



S (I-A) Tuesday, October 15, 2025; 8:30 am – 10:45 am
Noise, Impact including Exposure to silica,
Ergonomics and Safety Risks from Power Tools

Influencing Procurement of Powered Hand Tools to Improve Safety and Productivity

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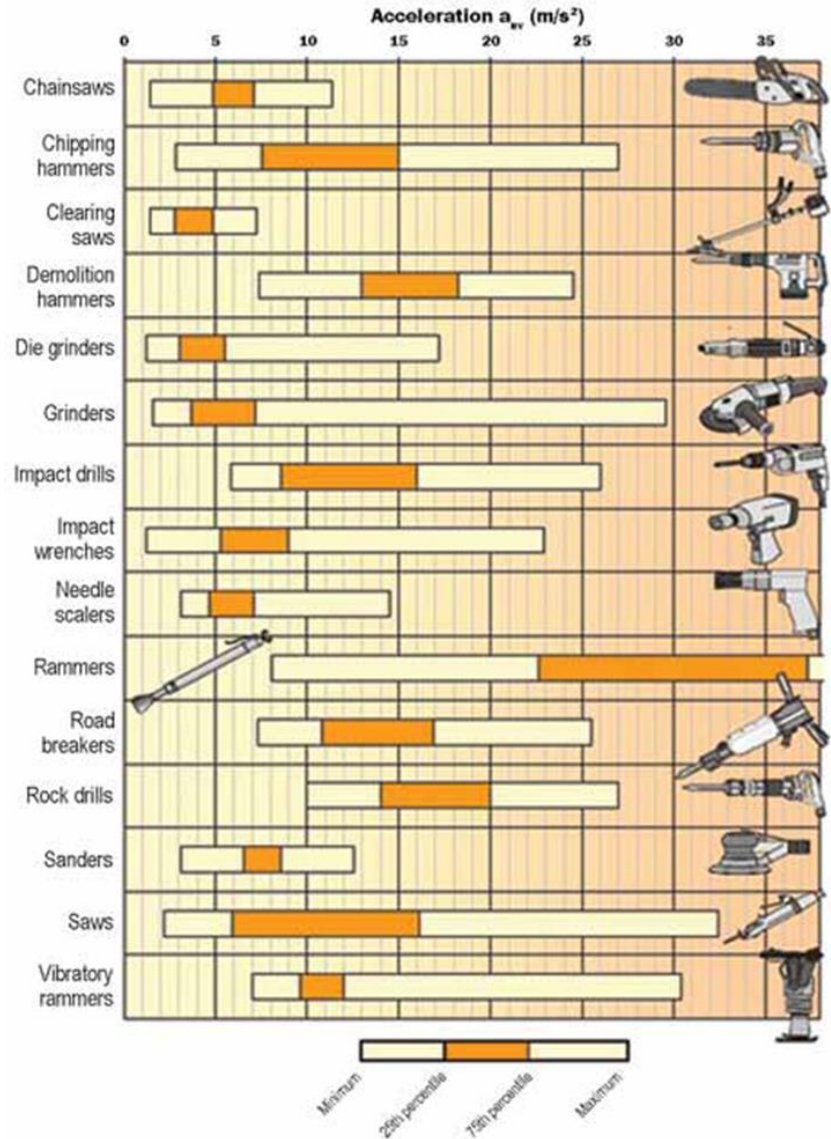




Objectives - DEVELOPMENT OF A BALANCED SCORECARD FOR EVALUATION AND PROCUREMENT OF POWERED HAND TOOLS

- Describe safety and influence of power tools with specific requirements for vibration, noise and ergonomics
 - Provide background addressing hand-arm vibration
 - Describe work of Society of Automotive Engineers EG1-B1 Committee work in developing standard approaches for power tool evaluation and procurement
 - Discuss possible way ahead for improving quality of tools available to Federal workers and the construction industry in general
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Product Selection is Vital for Vibration and Noise Control



Hand Vibration Injuries



Hands of vibrating pneumatic hand-tool operator in later stages of irreversible Hand Arm Vibration Syndrome 1

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Image of hands (not US Navy worker).

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common “White Finger” effect
termed Reynaud’s Disease



Hand Arm Vibration Syndrome (HAVS) is an illness caused by vibration when working with tools or holding a vibrating work piece.

