

SOUTHWIND
International **USA** 

WHY COLD FORMING TOOLS FAIL?

¿Por que fallan las herramientas de forjado en frío?



Ing. John B. Graef
Sources:
Nedschroef Academy
Universal Punch Corp.

WHY COLD FORMING TOOLS FAIL?



- This presentation is an open discussion about a critical issue in the fasteners and cold forming parts industry, that is the failure of the cold forming tooling.
- The proposal is to present and comment the main causes of cold forming tools breakage, poor tool life and other kind of failures that affect in some way, the production and the costs of the fastener's industry.



THE SPEAKER



- **John B. Graef (64)**, Mechanical Engineer, graduated at Catholic University of Rio Grande do Sul (PUC-RS), Porto Alegre-Brazil and MBA by Maua Institute of Technology, with specialization in Marketing Strategy at Getulio Vargas Foundation (FGV-Sao Paulo School of Economics) both in Sao Paulo-Brazil.
- Fasteners Manufacturing Specialist, with over 35 years of experience in fasteners and cold forming parts production, engineering, sales & marketing and international trading of fastener machinery, tooling and cold forming technology.
- For 15 years working as Plant Manager and General Manager of Brazilian fastener companies and since 1995 founder and CEO of SouthWind International, a Brazilian technical trading company specialized in supplying machinery and tooling for the fastener industry in Brazil and South America, currently representing 15 companies, machines and tools manufacturers from more than 10 countries, and since 2015 Managing Director of SouthWind Int'l USA, specialized in supplying cold forming tools for North American fasteners producers.

