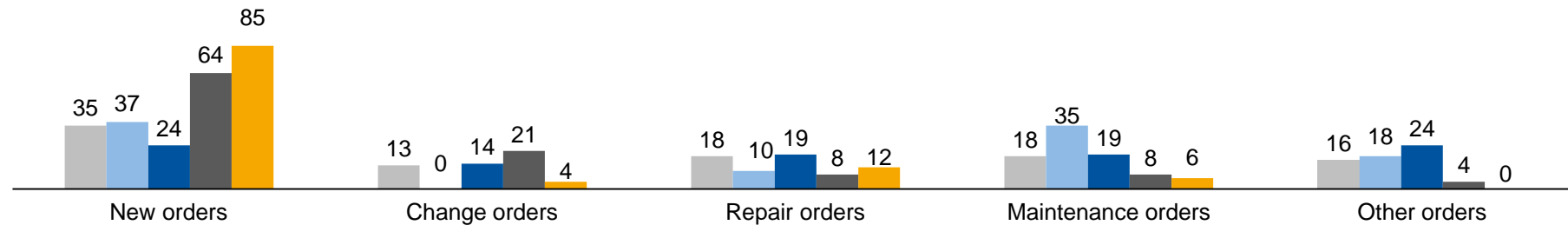
 - 3.2 Product**

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Product: Distribution of orders



Distribution of orders according to quantity [%]



Findings

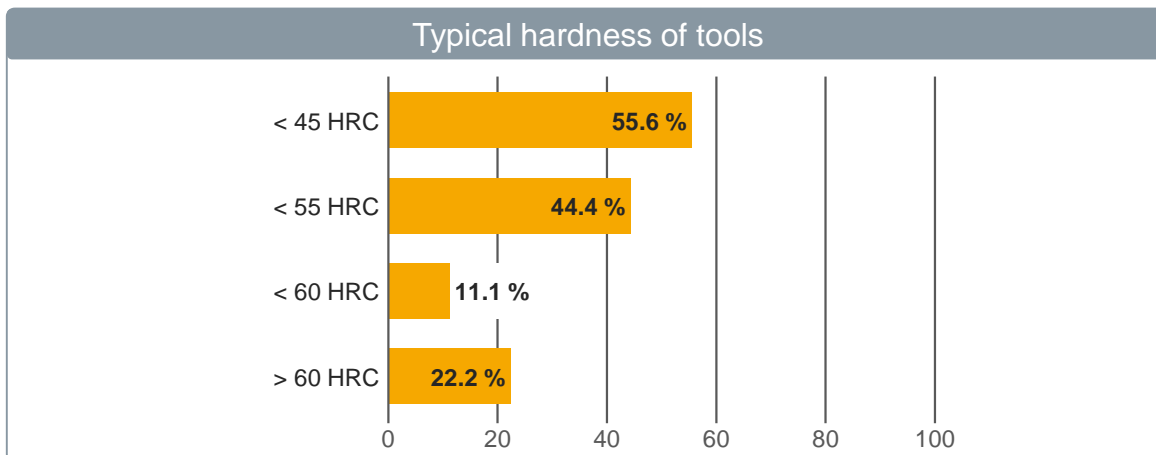
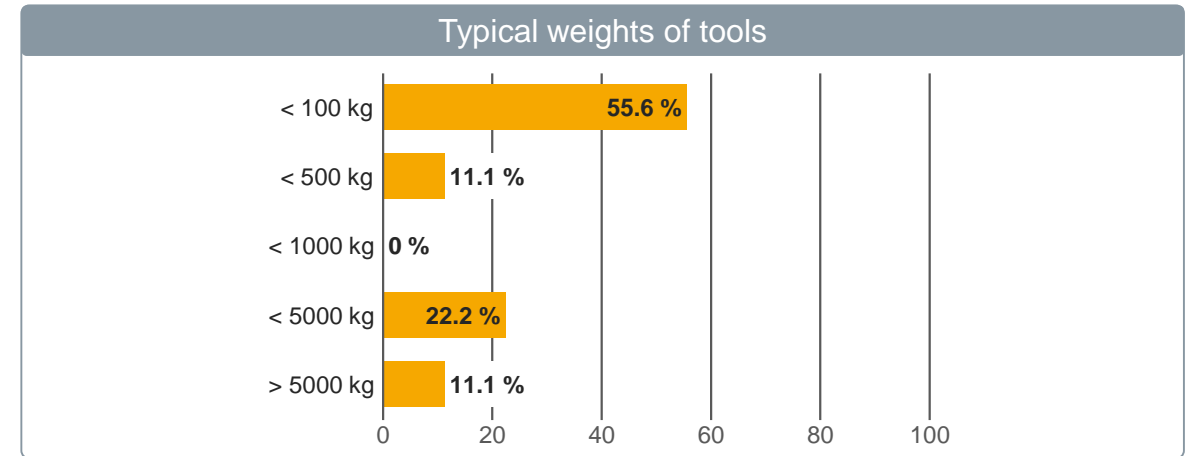
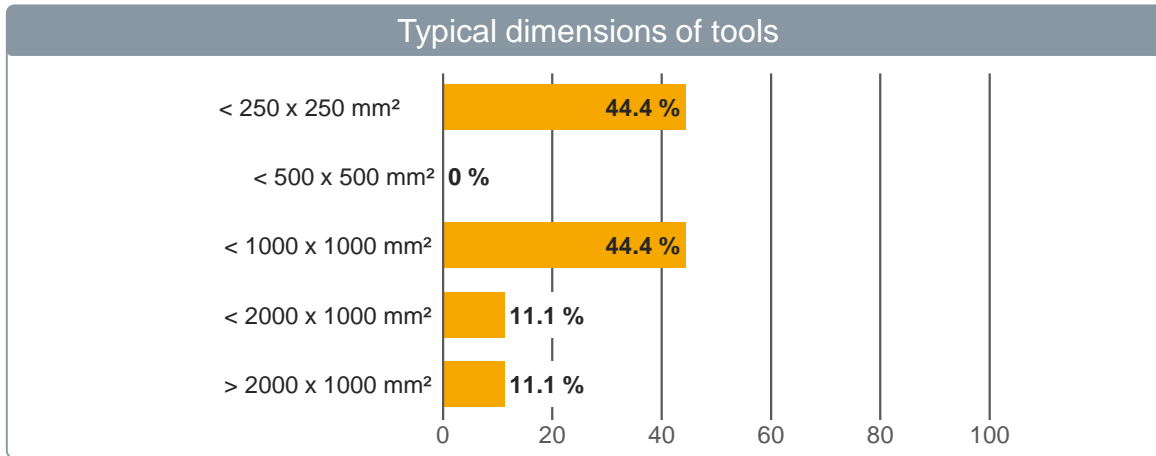
- Orders for maintenance have decreased significantly in the past 7 years – Expanding the order range may require investments in technologies, in any case the development of additional qualifications is essential
- The high share of new orders can be explained by the high number of part manufacturers and furniture companies in the 2020 Benchmarking project – for those companies the other types of orders are less relevant

The low share of change orders, repair orders and maintenance orders indicate a high dependency on new orders, which have doubled since 2014 – In contrast to international competitors South African tool shops in 2020 have focused their service on mainly new orders

Product: Macro-geometric characteristics



No data
2014



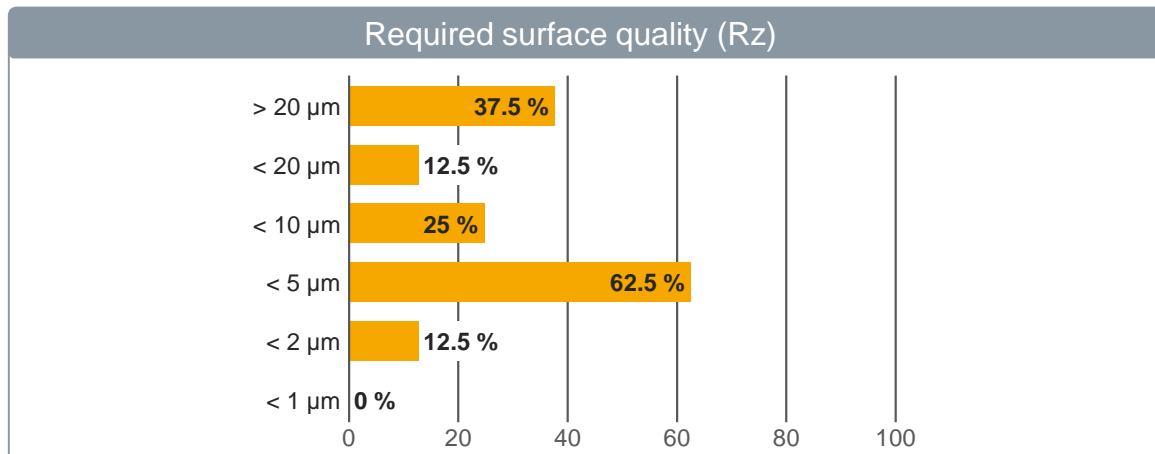
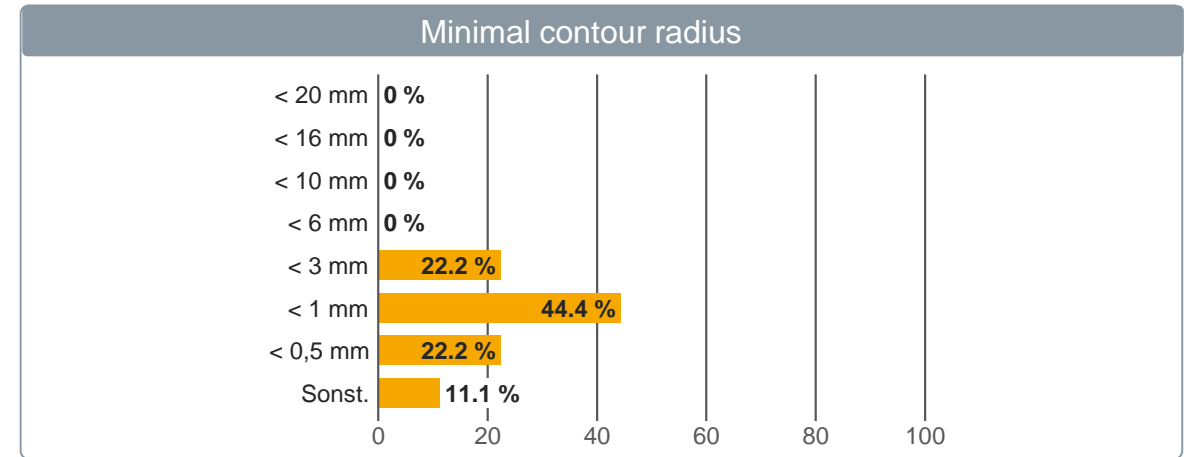
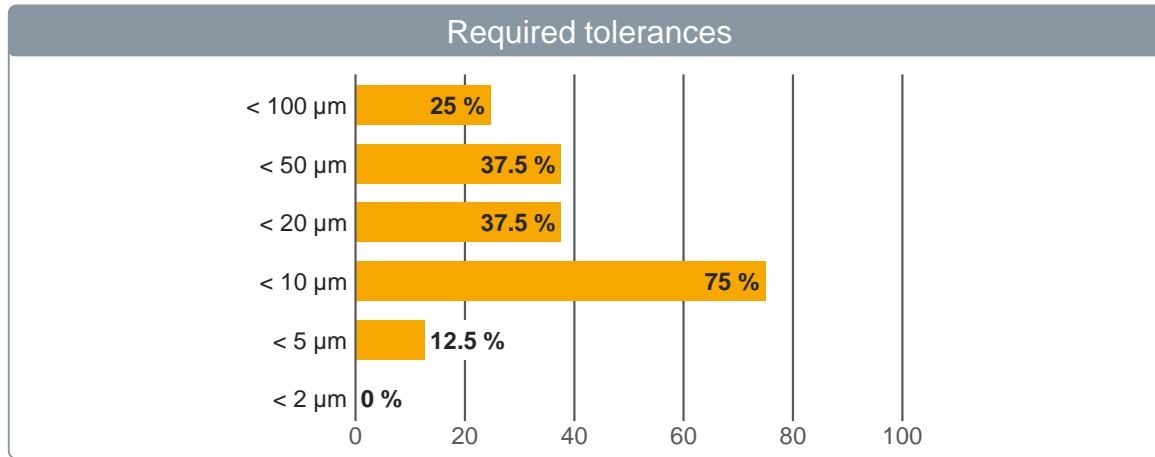
Findings