Factors Used in Power Tool Evaluation

Factor	Relative Weighting	Notes
Productivity	20%	May include cycle time; amount of material removed, time to accomplish a particular amount of work.
Noise	5-10%	Depend on relative contribution as a risk factor. For example:
Hand-arm vibration	20%	Depend on relative contribution as a risk factor. For example: 5% of the evaluation based on vibration levels if $< 2.5\%$. 10% if tools operate in the range of $> 5.0 \text{ m/s}^2$ 15% if tools $> 10 \text{ m/s}^2$ and used > 2 hours/day
Ergonomic factors other than shock and vibration	20%	Guidance from Atlas Copco Guide to Power Hand tool Ergonomics and associated references.
Initial procurement cost	5%	May depend on anticipated life-span of tool and intensity of use (for example, occasional; periodic; daily).
Life cycle cost	15%	Includes maintenance - parts and labor

1. Productivity

Relative Weighting	Notes
20%	<p>Sub-factors may include</p> <ul style="list-style-type: none">-cycle time;-amount of material removed-time to accomplish a particular amount of work-Need to select a representative work task(s); ideally the one(s) used to evaluate noise and vibration

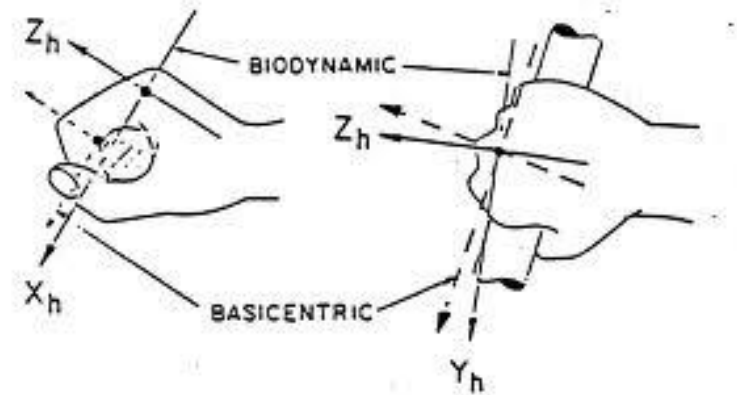
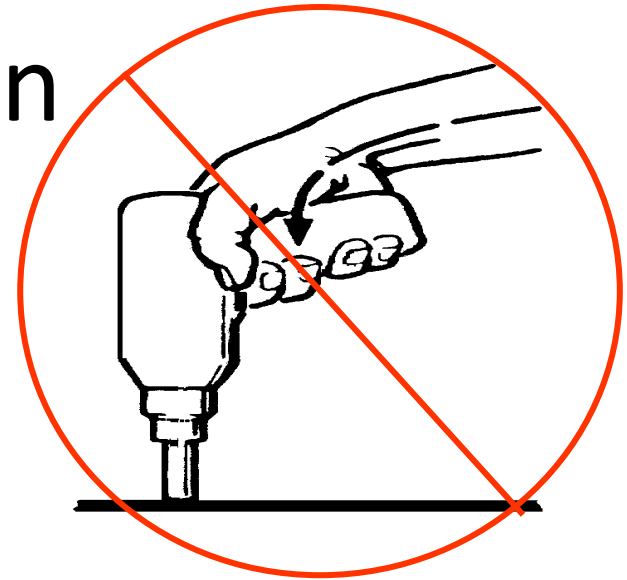
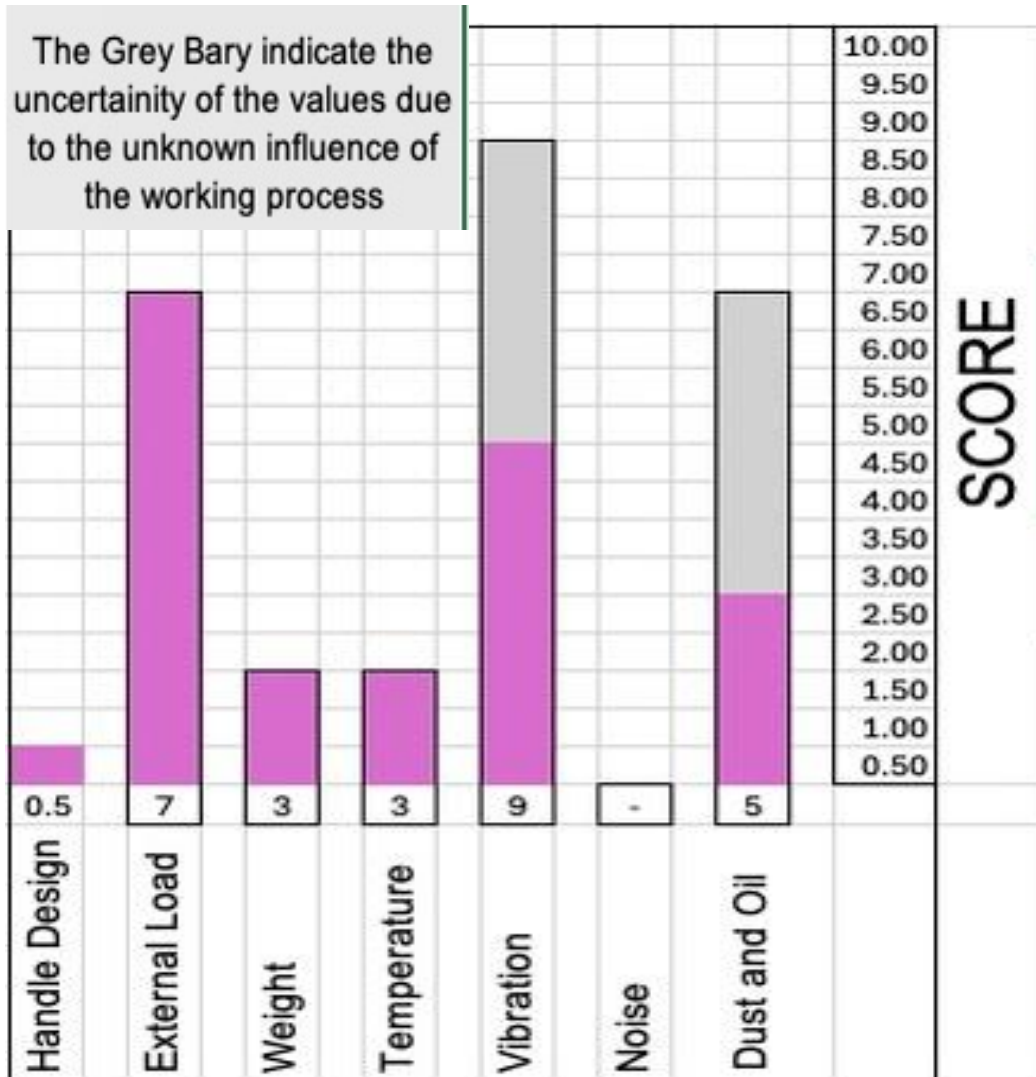
2. Noise