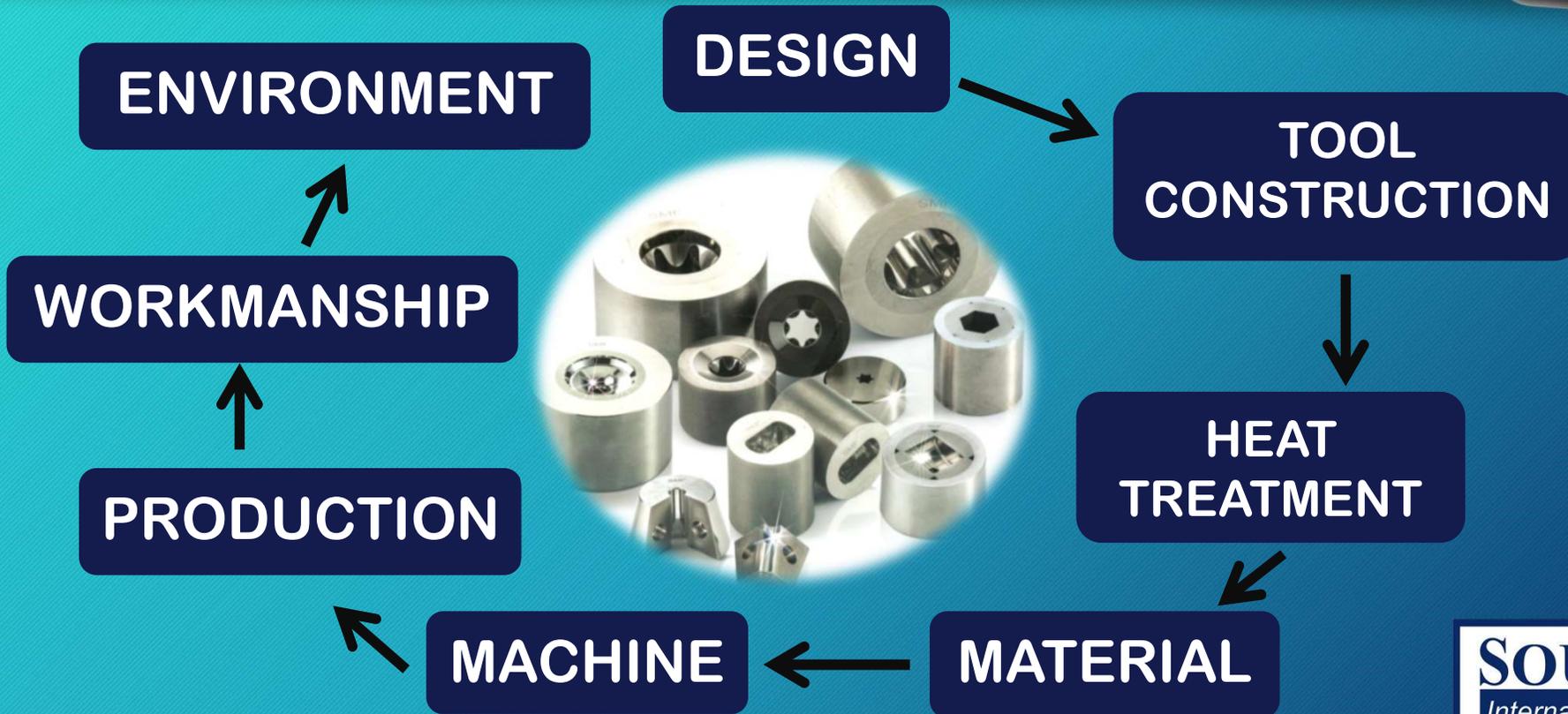
INTRODUCTION



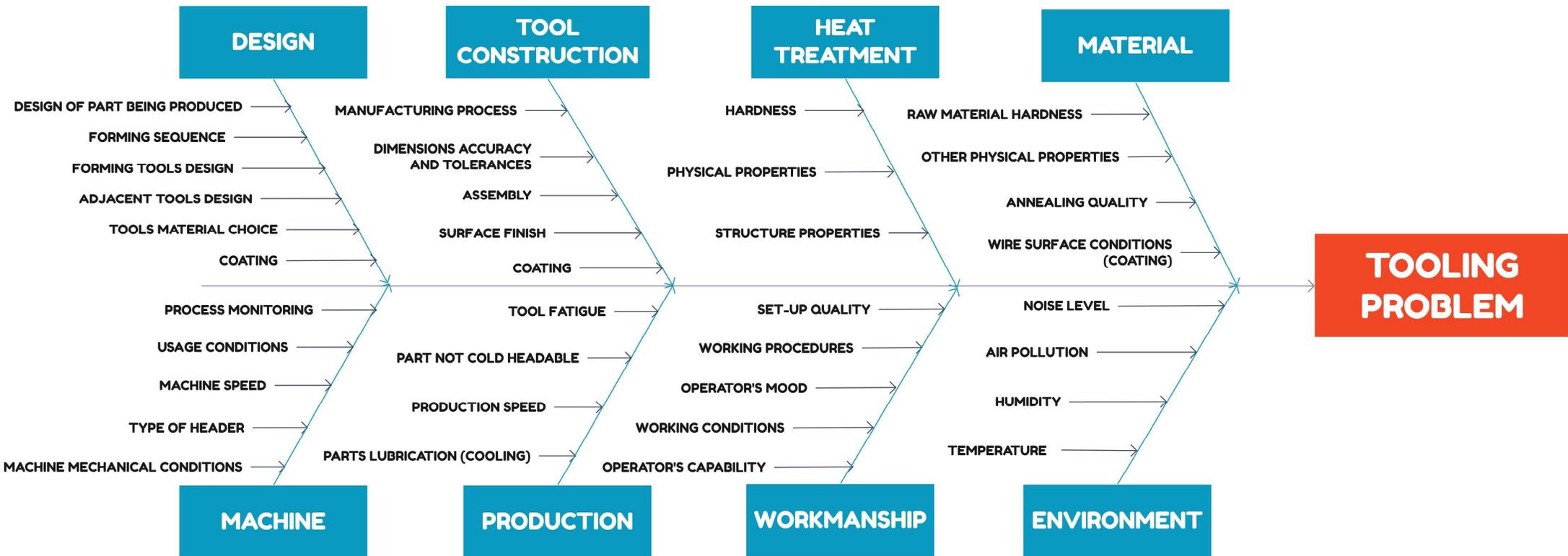
- Cold forming tools failure is a broad subject for technical discussions and this presentation does not intend to exhaust the theme, but rather to open the discussion and transmit something from our knowledge and experience in the processes of cold forming and the main causes that leads to failure of the tools involved in the manufacturing process of fasteners and cold forged parts.
- When a tool failure happens during production, we are normally driven to think that the obvious reason is the poor quality of the broken tool, but it is not always like that, as several factors can influence the cold forming tools failure.



