

JOHN B. LACSON
LIBRARY
MAY 2019

Machine Design®

THE PREMIER RESOURCE
FOR THE MULTI-DISCIPLINED
DESIGN ENGINEER

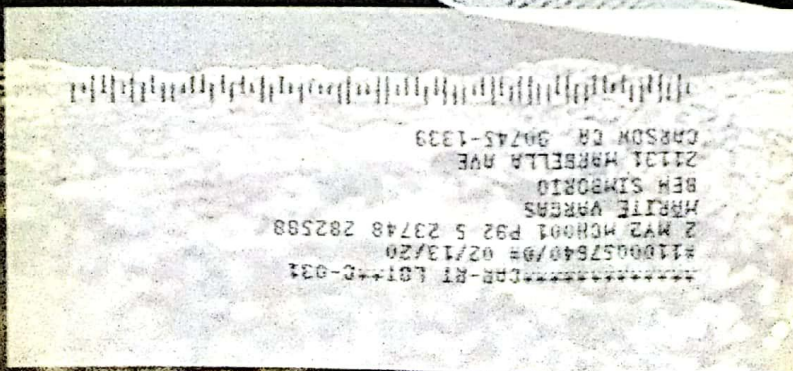
MAY 2019 machinedesign.com



HIGH-TECH ePTFE

Keeps Feet
Dry & Comfy

p32



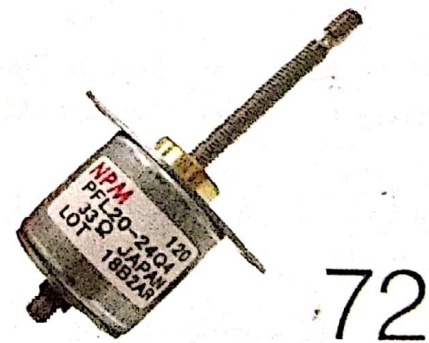
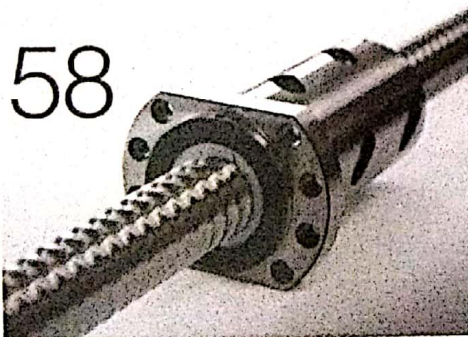
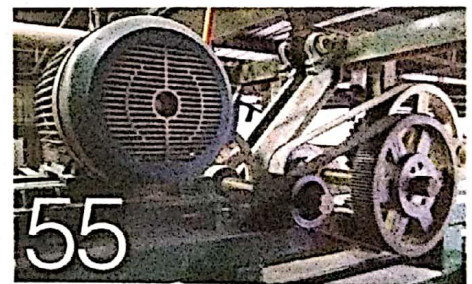
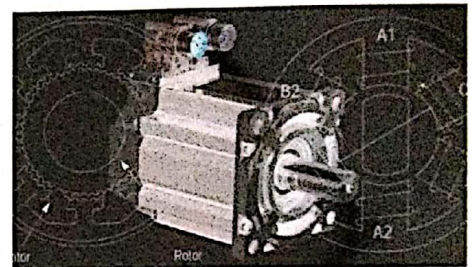
Access to
8.7 Million+
Products Online

DIGIKEY.COM

IN THIS ISSUE

FEATURES

- 32 ePTFE Keeps Athletic Shoes Dry and Comfortable**
Pores in ePTFE membrane can be small enough to keep water molecules out but large enough to let air in and out, letting the fabric "breathe."
- 46 Which Servers Are the Best: Servos or Steppers?**
Closed-loop stepper motors may be the best choice for tasks typically done by servos because traditional steppers couldn't handle them.
- 55 Trading Gearboxes for Advanced Belt Drive Systems**
Synchronous belts are emerging as the best choice across many industries.
- 58 High-Load Ball Screws: Motion Control with Higher Load Densities**
Now there's an alternative to standard ball and roller screws for high loads and short strokes.
- 66 3D Printing Trends in Manufacturing, Part 2**
Companies are using 3D printing in novel ways to increase and improve production.