Relative Weighting	Notes
5-10%	<p>Depend on relative contribution as a risk factor. For example:</p> <ul style="list-style-type: none">5% for tools typically operating below 85 db. a10% for tools operating in the range of 100 dBA. <p>Sound power should be obtained, if feasible.</p> <p>NIOSH or European Union databases first choice</p> <p>Vendor's declared values might be used as initial estimate, but should be subject to verification. (Suitable penalties for significant misstatement would need to be</p>

3. Hand Arm Vibration

Relative Weighting	Notes
20%	<p>Depend on relative contribution as a risk factor. For example:</p> <p>5% of the evaluation based on vibration levels for categories of tools typically operating below 2.5 m/s^2 .</p> <p>10% for tools typically operating at $\geq 5.0 \text{ m/s}^2$</p> <p>Special case-15% for categories of tools typically operating at $> 10 \text{ M/s}^2$ and commonly used for > 2hours/day</p> <p>Information from EU and NIOSH databases may be used</p> <p>Vendor's declared values might be used as initial estimate, but should be subject to verification. (<i>Suitable penalties for significant misstatement would need to be applied, including product disqualification</i>)</p>

4. 20% Ergonomic Design



All factors side by side give a good picture of the tool ergonomics

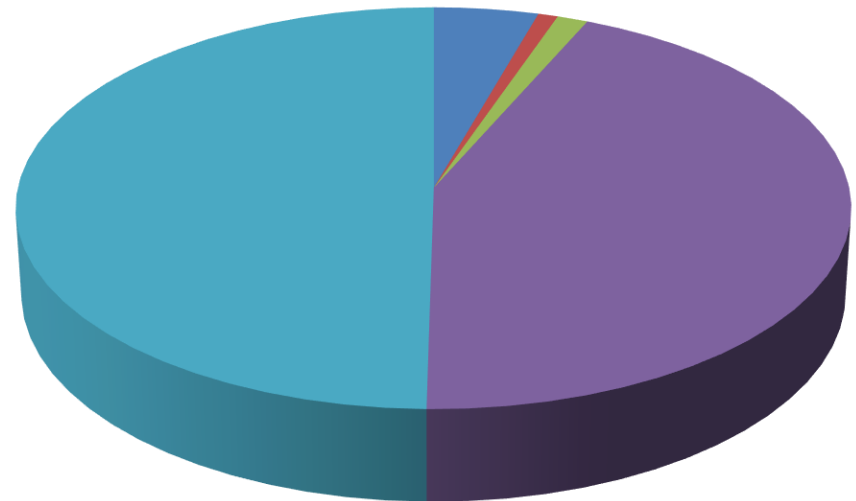
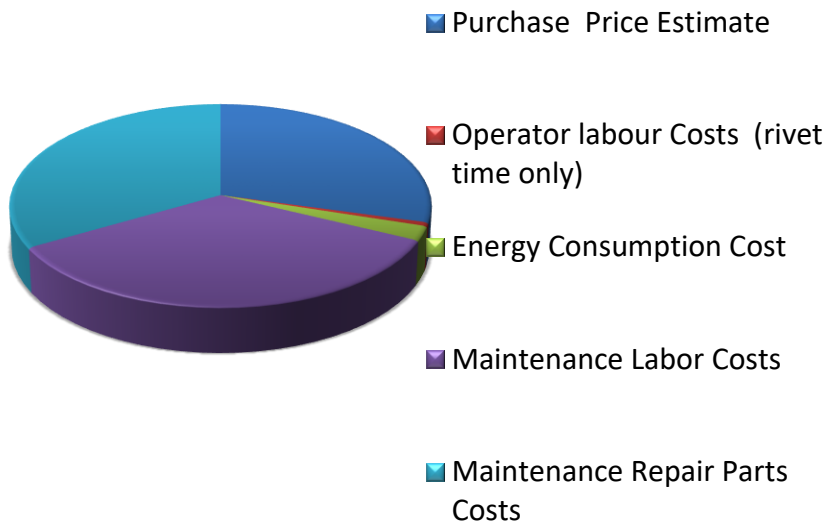
5 Initial Cost – 6 Life Cycle Cost

Comparison of Projected Life-Cycle Costs for Two Rivet Hammers			
	Tool Type	RRH 04 -12 TS, Rivet Hammer	Brand C, Rivet Hammer
#5 Initial Purchase Cost	Purchase Price Estimate	\$1,179.35	\$312.03
	Operator labor costs (rivet time only)	\$23.23	\$59.14
	Maintenance Repair Parts Costs	\$1,340.97	\$3,479.60
	Total Maintenance Costs (Reflects Warranty Costs Savings for New Tools)	\$2,557.40	\$6,006.78
	Yearly cost	\$3,149.99	\$6,462.45
#6 Life Cycle Cost	Five-year cost	\$15,749.93	\$32,312.26

TCO (Total Cost of Ownership) Life Cycle Cost

Brand "X" Rivet Hammer

Brand "Y" Rivet Hammer



Initial tool cost Brand X \$1,200

Initial tool brand Y cost \$312

5-year cost \$15,750

5-year cost \$32,312

Low price \neq Low TCO

“Balanced Scorecard”

- Develop a COMPLETE evaluation and procurement process for portable power tools
- Use a WEIGHTED approach to key parameters
- Produce input for ISO/SAE/ASME/EU standards



Approaches to Tool and Process Management

Getting the best (versus best marketing) vendors

What aspects of European and other approaches might be considered?