FACTORS INFLUENCING TOOL LIFE



FISHBONE OF TOOLING FAIL FACTORS



DESIGN OF THE TOOLING



1. DESIGN OF THE PART BEING PRODUCED
2. FORMING SEQUENCE
3. FORMING TOOLS DESIGN
4. ADJACENT TOOLS DESIGN
5. TOOL MATERIALS CHOICE
6. COATING

TOOL CONSTRUCTION



1. TOOL MANUFACTURING PROCESS
2. DIMENSIONS ACCURACY AND TOLERANCES
3. TOOL ASSEMBLY
4. SURFACE FINISH
5. COATING

HEAT TREATMENT



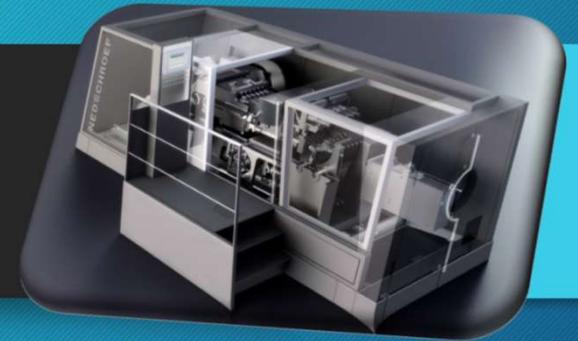
1. HARDNESS
2. PHYSICAL PROPERTIES
3. STRUCTURE PROPERTIES

MATERIAL



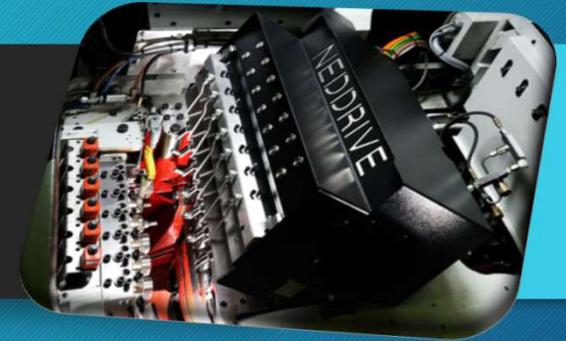
1. RAW MATERIAL HARDNESS
2. OTHER PHYSICAL PROPERTIES
3. ANNEALING QUALITY
4. WIRE SURFACE CONDITIONS (COATING)

MACHINE



1. MACHINE MECHANICAL CONDITIONS
2. TYPE OF HEADER
3. MACHINE SPEED
4. USAGE CONDITIONS
5. PROCESS MONITORING

PRODUCTION



1. PARTS LUBRICATION (COOLING)
2. PRODUCTION SPEED
3. PART NOT COLD HEADABLE
4. TOOL FATIGUE

WORKMANSHIP



1. OPERATOR'S CAPABILITY
2. WORKING CONDITIONS
3. OPERATOR'S MOOD
4. WORKING PROCEDURES
5. SET-UP QUALITY

ENVIRONMENT



1. TEMPERATURE
2. HUMIDITY
3. AIR POLLUTION
4. NOISE LEVEL

TOOLING FAILURE PREVENTION



The use of load process monitors on heading machines and thread rolling machines, can prevent most of the cold heading problems and tool breakage, as these systems can literally feel the forming process behavior and stop the machine even before the problem happens or stops the process after the very first incident of tool failure, preventing additional tooling breakage on the following tools of the heading progression.

As any manufacturing control and monitoring systems, the loads monitors when installed on the machine, must be followed by the operator's training in order to get the benefits of the system and thus, avoid unnecessary risks on the cold heading process.

CONCLUSION



Cold forming tool failure or poor tool life normally involves more than one factor and the problem must be analyzed under the several different aspects that we have seen during this presentation.

By using the problem analysis methodology we can always cover all possible causes that diminish tool life and narrow the search to identify the root cause of the tooling fail.

The quality of the tool itself usually is considered as the first possible cause of tooling failure, but as we've seen in this presentation, many other external factors can apply and must be considered in the analysis of the problem.



QUESTIONS



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