A. Acronyms and Abbreviations

A

A2MAC1- (Supplier of Database)

ABAQUS - a commercial finite element code

ACC - Automotive Composites Consortium

ACCU - ACC Underbody Project

AHSS - Advanced high-strength steels

AISI - American Iron and Steel Institute

Al - aluminum

ALE - Arbitrary Lagrangian-Eulerian

AMD - Automotive Metals Division

A/SP - Auto-Steel Partnership

ASAP - Automated Sample Preparation System

ASP - Auto Steel Partnership

ASTM - American Society for Testing of Materials

AT - Axial-Torsional

ATC - Analytical Target Cascading

AUST, SS - austenitic stainless steel

AWS - American Welding Society

B

BBC - body centered cubic

BCJ - Bammann-Chiesa-Johnson

BET - Brunauer, Emmett, and Teller

BFI - Body-Frame-Integral (e.g. ‘unibody’)

BH - bake-hardenable

BIW - body-in-white

BN - used to designate a stir tool made from polycrystalline boron nitride. Numbers following BN, such as BN46, BN77, etc., are codes referring to the machining drawings that specify the tool shapes and dimensions.

BOF - Body on Frame

C

C - Carbon

CA - Cellular Automaton

CAE - Computer-aided engineering

CAD - Computer Aided Design

CALPHAD - Calculated Phase Diagram

CAVS - Center for Advanced Vehicular Systems

CCT - continuous cooling transformation

CDC - channel die compression

CF - carbon fiber

CMH - Composite Materials Handbook

CNC - computer numerical control

Co - Cobalt

CO_2 - Carbon dioxide

CP - complex-phase

CP - crystal plasticity

CPMT - Center for Powder Metallurgy Technology

Cr - chromium

CRADA - Cooperative Research and Development Agreement

D

D12, D13, D23 - components of rate of deformation tensor

db - Dry basis (adjusted for moisture content)

DC - Direct Current

DD - discrete dislocation

DICTRA - DIffusion-Controlled TRAnsformations in multicomponent systems (software package).

OEMs - original equipment manufacturers

DOE - Department of Energy

DoE - Design of experiment

DP - dual-phase

DP590 - dual phase 780 MPa

DP780 - dual phase 780 MPa

DQSK - draw-quality semi-killed

DRIFT - Direct Re-Inforcement Fabrication Technology

DRX - Dynamic Recrystallization

DSC - differential scanning calorimetry

E

EAM - embedded atom method

EBSD - Electron back-scatter diffraction

EDS - Energy dispersive microanalysis

EERE - Energy Efficiency and Renewable Energy

EHF - Electrohydraulic Forming

EHSSA - enhanced hierarchical statistical sensitivity analysis

EMF - Electromagnetic Forming

ER - extrusion ratio

ESPEI - Extensible Phase Equilibrium (software package)

ETA - (Supplier) Engineering Technology Associates

F

FBJ - Friction bit joining

FCC - face centered cubic

Fe - iron

FE - Finite element

FEA - Finite Element Analysis

FEM - Finite Element Modeling

FGPC - Future Generation Passenger Compartment

FLC - forming limit curve

FLCA - Front Lower Control Arm

FLD - Forming Limit Diagram

FMVSS - Federal Motor Vehicle Safety Standards

FRPMC - Fiber reinforced polymer matrix composites

FSSW - Friction stir spot welding

FOM - Figure of merit

FY - fiscal year

G

GA - galvannealed

GDIS - Great Designs in Steel

Gen - Generation

GM - General Motors Company

GMAW - Gas metal arc welding

GOS - grain orientation spread

GPa - Giga-Pascal

GSSI - global statistical sensitivity index

H

HAZ - Heat affected zone

HCP - Hexagonal Close Packed

HPDC - High Pressure Die Cast

HSB - hot-stamp boron

HSBS - hot-stamped boron steel(s)

HSLA - High-Strength Low Alloy

HSS - High Strength Steels

HSSA - hierarchical statistical sensitivity analysis

HyperXtrude - a commercial finite element code

Hz - Hertz

I

ICME - Integrated Computational Materials Engineering

ID - identification

IF - interstitial-free

IIHS - Insurance Institute for Highway Safety

IPT - in-plane transverse

IR - Infrared

ISV - Internal State Variable

J

JSSC - Joining Strategy Steering Committee

K

kg - Kilogram (unit)

L

LAMMPS - a molecular dynamics code

LANL - Los Alamos National Laboratory

lb - Pound (unit)

LCA - Life Cycle Analysis

LCCF - Low Cost Carbon Fiber

LCI - Life Cycle Inventory

LDH - limit dome height

LENS - Laser Engineered Net Shaping

L-IP - lightweight austenitic steels with induced plasticity

LM - Lightweighting Materials

M

m - Meter (unit)

μm - Micron (unit)

μs - microseconds

m^2g - square meters per gram

MA - Methyl acrylate

MAP - Microwave-assisted plasma

MBC – Main Bearing Cap

MC - Monte Carlo

MCA - Material Constitutive Analyzer

MCA - Material Constitutive Analyzer

MCS - Monte Carlo time step

MD - molecular dynamics

MEARS - Mass Efficient Architecture for Roof Strength

MEL - Magnesium Elektron Inc.

