machine design

In This Issue

0 7 JUN 2016

FEATURES

38 IDENTIFY THE BEST 3D PRINTING PROCESS FOR YOUR APPLICATION
Boiling down 3D-printing processes into simple questions can facilitate applications-based decision-making.

46 SOARING TO NEW HEIGHTS
Quadcopters carry an extraordinary array of sophisticated equipment that makes them simple and fun to fly.

52 THE IMPACT OF IoT ON FLUID-POWER SYSTEMS
Experts explain how fluid-power systems are becoming more interconnected in the ever-expanding Internet of Things universe.

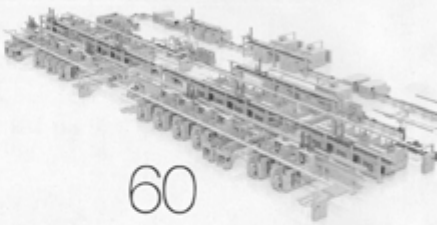
60 GREATER MARGINS FOR LINEAR ENCODER TOLERANCES
Modern linear encoders for machining centers in automated large-batch production.

66 PLCs, PCs, AND PACs: WHEN THE LINES IN MOTION CONTROL BECOME BLURRED
Asking the right questions early simplifies optimizing your next motion control system.

74 RADIAL AND ORBITAL RIVETING ADD FINESSE TO FASTENING AND JOINING
Knowing where and how to apply pressure is more important than brute force for these two riveting techniques.

82 DON'T STRESS OUT: HOW TO PICK THE BEST TOOL FOR STRAIN MEASUREMENTS
The CEO of Sensuron explains modern strain measurement tools and for which applications they are best suited.

46



60

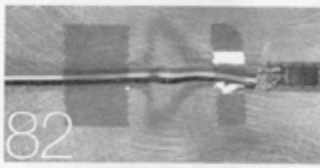
66

DEPARTMENTS

4 ON MACHINEDESIGN.COM
10 WHAT'S INSIDE
Software Updates Help Improve 3D Printing
Linear Actuators for Accelerating Motion System Design
12 NEWS
26 WHAT'S THE DIFFERENCE
Elastic Modulus and Kinetic Modulus?
32 DISTRIBUTION
89 NEW PRODUCTS
93 LIT EXPRESS
94 CLASSIFIEDS
94 AD INDEX
95 DATA FILES

COLUMNS

8 EDITORIAL
Curiosity Evolved the Cat—Jeff Kerns
22 INTERVIEW
Upgrade Old Networks with IoT Smart Machines—Mark Duncan
96 PRODUCT DEVELOPMENT
Breakthrough Innovations: Nine Techniques—Bradford L. Goldense



82

ON THE COVER: A showroom model of a propeller printed using stereolithography.

JOIN US ONLINE

twitter.com/machinedesign

facebook.com/MachineDesignMagazine

Printed in U.S.A. Copyright © 2016, Penton Media, Inc. All rights reserved. Nicene Droos (ISSN 0024-9114) is published monthly by Penton Media, Inc., 9800 Metcalf Ave., Overland Park, KS 66212.
Paid subscriptions include issues 1-12. Rates: U.S.: $139/year; $199/two years. Canada/Mexico: $159/year; $239/two years. All other countries: $199/year; $299/two years. Cost for back issues are U.S. $13.00 per copy plus tax, Canada $15.00 per issue plus tax, and int'l $20.00 per issue. OEM Handbook and Supplier Directory, $30.00 plus tax. Prepaid subscription: Penton Media (Nicene Droos), P.O. Box 2100, Skokie IL 60076-7800. Periodicals postage paid at Kansas City, MO and additional mailing offices.

Can GST #R124431964. Canadian Post Publications Mail Agreement No.40612608. Canada return address: IMEX Global Solutions, P.O. Box 25542, London, Ont., N6C 6B2.

Digital subscription rates: U.S.: $99/year. Canada/Mexico: $79/year. All other countries: $99/year. Print/Digital combo subscription rates: U.S.: $174/year; $249/two years. Canada/Mexico: $199/year; $299/two years. All other countries: $249/year; $374/two years.

POSTMASTER: Send change of address notice to Customer Service, Nicene Droos, P.O. Box 2100, Skokie, IL 60076-7800.