- Typical South African tools in 2020 have relatively small dimensions and weights and are produced with various hardness
- Typical orders of South African tool shops in 2020 have smaller dimensions, weights and a low hardness compared to South African competitors average
- The required hardness is below average which indicates the potential for expanding the range of services

Product: Micro-geometric characteristics



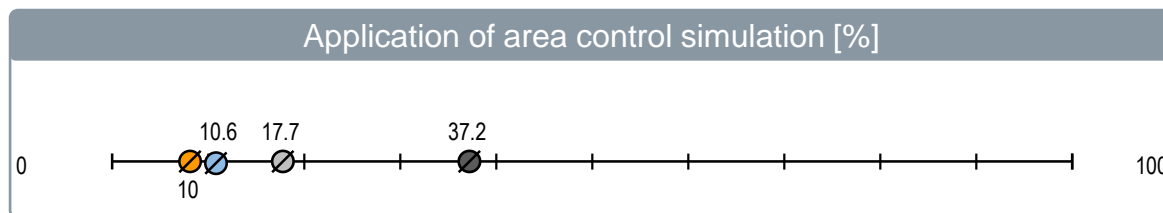
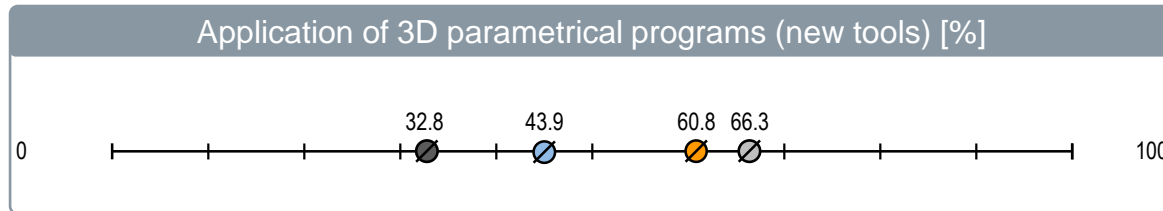
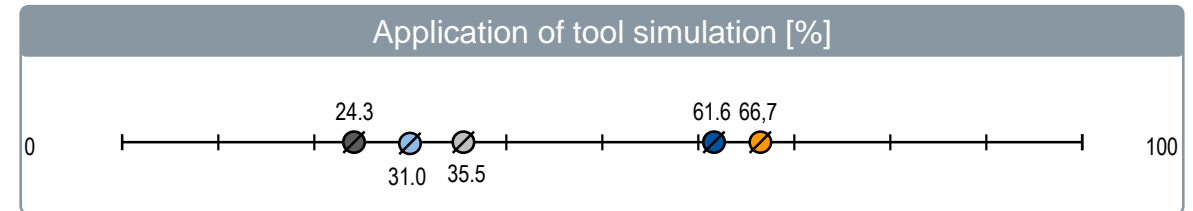
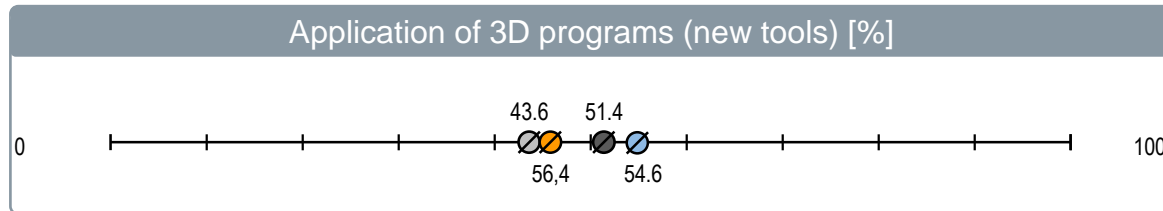
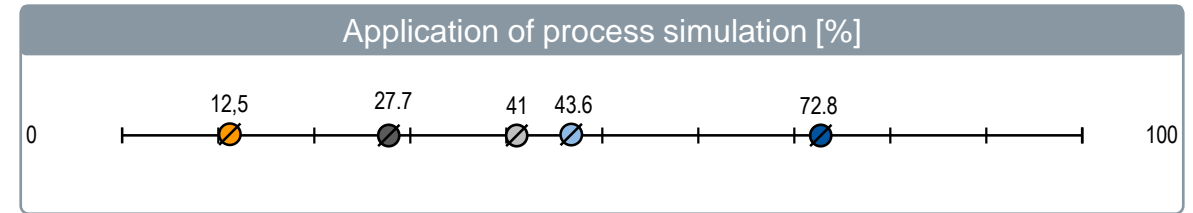
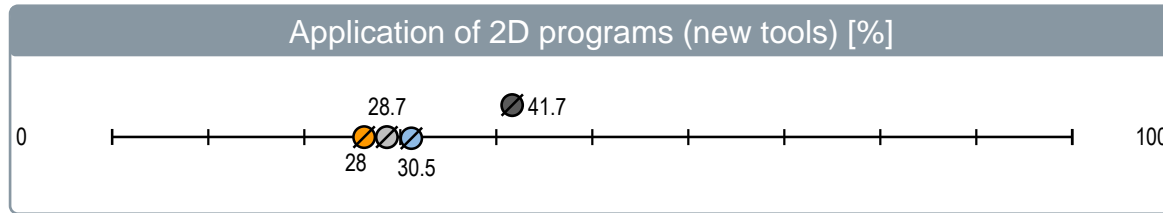
No data
2014



Findings

- Customers in South Africa in 2020 have lower requirements for surface qualities compared to the average of last year
- Tool shops in Afrika produce a variety of medium tolerances with typically small dimensions and weights - the need for higher tolerance and quality standards should be investigated

Product: Design systems

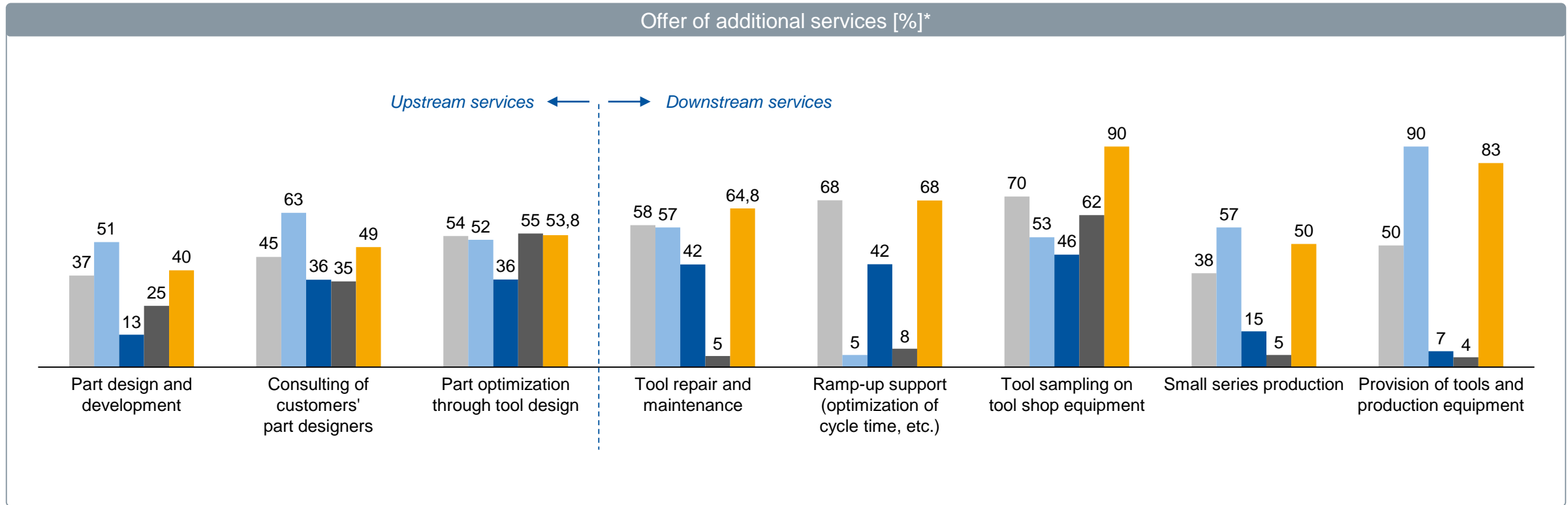


Findings

- The application of process simulations in 2020 falls back behind 2014 and every comparison group – it could be improved to achieve a more efficient production process
- South African tool shops have increased in application of 3D parametrical programs and tool simulation since 2014 further ahead than international competitors – offering the potential to shorten the time of development

The implementation of various design systems has only developed partwise for the better in comparison to 2014 – In application of 2D and 3D programs South Africa has fallen behind the score of 2014 as well as the international average

Product: Service range



*% of tools sold with this additional service

The downstream services in 2020 show a trend of increase in maintenance, Ramp up support and tool sampling – South Africa maintained a wide range of service portfolio which is also significant higher in downstream services than international competitors

⊘ Average
 ⊘ South Africa 2014
 ⊙ German best practice
 ⊘ Chinese competitors
 ⊙ South Africa 2020

Source: Analysis according to the questionnaire

Sector-Wide Benchmarking Analysis 2020: Presentation of benchmarking results

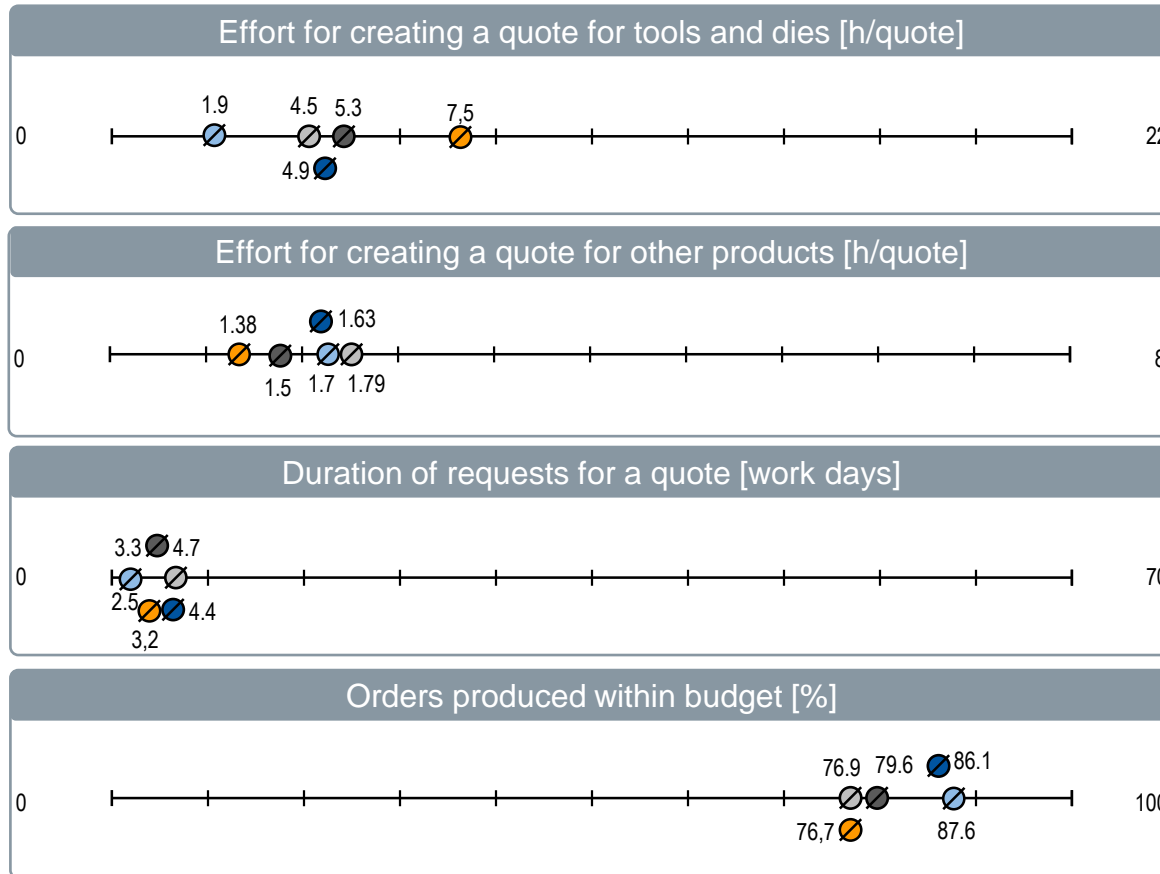


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Process: Calculation – inquiries and quotes