MFE - Magnesium Front End

MFEDD - Magnesium Front-End Design and Development Project

MFERD – Magnesium Front End Research and Development

Mg - Magnesium

min - minute (unit)

mm - millimeter

MMV - Multi-Material Vehicle Program

Mn - Manganese

Mo - molybdenum

MPa - mega-Pascal

MPIF - Metal Powder Industries Federation

MPP - Mesophase pitch

MPS - material point simulator

MS - Martensitic Steels

MS - Master of Science

MSF - Multi-stage fatigue (model)

MSST - Mississippi State University

N

N - nitrogen

Nb - Niobium

NCAP - New Car Assessment Program

NDA - Non-disclosure Agreement

NDE - Nondestructive Evaluation

NDI - Nondestructive Inspection

Ni - Nickel

NIST - National Institute of Standards

nm - nanometer

NPSS - nano precipitate strengthened steel

NSF - National Science Foundation

NVH - noise, vibration, and harshness

O

O - oxygen

ODB - Offset Deformable Barrier

OEMs – original equipment manufacturers

OM – Optical Microscope

ORNL – Oak Ridge National Laboratory

P

P - Phosphorus

P4 - Programmable Powdered Preform Process

PAN - Polyacrylonitrile

PCBN - polycrystalline boron nitride

PDAS - Primary Dendrite Arm Spacing

PDF - probability distribution function

PE - Polyethylene

PEO - Polyethylene oxide

PET - Polyethylene terephthalate

PFA - Progressive Failure Analysis

PFF - Precision Flow Form

PI - Principal Investigators

PM - Powder Metal / Powder Metallurgy

PMC - Polymer matrix composite

PNNL - Pacific Northwest National Laboratory

PPF - Pulse Pressure Forming

ppm - parts per million

R

R - Stress ratio defined as minimum stress/maximum stress in cyclic fatigue testing

R&D - research and development

RD&D - Research, development, and demonstration

RF - radio frequency

RMP - Repository of Material Properties

ROI - Return on investment

ROM - rough-order-of-magnitude

ROS - reactive oxidative species

RPM or rpm - revolutions per minute

RSTO - robust shape and topology optimization

RSW - resistance spot welding

S

SAMPE - Society for the Advancement of Material and Process Engineering

SANS - Small angle neutron scattering

SBIR - Small Business Innovative Research

SDAS - Secondary Dendrite Arm Spacing

SEA - Specific Energy Absorption

SEL - Solvent-extracted lignin

SEM - Scanning electron microscope

SETAC - The Society of Environmental Toxicology and Chemistry

Si - Silicon

SIMS - Secondary Ion Mass Spectrometry

SMC - Sheet molding compound

SN - used to designate a stir tool made from silicon nitride. Numbers following SN, such as SN77 or SN97, are codes referring to the machining drawings that specify the tool shapes and dimensions.

SOW - Statement of Work

SPR - Self-pierce riveting

SQS - Special Quasirandom Structures

SRIM - structural reaction injection molding

SSA - statistical sensitivity analysis

SUV - Sport Utility Vehicle

SVDC - Super Vacuum Die Casting

SVE - statistical volume element

SWE - spot weld element

T

TCM - Technical Cost Modeling

TEM - Transmission electron microscope

TGA - Thermogravimetric Analysis

Ti - Titanium

TMAC - Test Machine for Automotive Crashworthiness

TMS - The Minerals, Metals, and Materials Society

TMP - thermo-mechanical processing

TRIP - transformation-induced plasticity

TS - Tensile Strength

TT - through thickness

TWIP - Twinning Induced Plasticity steel

U

UCF - University of Central Florida

UHSS - Ultra High Strength Steel

UHV - Ultra-High Vacuum

ULSAB-AVC - Ultralight Steel Auto Body-Advanced Vehicle Concept

UMAT - user material routine

USAMP - United States Automotive Materials Partnership

USCAR - United States Council for Automotive Research

UT - University of Tennessee (Knoxville, TN)

UV - Ultraviolet light

UVa – The University of Virginia

UW – Ultrasonic welding/joining

V

V - vanadium

VA - Vinyl acetate

VPSC - Visco-plastic self-consistent (model for deformation)

W

WDS - Wavelength dispersive microanalysis

Wt (and wt%) - Weight (and % by weight)

X

XPS - X-ray Photoelectron Spectroscopy

XRCT - X-Ray Computed Tomography

XRD - x-ray diffraction

Y

YS - Yield Strength

Z

Zn - Zinc

Numeric

2-T - two-thickness

3D - Three dimensional