

SHADE TREE METALLURGY

- AGENDA** GENERALITIES
TYPES OF STEEL
OBTAINING & IDENTIFYING
HARDENING PROCESSES
QUESTIONS ANYTIME
- GENERALITIES** IF YOU HAVE COUSIN THAT IS METALLURGIST LISTEN TO THEM
STEEL AMAZING PRODUCT STARTS AS IRON OXIDE, SMELT IT, USE IT, LOSE IT, RETURNS TO OXIDE
BUT IN THAT USE IT PERIOD PRIMITIVE TOOLS, STEAM ENGINES, STEEL BUILDING,
AIRPLANES, ROCK ENGINES, CARS, KNIVES
WHY DO WE CARE ABOUT METALLURGY
BUY WORK HORSE CHISELS MODERN TECHNOLOGY
HARDENING DOESN'T HAVE TO BE PERFECT TO DO A GREAT JOB
MAKE TOOLS TO TEST BEFORE BUYING
ONLY NEED SPECIAL STEEL IF NEED EDGE
TRY STUFF
- TYPES** SAMPLES CAN'T TELL DIFFERENCE
ANSI, ASME, ASTM, SAE, MANUFACTURERS NAMES
HOT ROLLED & COLD ROLLED - MANUFACTURING PROCESS NOT A TYPE
IRON WROUGHT
CAST
CARBON **LOW OR MILD** 1006-1035
MEDIUM 1035-1055 RESPONDS TO HARDENING @ 35 PTS
HIGH 1055-1095
ALLOY (TITANIUM, VANADIUM, MOLYBDENUM, TUNGSTEN, CHROMIUM, MANGANESE, COBALT)
LOW ALLOY BELOW 4%
TOOL ABOVE 4%
S SHOCK
H HOT
O, W, A, D COLD
M, T HIGH SPEED
P MOLD
L, F SPECIAL
BLACKSMITH HIGH CARB, H-13, S-7, LOW ALLOY
WOODWORKING W1, A2, M2 T HIGH SPEED, HI CARBON
- OBTAINING & IDENTIFYING** **BUY** KNOW IF ANNEALED WHAT STATE IS IT IN?
FIND WHAT IS IT SEE SHEET
SPARK TEST SEE SHEET
- HARDENING PROCESS** WHY HARDEN, ONLY WHEN NEED EDGE LONG TOOLS
IF HOLDER ONLY FOR SMALL BIT MILD STEEL IF EDGE THEN TOOL
TERMS **HARDENING** ADDING STRESS
QUENCHING
TEMPERING REMOVING SOME STRESS GLASS EXAMPLE
ANNEALING REMOVE ALL ANNEAL IF HARD AND IF NEED TO MODIFY A LOT
LONG SLOW IN ASH WITH HEAT BLOCK
NORMALIZING REMOVE MORE THAN SOME BUT NOT ALL
IN AIR NORMALIZE IF WELDING ON TANG
WHAT MAKES HARDENING POSSIBLE? CRYSTAL BODY CENTERED AT LOW
FACE CENTERED AT CRITICAL MORE CARBON ATOMS CAN BE HELD AT FACE CENTERED
COOL SLOW CHANGES BACK, COOL QUICK CARBON GETS TRAPPED
HARDNESS DIFFERENT SCALES ROCKWELL C MOST COMMON ON TOOLS
50C OR BETTER TYPICAL
MOST COMMON MISCONCEPTION IN HARDENING IS THAT FORGE TEMP COLORS @ TEMPERING
COLORS ARE RELATED SEE BOOK COLORS
HEAT TO CRITICAL TEMP RISING NON MAGNETIC
QUENCH IN PROPER MEDIA WATER, AIR, OIL
MOVE IN FIGURE 8 TO PREVENT STEAM BUILD UP
MOVE UP AND DOWN TO PREVENT BRITTLE LINE
TEMPER IMMEDIATELY AFTER QUENCHING MINIMIZES CRACKING
TEMPER TEMPERATURE BASED ON STEEL SEE SHEET
WAYS RIGHT AFTER QUENCHING WITH RESIDUAL HEAT
TORCH
IN HOME OVEN
ON A TEMPERING BLOCK
POLISH STEEL ON SIDE
WATCH FOR PROPER TEMPERING COLOR (NOT FORGING COLOR)
WOODWORKING USUALLY STRAW
COLOR IS JUST OXIDE (RUST) THAT FORMS AT DIFFERENT TEMPS
BLACKSMITH BECAUSE BLACK OXIDE FORMS (RUST) AT HI TEMP
BROWN AT AMBIENT
QUENCH AGAIN TO STOP
CAN BE REPEATED FOR CONSISTENCY
SHARPEN WITH OUT HEATING TO TEMPER COLOR
IF YOU DO START OVER