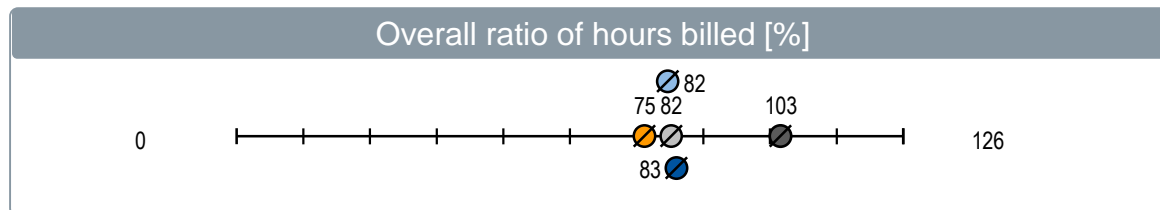
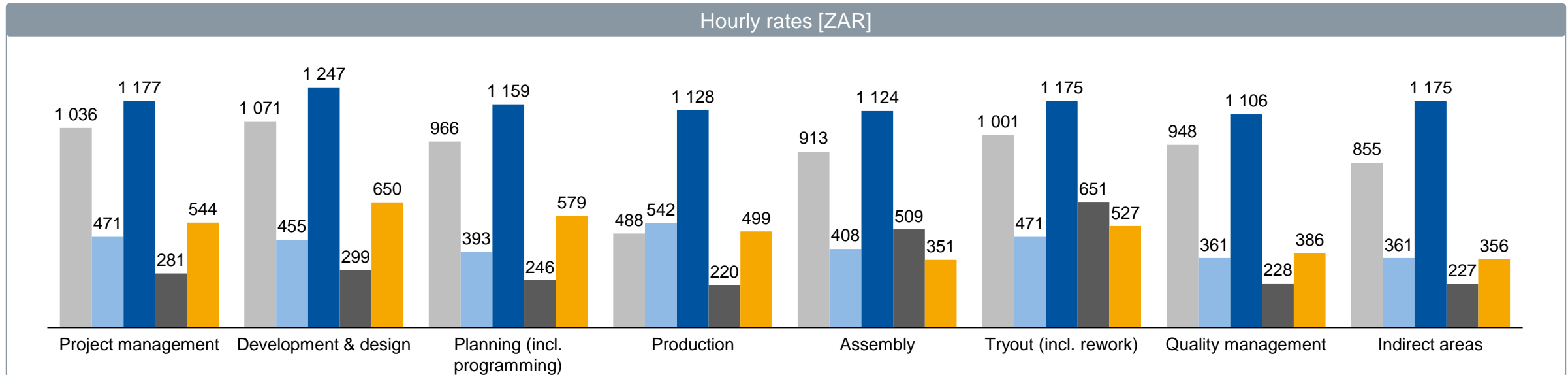


Findings

- South African tool shops in 2020 have a high effort increase for tools – However the effort for other products has significantly decreased
- The effort for creating a quote indicates the ability to plan efficiently and offer customer oriented information
- Calculations made with a mix of undocumented and unstructured experience of finished projects increase the time effort for quotes which offers a high demand for systematization & post calculation
- The quality of budgeting in 2020 has decreased below international average – the quality serves as an indicator of internal calculations as well as process flexibility
- An improved and more detailed standardized recalculation process delivers a database for precise calculation – It can help to identify cost saving potentials and create more competitive quotes for customers

In dependency to the risen hourly effort creating a quote for tools the duration for requests has also significantly increased – the positive development in creating quotes for other products is linked to the high share of attending companies not in the tool shop industry

Process: Calculation – hourly rates



“ratio of hours billed” = billed hours / hours worked

exchange rate: 1 € = 17.56 ZAR

source: 01-12-2022
European Central Bank

South African tool shops are characterized by comparable low ratio of hours with a clear upwards trend in general in the past 6 years - Especially in project management and development the increase is significant

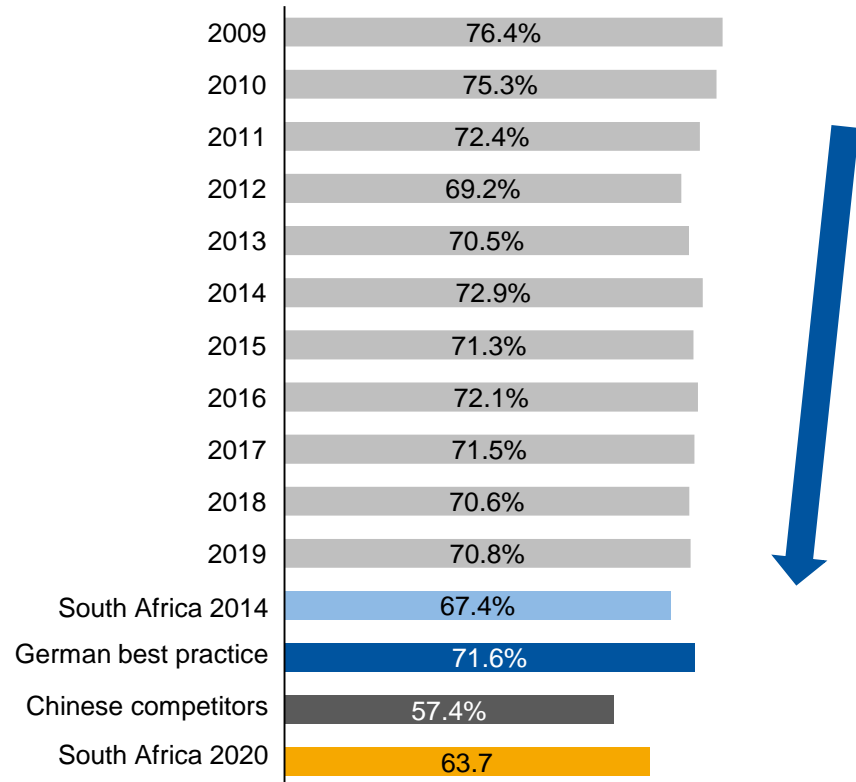
● Average
 ● South Africa 2014
 ● German best practice
 ● Chinese competitors
 ● South Africa 2020

Source: Analysis according to the questionnaire

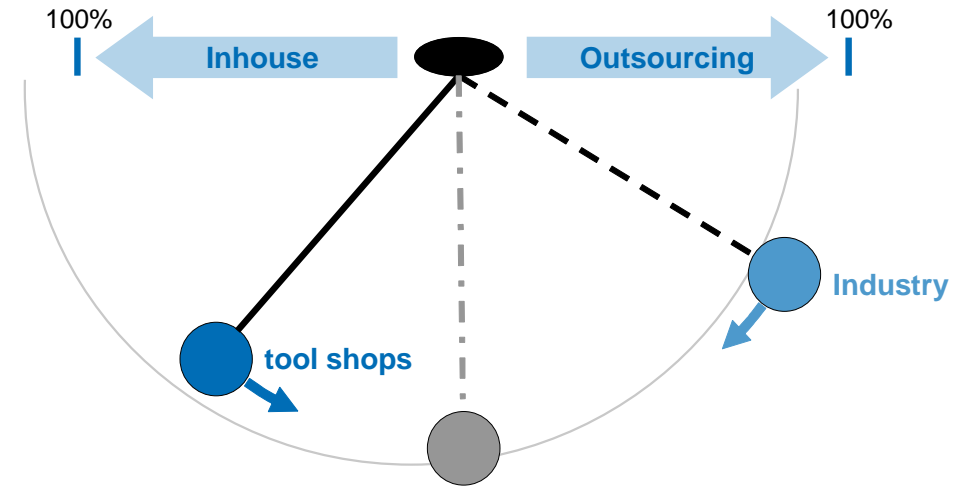
Process: Depth of added value



Development of depth of added value of tool shops



Industry development of sourcing



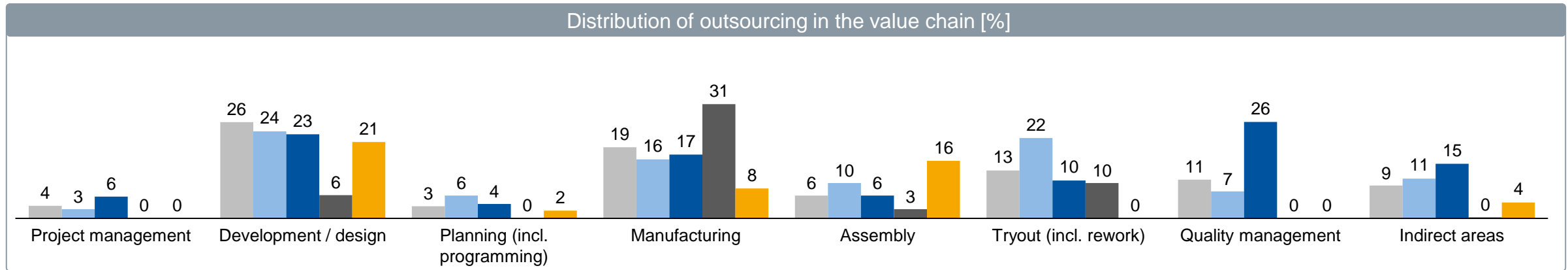
Where is the optimum for tool shops?

The general trend is a decreasing depth of added value – South African tool shops in 2020 follow this trend and is focusing on its core competencies

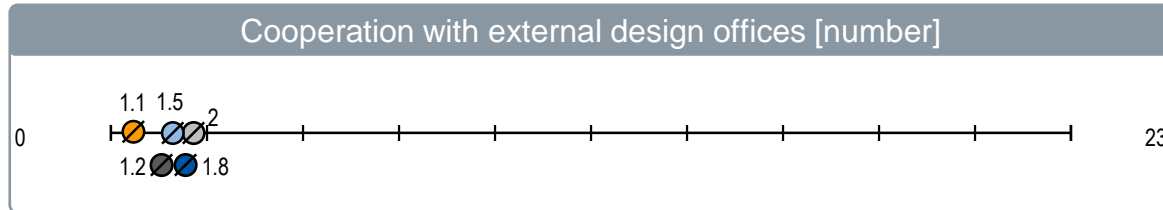
Process: Outsourcing



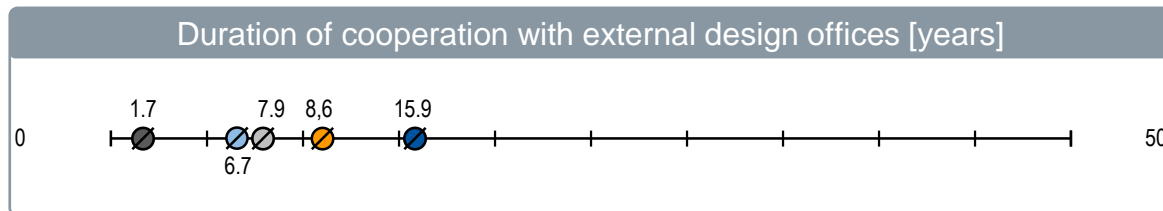
Distribution of outsourcing in the value chain [%]



Cooperation with external design offices [number]



Duration of cooperation with external design offices [years]



Findings

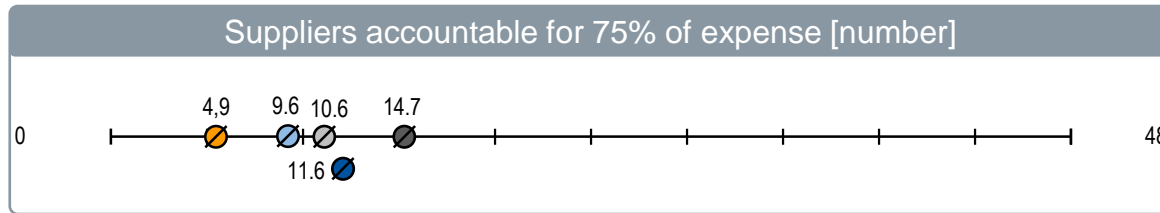
- Outsourcing of non-core competences offers future cost reduction and flexibility potentials – South African tool shops displayed in 2014 a clear development towards utilizing outsourcing for their own optimization
- Tight and long-lasting strategic partnerships are highly important for successful outsourcing – the risen relationship duration in 2020 provides trust affiliated with good timeliness
- The South African tooling industry could use outsourcing as a strategic tool to avoid future capacity overloads and thus potentially acquire more orders