It's not just the tools –it's the process management!

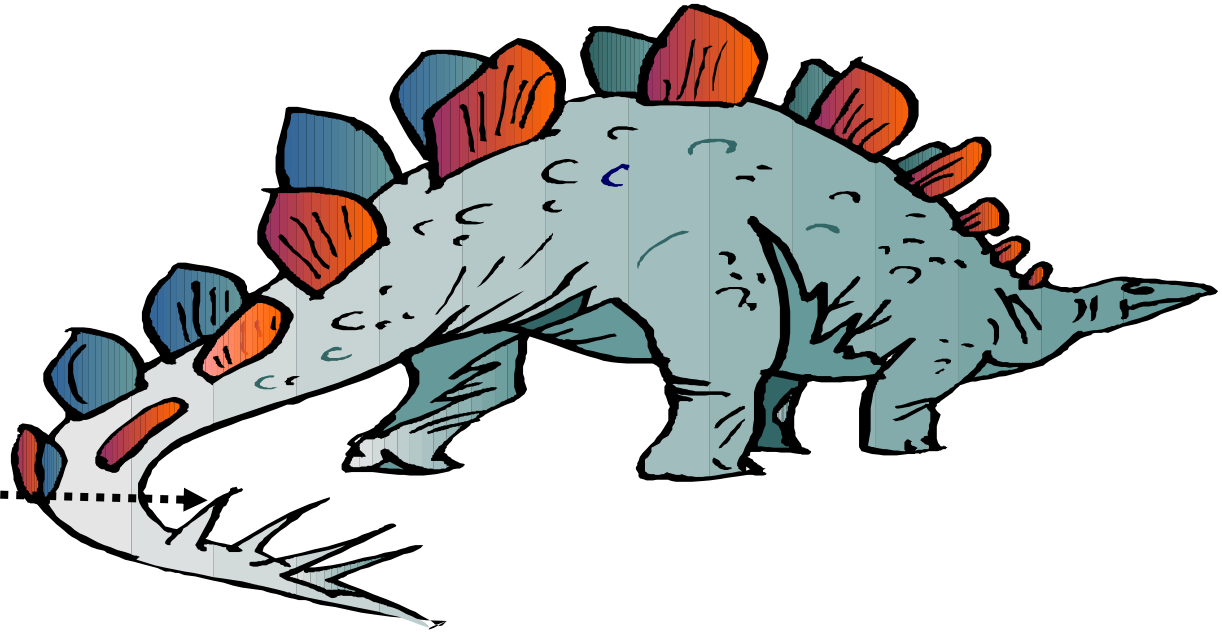
Cultural issues and organizational impediments to progress

How integrate safety and health as an indicator of process quality and effectiveness

Commit to Human Systems Integration

Typical Life Cycle Costs in Acquisition

This can be the Disposal Side



60-70% Operations, Maintenance & Disposal

20-30% Procurement

10% R&D

• 70% of costs committed in preliminary designs

Operations & Support

Production &
Deployment

System Development &
Demonstration

Technology
Development

Concept
Refinement

Power Tools: The Approach



- Evaluate power hand tools where vibration, noise or other safety concerns are a hazard
- Identify the same need at local and process management level
- Establish procedures for the Qualified Products List (QPL)
- Evaluate possible approaches to facilitate and document labs which can provide testing and evaluation
- Crosslink NIOSH, OSHA and EU websites

Wrap-up

- HAVS and other safety/health risk factors will be addressed through a tool evaluation process employing a Balanced Scorecard approach
- Society of Automotive Engineers EG1-B1 Committee Subcommittee developing evaluation guidance
 - Members include DOD Health and Safety, General Services Administration and industry representatives
 - Standard would allow common approach to procurement without needing to justify each purchase individually
- EU Regulatory challenges will need to be addressed
- Link with NIOSH is vital to this effort
 - Health Effects Research Laboratory (Vibration evaluation)
 - Construction Safety and Health
 - Prevention through Design
- Support for outreach to industry and Federal agencies

Thank you

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Addendum

DEVELOPMENT OF A BALANCED SCORECARD FOR EVALUATION AND PROCUREMENT OF POWERED HAND TOOLS

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Feedback Survey



Your feedback is important to me!