Except assembly, outsourcing in South African tool shops of non-core competencies, decreased significantly since 2014

○ Average ○ South Africa 2014 ● German best practice ● Chinese competitors ● South Africa 2020

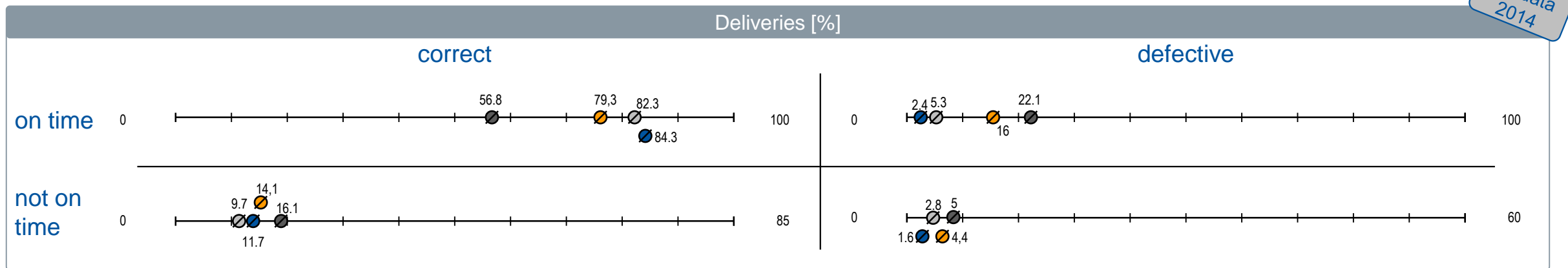
Source: Analysis according to the questionnaire

Process: Suppliers



Findings

- In the year 2020 South African tool shops partners with a small number of reliable suppliers – the reliability of suppliers is essential to internal operational excellence and timeliness
- The timeliness and quality of the selected suppliers is comparable to average international competitors but still calls for improvement – a supplier qualification is a suitable solution

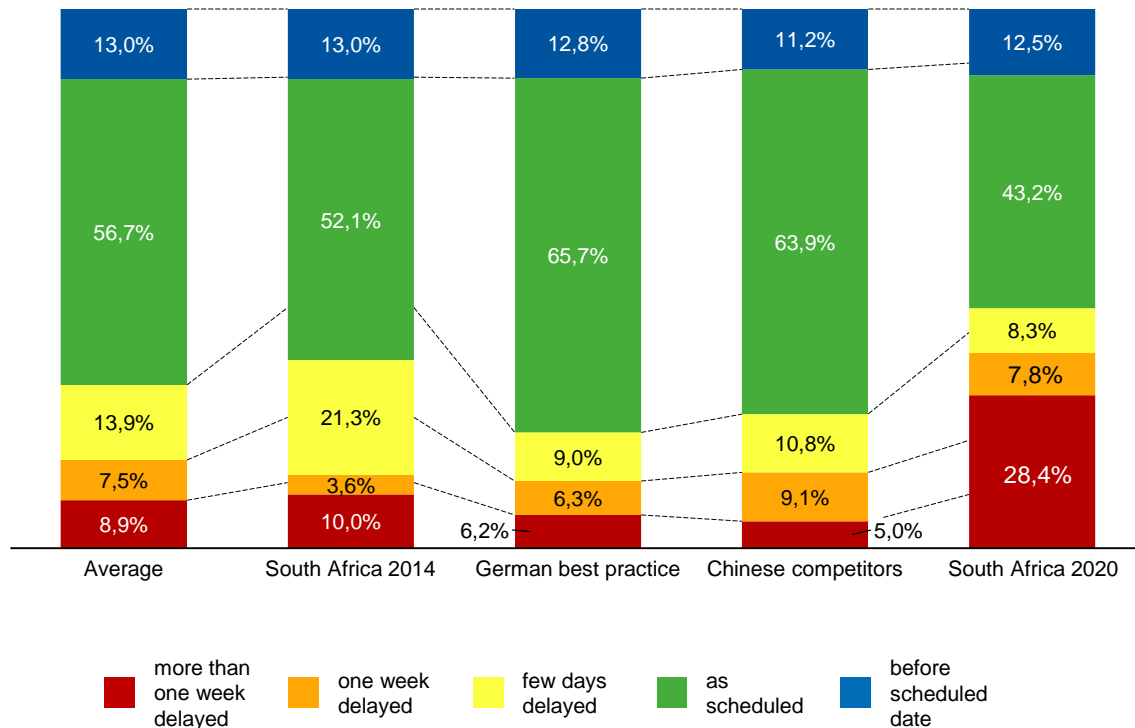


South African tool shops are dependent on a small number of suppliers leads to risks – widening the supplier base should be considered to achieve better quality and timeliness

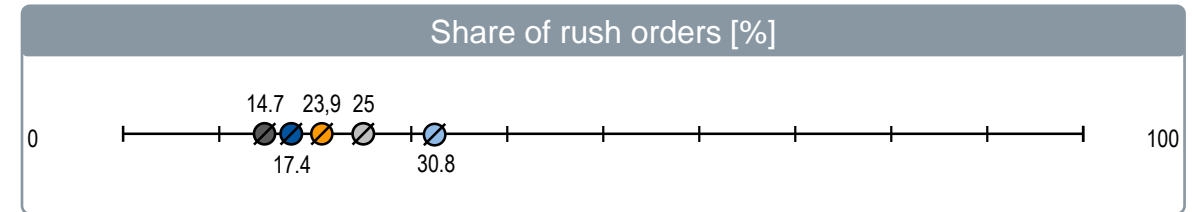
Process: Due date reliability



Adherence to delivery dates



Share of rush orders



Findings

- The adherence to scheduled delivery dates is an indicator to evaluate the overall process effectiveness as well as the ability to use capacities efficiently in order to reduce wastage
- Despite the low share of rush orders in 2020 South African tool shops currently provides a below average reliability regarding delivery dates – however the number of orders which are delayed more than one week should be immediately improved
- The low share of rush orders indicates general flexibility managing incoming orders – thus through effective planning delays could be avoided

Compliance with schedules is an essential differentiation criteria within the competition and minimizes wastage of resources – due to the essential importance of timeliness, improvement measures need to be implemented

Turnover and value added: Referring the tool shops' output to the number of employees indicates its productivity



Turnover per employee	776,521 ZAR	455,260 ZAR	2,289,314 ZAR	1,290,221 ZAR
Total costs per employee	736,168 ZAR	447,279 ZAR	2,266,978 ZAR	1,113,216 ZAR
Productivity index ¹	1,1	1.02	1.0	4.3
Value added per employee	573,334 ZAR	307,068 ZAR	1,603,649 ZAR	762,297 ZAR

$$^1\text{Productivity index} = \frac{\text{Sales turnover}}{\text{Total cost}}$$

exchange rate: 1 € = 17.56 ZAR

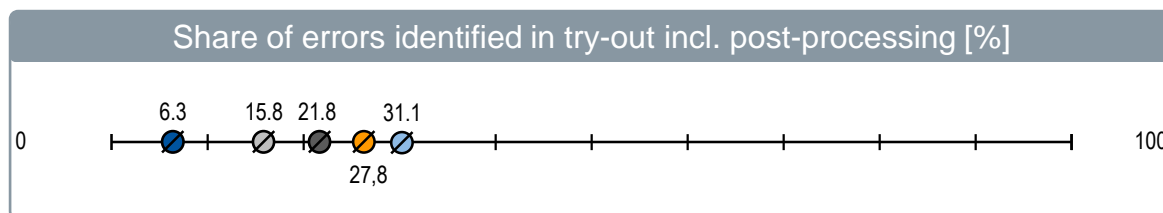
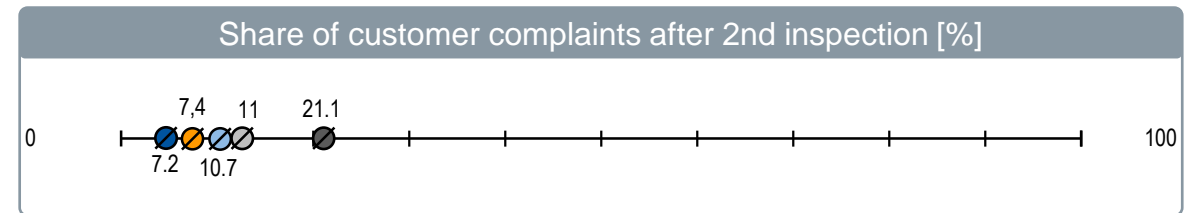
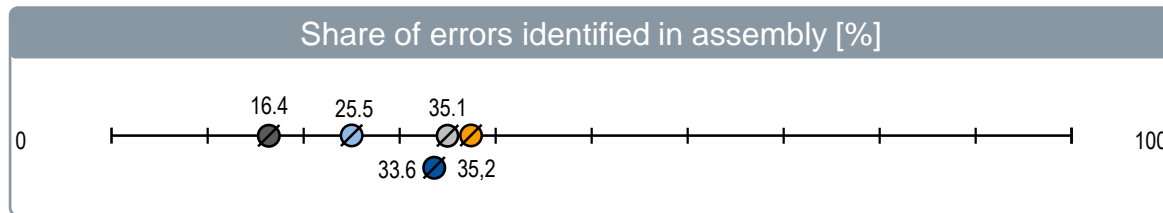
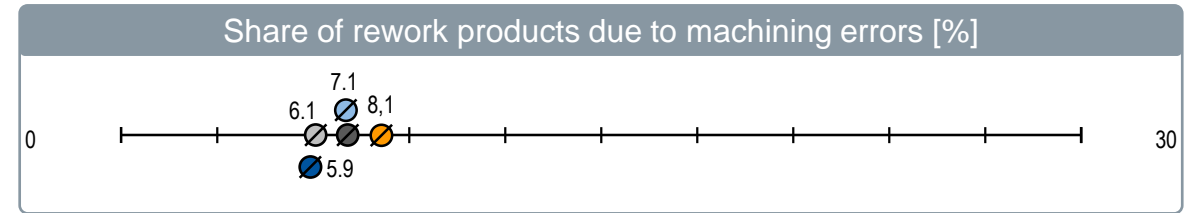
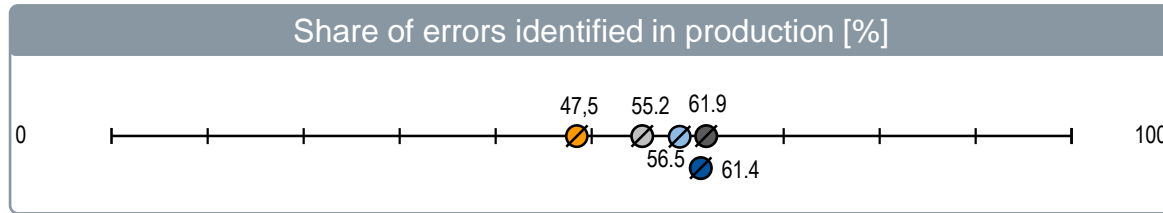
source: 01-12-2022
European Central Bank

South African tool shops have significantly increased in turnover per employee and value added per employee since 2014

⊘ Average
⊘ South Africa 2014
⊙ German best practice
⊘ Chinese competitors
⊙ South Africa 2020

Source: Analysis according to the questionnaire

Process: Quality management



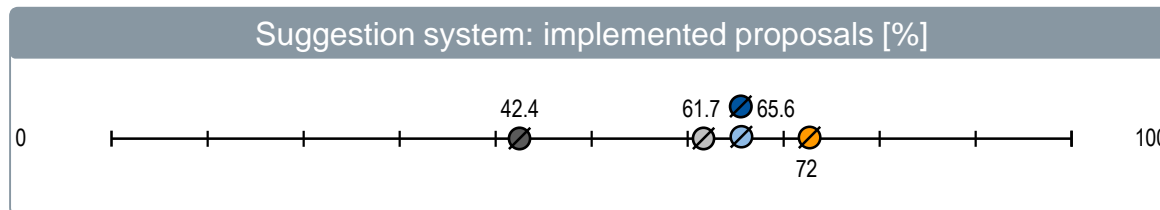
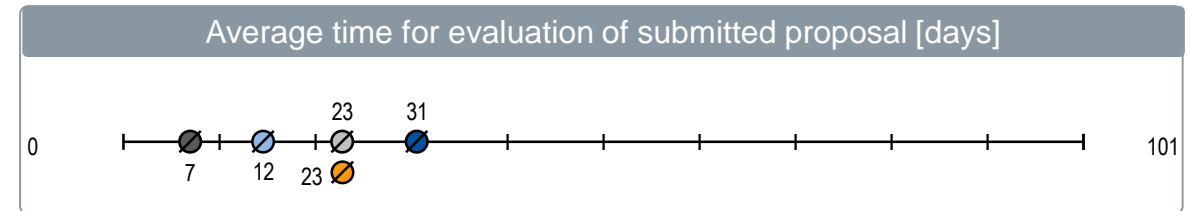
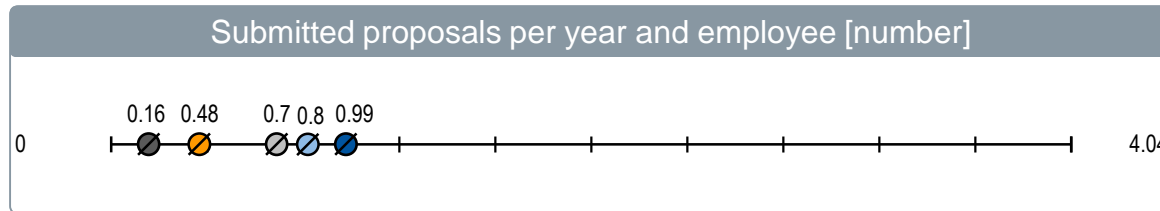
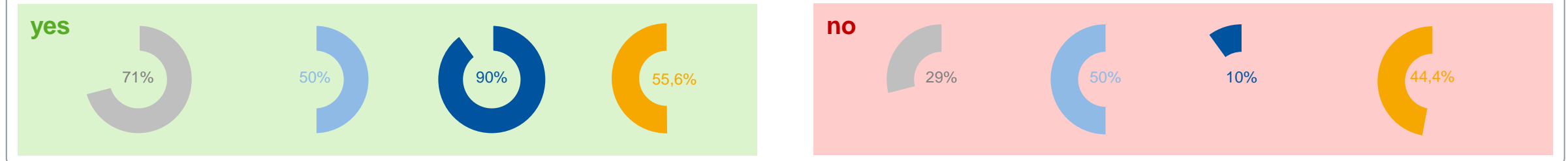
Findings

- The share of reworked products due to machining errors could be reduced by investing in new machines or implementing more systematic machine maintenance
- At South African tool shops, most of the errors are still detected late in the production process which leads to high costs for troubleshooting
- The share of reworked products in 2020 is lower than 2014, indicating an improved perception for quality management

Process: Suggestion system



Use of the internal suggestion system in the company



Findings

- Leveraging the employees' ideas helps to significantly increase operational excellence – Furthermore, the introduction of a suggestion system in the company is advisable to increase employee satisfaction

Since 2014 the number of proposals per year has cut in half and the average time for evaluation has doubled in South African tool shops – This development demands for improvement of the implementation process of suggestion systems

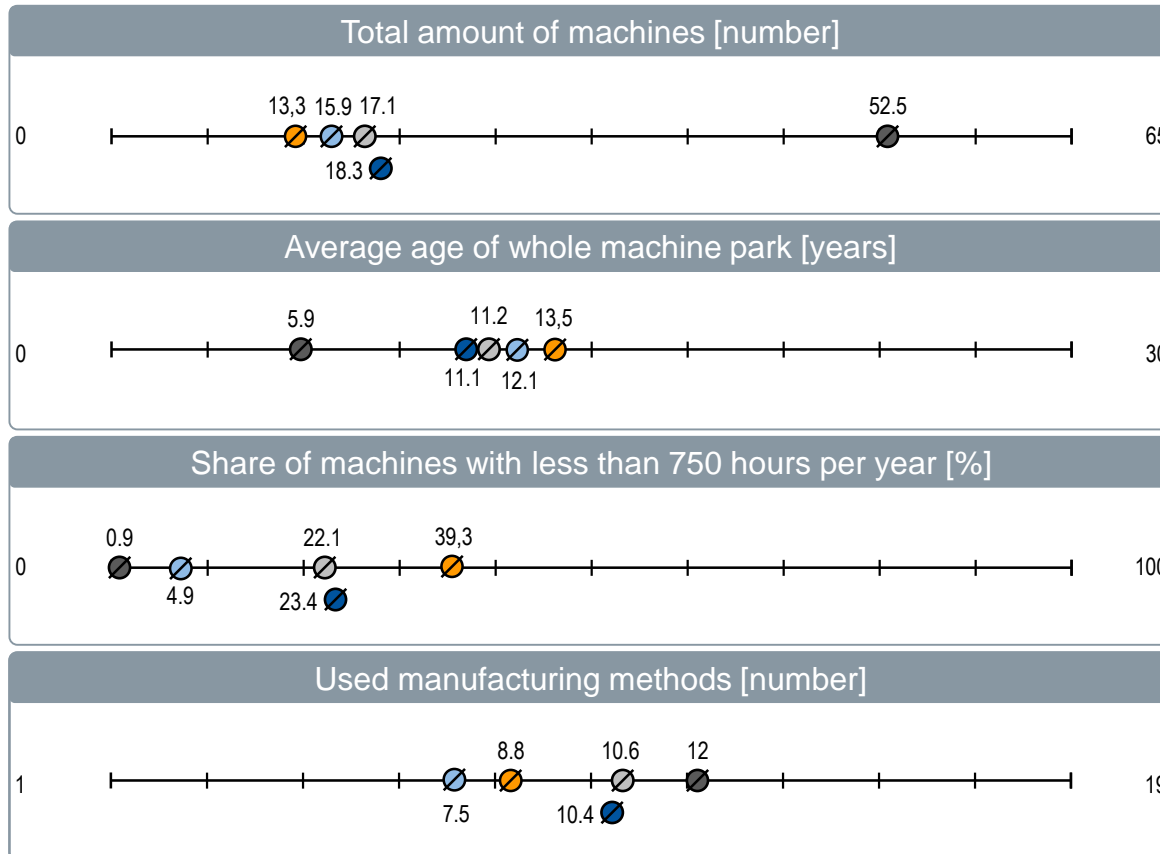
Sector-Wide Benchmarking Analysis 2020: Presentation of benchmarking results



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Resources: Machinery



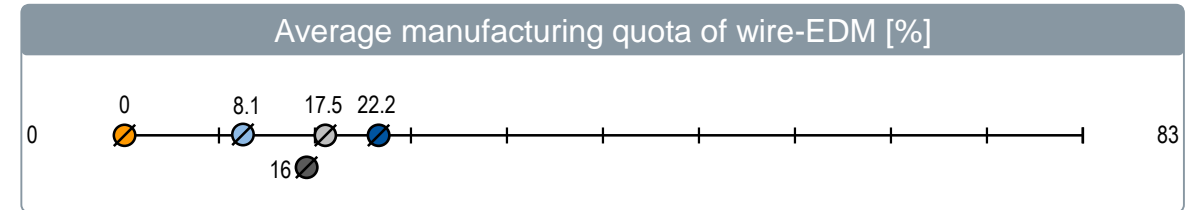
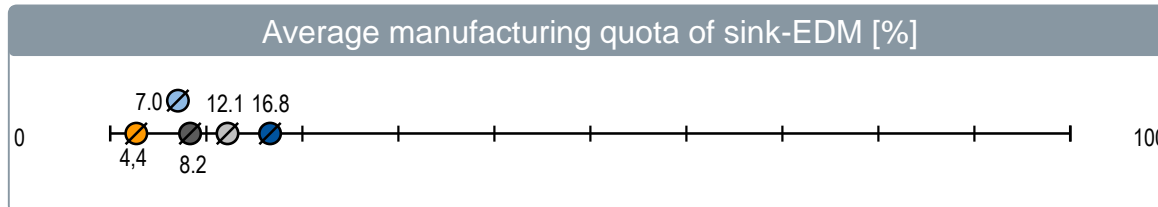
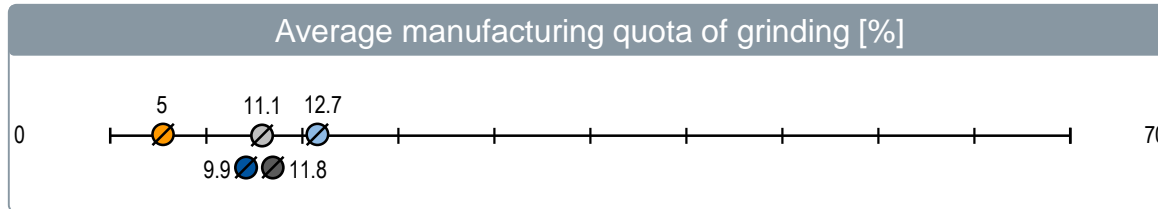
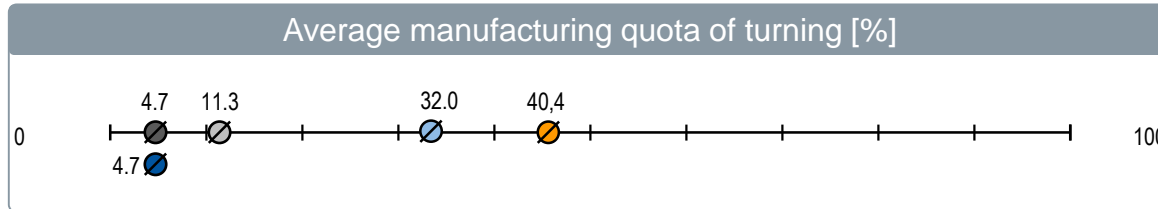
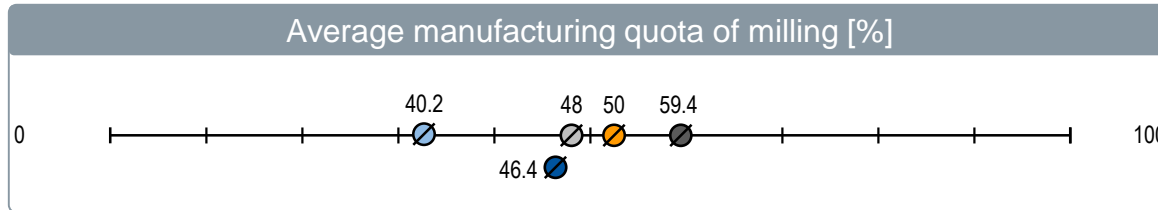
Findings

- South African tool shops in 2020 use a low sized machine park compared to all comparison groups, that complies with the amount of manufacturing methods
- The variety of manufacturing methods is significantly below the average variety of all comparison groups, although it has increased since 2014
- The age of the whole African machine park is above the majority of the comparison groups which indicates a high probability for machine problems and failure
- Machine failure is a problem due to the low flexibility of evasion possibilities
- The share of machines with less than 750 hours has strongly increased from 2014 to 2020 indicating an insufficient planning process

The condition of the machine park and the variety of manufacturing methods indicate the long-term ability to comply with the market demand and fluctuation – however the South African tool shops in 2020 have still room for improvement in this specific area



Resources: Allocation of manufacturing methods

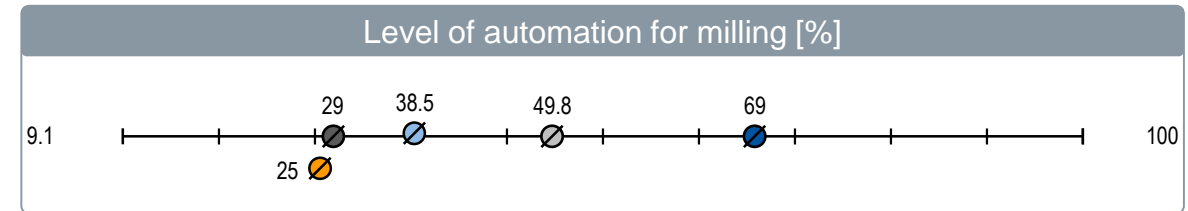
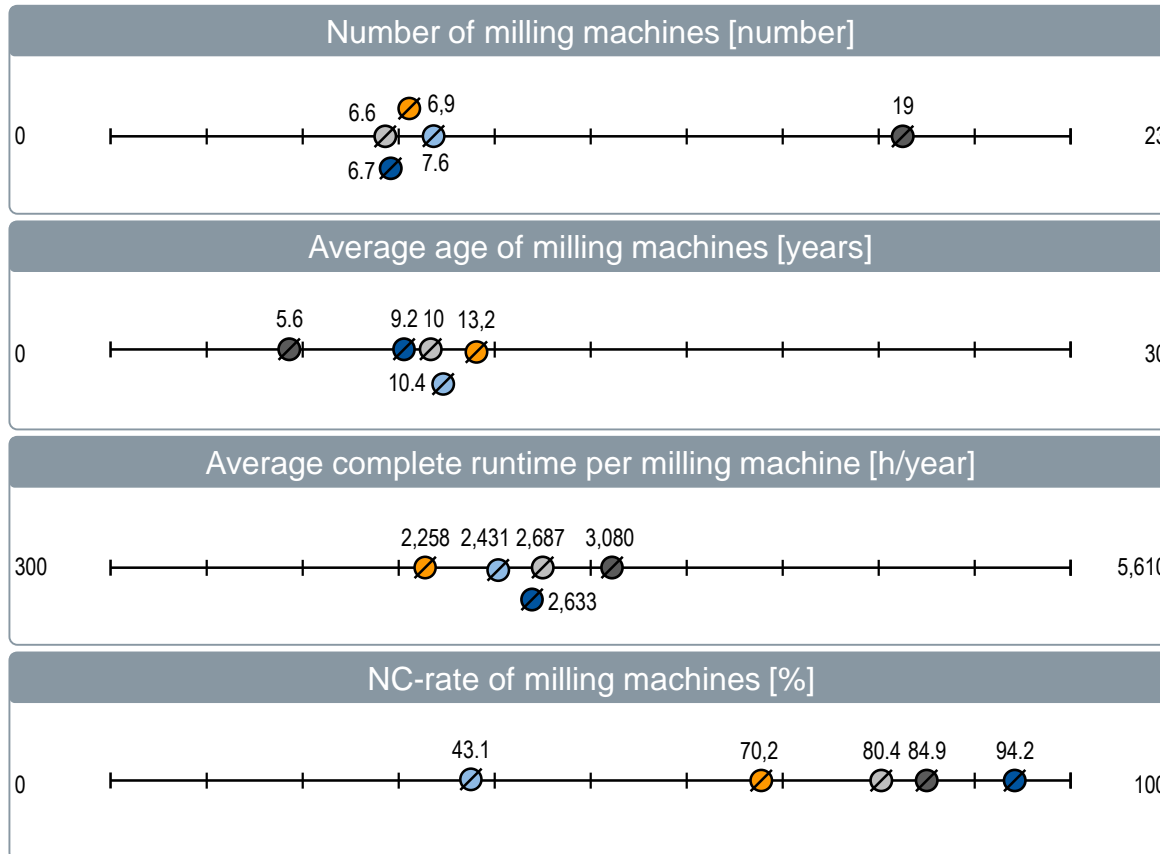


Findings

- On a national level, milling and turning are the most relevant technologies of the South African tooling industry, the share of turning superseding nearly every comparison group by far
- South African tool shops in 2020 are focused on core competencies – milling and turning are equally divided which have strongly increased since 2014
- Grinding, sink-EDM and wire-EDM has significantly decreased within the past 7 years – they are still of subordinate relevance in South Africa

**The milling technology dominates South African production by taking up more than half of all manufacturing efforts -
Increasing the runtime of milling machines is one of the most important tasks to be accomplished by the South African tooling industry**

Resources: Milling

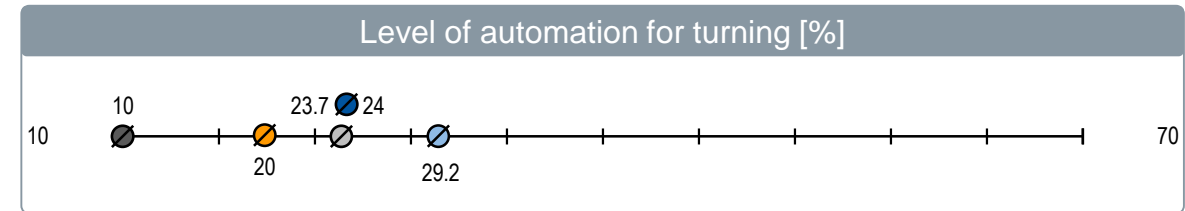
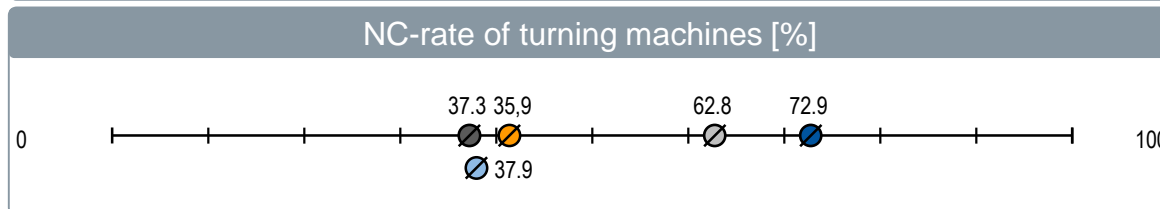
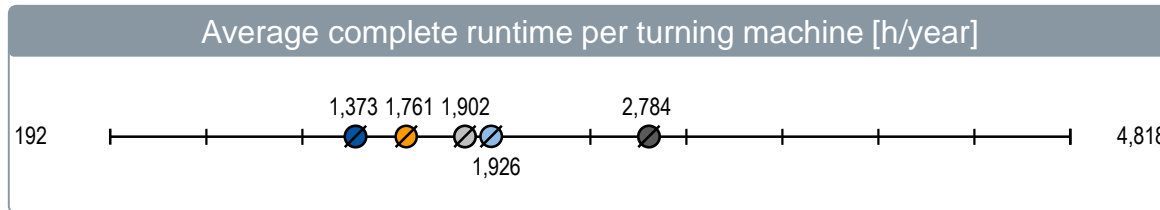
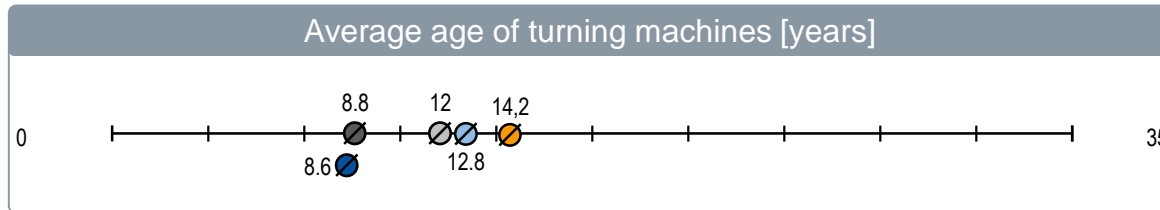
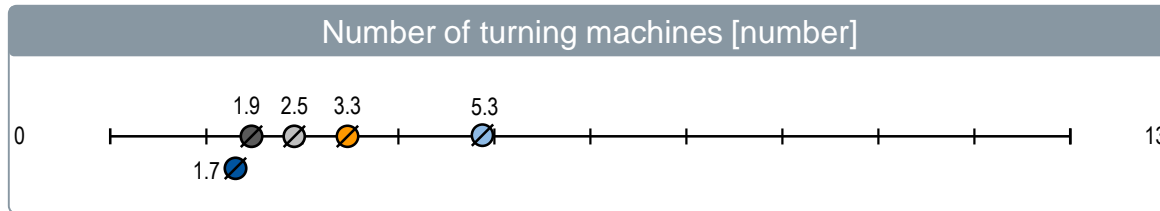


Findings

- South African average in 2020 has a total of 7 milling machines with an age higher than the market average – Since 2014 the number of machines and the average age has a positive development decreasing slightly
- The average runtime of the milling machines in 2020 is lower compared to the competitors, and lower than in 2014 indicating a trend of insufficient demand or resource planning
- South Africa maintains a lower level of automation in 2020 for milling machines – widening the level of automation could reduce time and further costs since milling makes up 50% of the manufacturing quota

Renewing existing milling machines and increasing their runtime by optimizing automation or maintenance & capacity planning holds great potential for South African tool shops

Resources: Turning

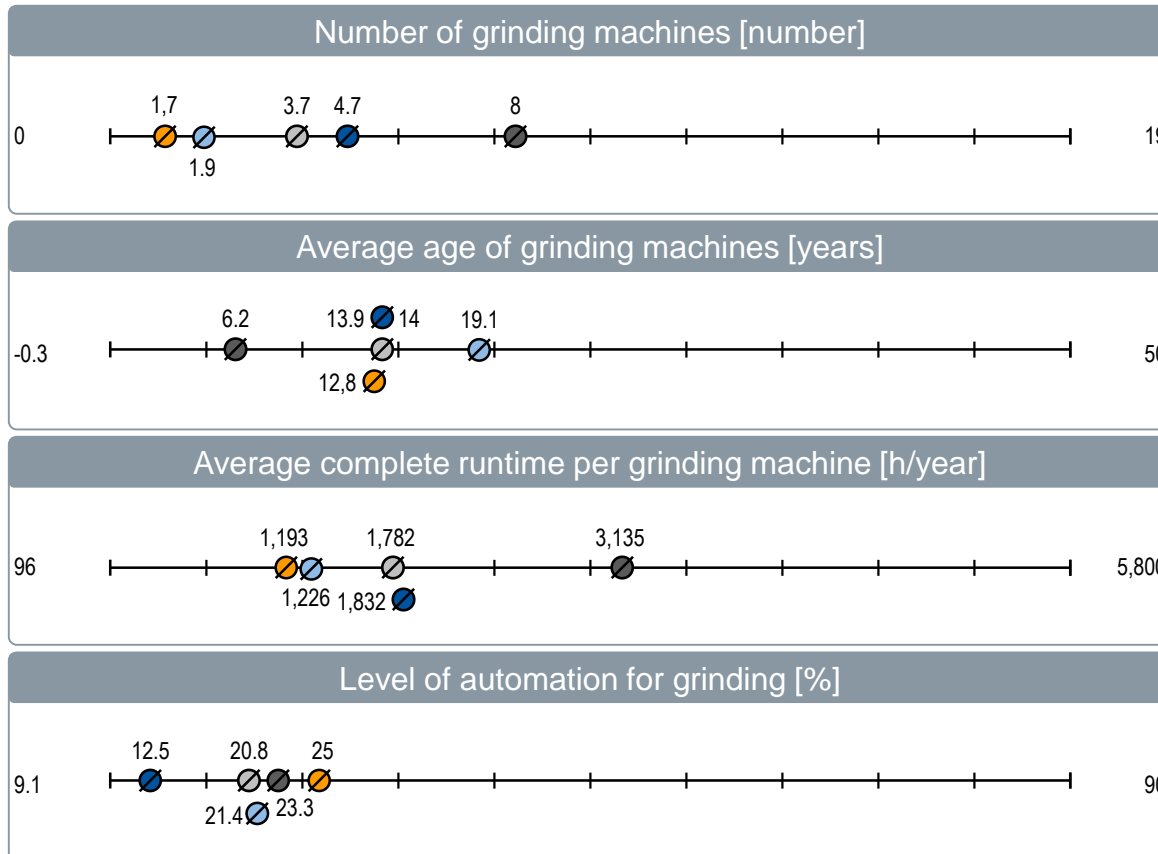


Findings

- South African tool shops in 2020 have a total of three turning machines with a higher age than the industry average – decreased about 2 machines since 2014, the number of the turning machines meets now the share of use of the technology
- The NC-rate could be improved to achieve better output – the automation level of turning machines is low compared to 2014 leading to higher costs and dependences on employee experience
- The strategic fit of new technologies should be evaluated before making an investment - A higher capacity utilization enables a quicker amortization of the machines and lowers the machine hourly rates

Investing in new turning machines with a high level of automation could help to increase the internal efficiency and productivity of the technology, helping to serve more customers because of a well functioning and faster overall production

Resources: Grinding

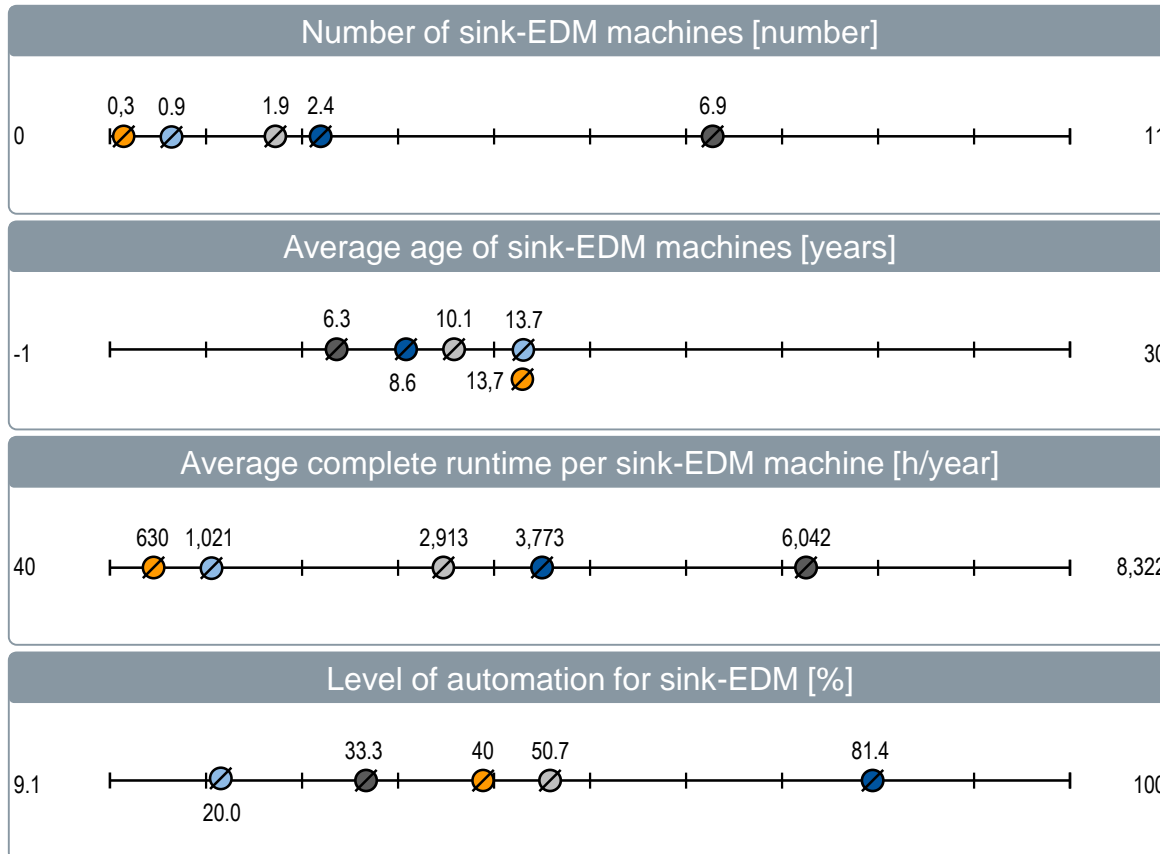


Findings

- The number of grinding machines in 2020 is still comparable low -As the dominating technology for higher precision manufacturing, grinding should be of significant relevance to the South African market
- The average age has decreased within the past 7 years and the level of automation has risen indicating a trend of investment in modern grinding machines
- Based on future strategic positioning to open up new markets, an investigation about the purpose of the machinery should be considered

The international manufacturing industry demands for increasingly precise tools – Grinding technology conducts a higher precision and thrives a perspective for international competitive tool production

Resources: Sink-EDM



Findings

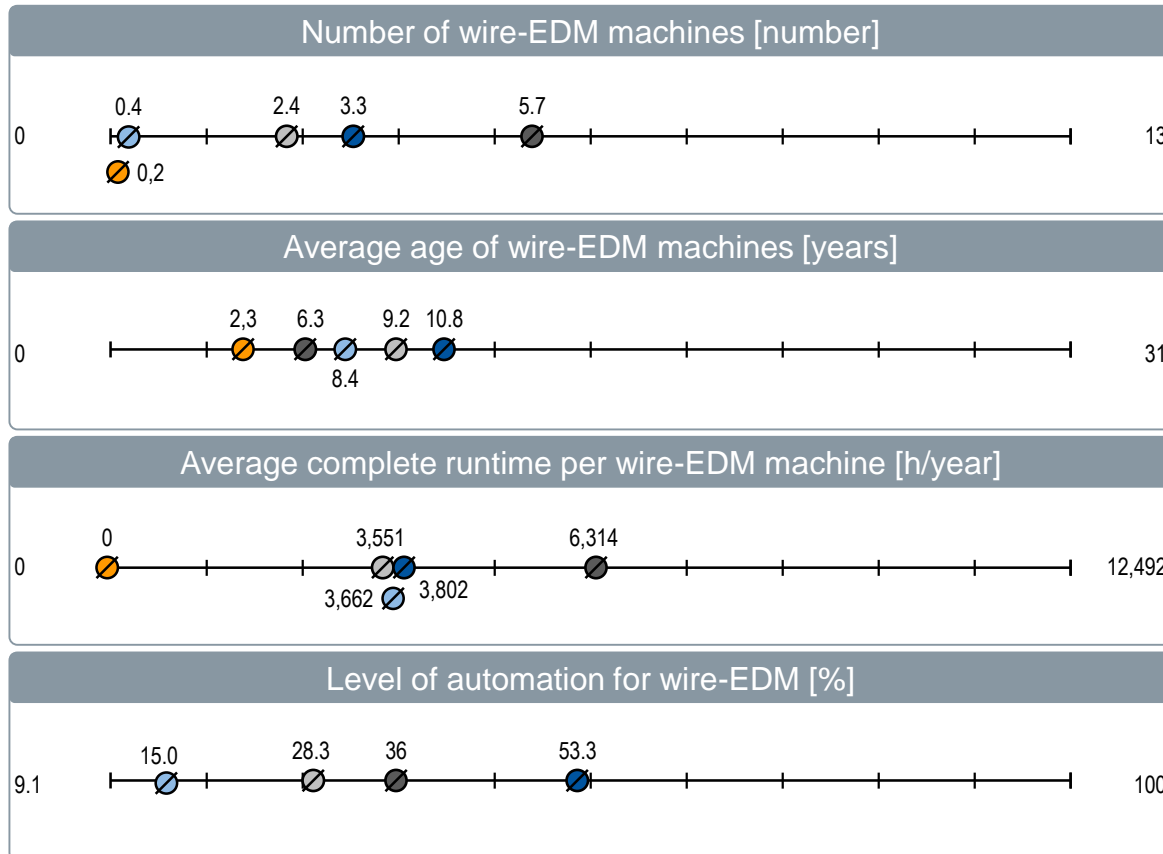
- The average of the South African tool shops 2020 own one sink EDM machine with an average age of almost 14 years
- In order to improve tool manufacturing precision, a strategic decision should be made regarding the intended technology focus in the future
- The average runtime of the machines at the South African competitors is significantly lower than the other comparison groups and has decreased from 2014 up to now, indicating insufficient demand or inefficient resource planning
- Moreover, the level of automation has highly increased since 2014 – However the German best practice tool shops are still higher which indicates further development of the sink-EDM technology for the international production market
- While having a lower importance to South African production at the moment, sink-EDM might be of increasing relevance in the future – tool shops should set their future technology scope more market oriented

South African Sink EDM production maintained a comparable high machine average age and dropped about 66% in number of machines since 2014 – The similar decreased low average utilization indicates the irrelevance of the technology for the attending companies this year

○ Average
○ South Africa 2014
○ German best practice
○ Chinese competitors
○ South Africa 2020

Source: Analysis according to the questionnaire

Resources: Wire-EDM



Findings

- Manufacturing parts with wire-EDM enables highly precise production processes with little necessary rework if applied correctly and for strategically appropriate parts
- Wire EDM cutting is also versatile in the hardness of the conductive metals it can cut with relative ease, ranging from flexible up to the hardest materials
- Wire-EDM is of subordinate relevance in South African production due to the comparable low number of machines
- From 2014 to 2020 the average age of the machines has significantly decreased – the South African tool shops are starting investing in EDM machines

**South African Tools shops have decreased the number of EDM machines about 50% in the past 6 years–
The largest problem of wire-EDM in South Africa is the low capacity utilization and the missing further investment in EDM technology**

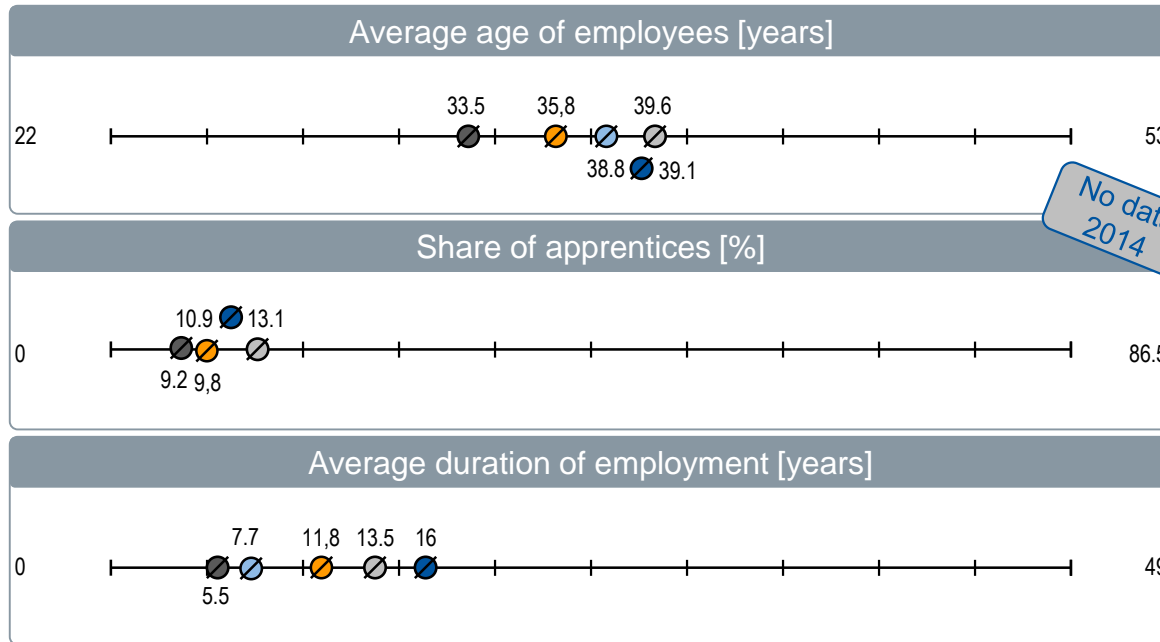
○ Average
 ○ South Africa 2014
 ○ German best practice
 ○ Chinese competitors
 ○ South Africa 2020

Source: Analysis according to the questionnaire

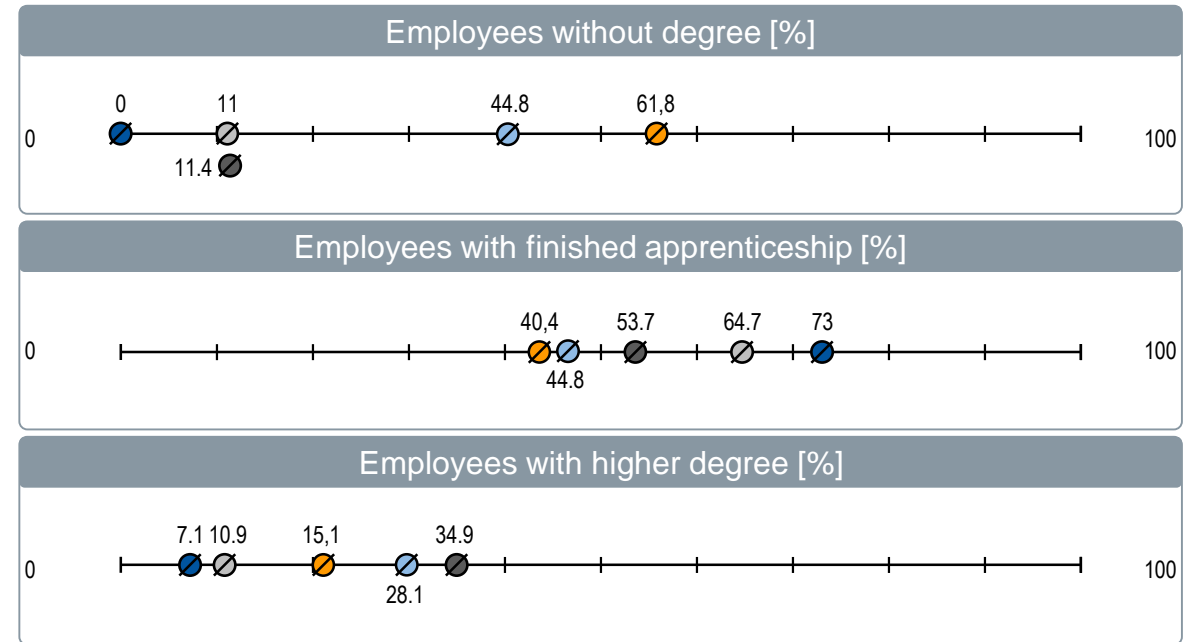


Resources:

General employee information and employee qualification



No data 2014



Different qualification systems across different markets – sum does not necessarily equal 100%

Findings

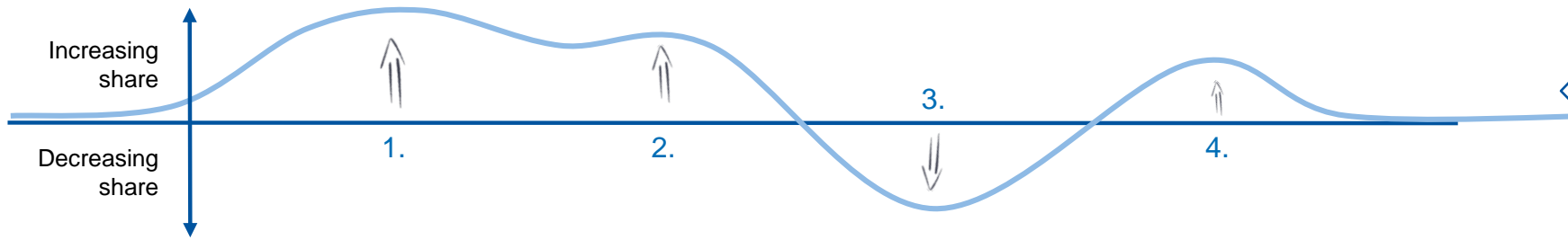
- South African tool shops analyzed in 2020 have a significant higher share of employees without a degree than 2014 and the international competition
- A higher share of apprenticeships and an apprenticeship program offers the potential to optimize future employee's skills – provides bonding potential and decreasing share of employees without a degree

South African tool shops strive for stronger efforts in educating young tool makers via apprenticeship programs – Achieving better employee relationships and establishing higher average duration employment

○ Average ○ South Africa 2014 ● German best practice ● Chinese competitors ● South Africa 2020

Source: Analysis according to the questionnaire

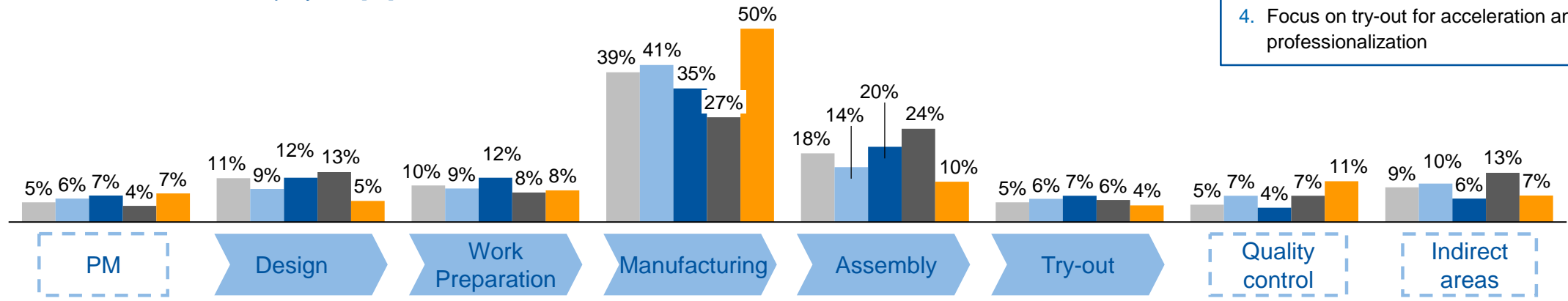
Resources: Employee distribution



Development of employee distribution in the tool and die industry

1. Increased use of know-how in development and design
2. Increased planning effort for modern manufacturing concepts
3. Decreasing importance of direct manufacturing through automation
4. Focus on try-out for acceleration and professionalization

Distribution of employees [%]

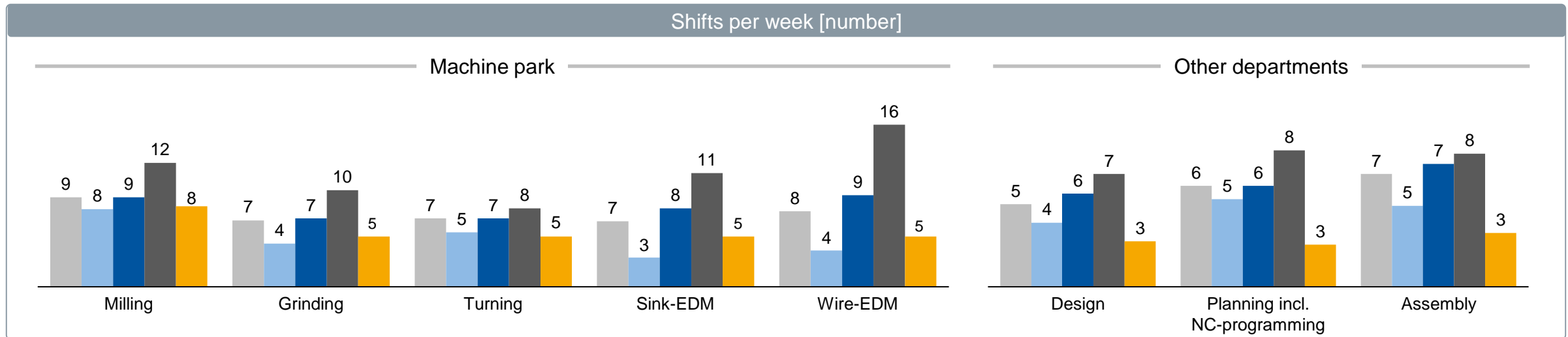


South Africa has increased the number of employees in the manufacturing and quality control from 2020 to 2014 – implementing standardized products and processes provides further potential for redistribution

○ Average
 ○ South Africa 2014
 ○ German best practice
 ○ Chinese competitors
 ○ South Africa 2020

Source: Analysis according to the questionnaire

Resources: Shift model



Findings

- The amount of milling and turning shifts that South Africa runs per week in 2020 is significantly above to the South African average from 2014 and far beyond other competitors which reflects the core use of technology
- Optimal economic utilization of the machines is indicated by high numbers of shifts – however every other machine park and department decreased since 2014

The distribution of shifts reflects the allocation of technology used in South Africa 2020 – driving up runtimes with focus on few machines provides further improvement potential

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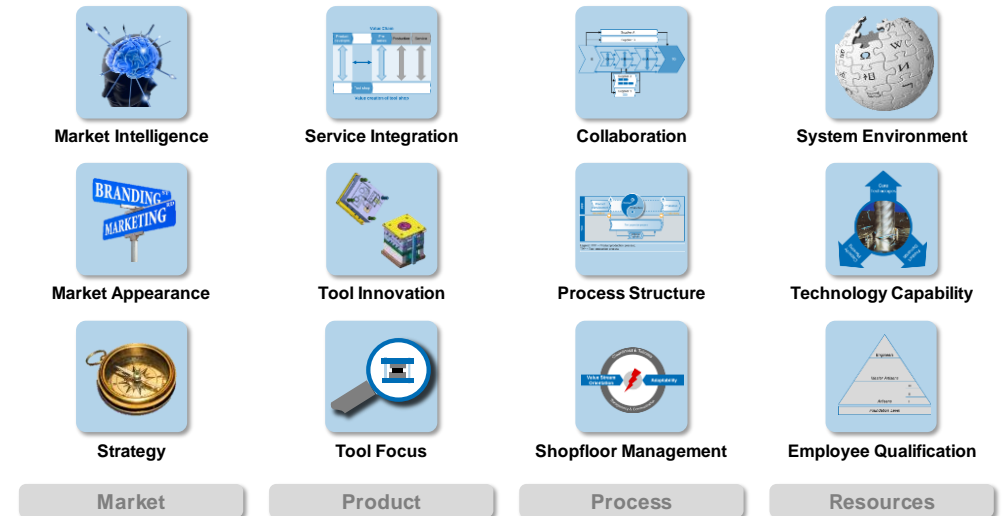
- 5 Contact



Development of the industry: Comparison of the benchmarking 2020 and 2014 (I/II)

Findings

- Through enhanced **online representation**, the South African tooling sector has advanced primarily within **market appearance**
- South African tool shops have increased their **usage of design systems** – yet the share of errors identified in production has not decreased which indicates there are still potentials in usage
- In the past seven years, national **hourly rates** have **risen in indirect areas** which indicates higher loan structures and **decreased in productive areas** which indicates higher efficiency – however there has not been significant investments and the **rise of productivity is lower** in comparison to other developing countries
- The tooling sector in South Africa has expanded its **service portfolio** which helps to generate new revenue and client demands – however toolshops still struggle to calculate and bill these services properly
- **Vision & strategy, planning and scheduling, shopfloor management, supplier management and calculation** are (still) the most prominent potentials of South African tooling companies



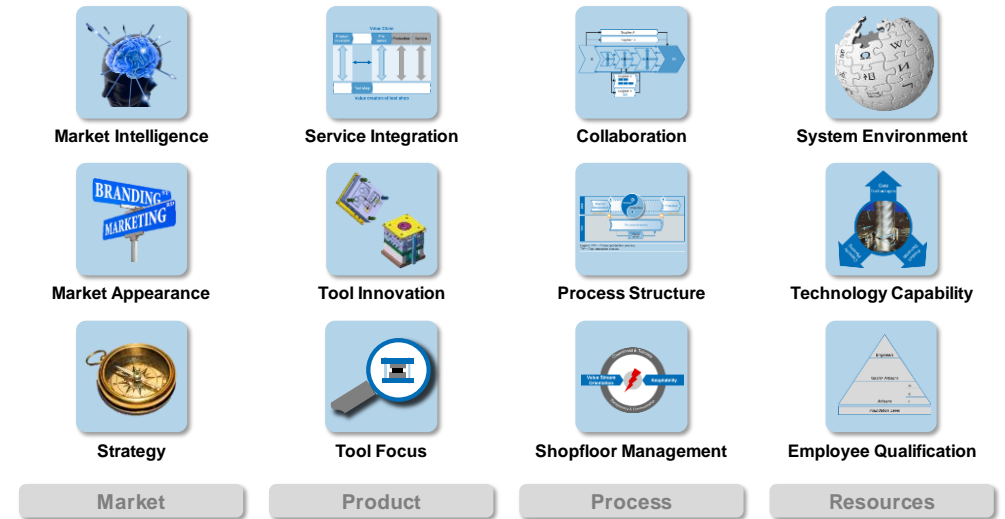
Tool shops must focus on their core competencies and organize their internal processes to remain competitive – Calculation and post-calculation, as well as productivity are key factors to increase the toolshops competitiveness



Development of the industry: Comparison of the benchmarking 2020 and 2014 (II/II)

Findings

- Due date reliability at South African tool shops is far behind the international best practice
- Changing market conditions should be actively addressed with a long-term company vision and strategy
- Setting a competitive budget and improving the quoting process are necessary for the international competition
- The use of suggestion systems has increased in South African tool shops



Tool shops must focus on their core competencies and organize their internal processes to remain competitive – Calculation and post-calculation, as well as productivity are key factors to increase the toolshops competitiveness