DEPARTMENTS

- 4 ON MACHINEDESIGN.COM**
- 10 NEWS**
- 72 NEW PRODUCTS**
- 78 AD INDEX**
- 78 CLASSIFIEDS**

COLUMNS

- 6 EDITORIAL**
3 Tips to Start a Digital Manufacturing Plan
- 80 R&D—PRODUCT DEVELOPMENT**

JOIN US ONLINE

-  twitter.com/machinedesign
-  facebook.com/MachineDesignMagazine

Printed in U.S.A., Copyright © 2019, Informa Media, Inc. All rights reserved. MACHINE DESIGN (ISSN 0024-4114) is published monthly by Informa Media, Inc., 5000 Metcalf Ave., Overland Park, KS 66212.
 Paid subscriptions include issues 1-12. Rates: U.S.: \$130/year; \$100/year (print); Canada/Mexico: \$150/year; \$230/year (print); All other countries: \$190/year; \$210/year (print). Cost for back issues are U.S. \$10 (US) per copy plus tax; Canada \$15 (CA) per issue.

plus tax, and Int'l \$20.00 per issue. OEM Handbook and Supplier Directory, \$50.00 (plus tax). Prepaid subscription: Informa Media Inc. (MACHINE DESIGN), P.O. Box 2100, Skokie, IL 60076-7800. Periodicals postage paid at Kansas City, MO and additional mailing offices.
 Can (514) 811-2643/1904. Canadian Post Publications Mail Agreement No. 406176001. Canada return address: IMEX Global Solutions, P.O. Box 23542, London, Ont., N6C 0R2.

Digital subscription rates: U.S.: \$60/year; Canada/Mexico: \$70/year; All other countries: \$80/year. Print/Digital combo subscription rates: U.S.: \$174/year; \$249/year (print); Canada/Mexico: \$184/year; \$260/year (print); All other countries: \$249/year; \$324/year (print).
 POSTMASTER: Send change of address notice to Customer Service, MACHINE DESIGN, P.O. Box 2100, Skokie, IL 60076-7800.



EXAIR.com

Atomizing Spray Nozzle

All stainless steel construction for durability and corrosion resistance.



For more info visit: www.exair.com/45/1181.htm

POWER SUPPLIES

Industrial & Railway

Rugged. Cost-effective. Custom Standard.

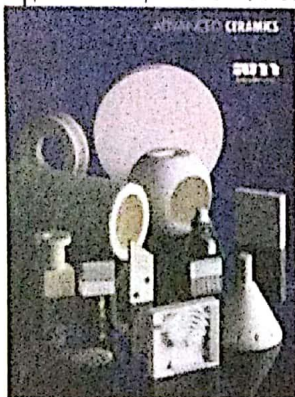


ABSOPULSE
ELECTRONICS LTD.

absopulse.com

ADVANCED CERAMIC SOLUTIONS

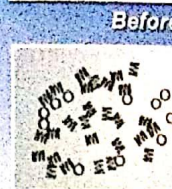
Astro Met's unique advanced ceramics provide cost effective solutions to material performance problems in a wide range of demanding applications. "Amalox 68" a 99.8% alumina ceramic and "Amzirox 86" an yttria stabilized zirconia provide superior wear resistance, corrosion resistance, high temperature stability, low thermal expansion, high stiffness to weight ratio, biocompatibility and high dielectric strength.



Astro Met, Inc.

Cincinnati, OH
(513) 772-1242
Fax: (513) 772-9080
Email: fgorman@astromet.com
Web: www.astromet.com

UNTANGLE YOUR SPRING PROBLEMS



SMART SOLUTIONS, FOR TANGLED SPRINGS

DISPENSE WORKS INC
(815) 363-3524 • www.d-tangler.com



DC-Powered Servo Drives

Supply voltages from 24 to 60 volts DC. Up to 40 in-lb peak output torque. Auto-tuning and Safe Torque Off (STO). Pair with J Series Servo Motors. www.applied-motion.com



AD INDEX

AEROTECH INC	30
ALLIED ELECTRONICS	57
ALTECH CORP	1,71,73
ALUMA CAST INC.	6
AMACOIL INC	65
AMETEK	50
APPLIED MOTION PRODUCTS	51
ASTRO MET ASSOCIATES INC.	78
ATLANTIC SPRING	21
AUTOMATION24 INC.	IBC
AUTOMATIONDIRECT.COM	IFC
BOKERS INC.	70
BRAXTON MANUFACTURING	12
BRECOFLEX CO LLC	76
CLIPPARD INSTRUMENT LAB INC.	17
CONTITECH	9
DELTA COMPUTER SYSTEMS	28
DIGI-KEY	5, FC
DORNER MFG CORP	54
DURA-BELT	70
DYNATECT MANUFACTURING INC.	52
EBM-PAPST	11
EIS, INC.	16
ENCODER PRODUCTS COMPANY	63
FABCO AIR, INC.	42
FESTO CORPORATION	25
FLOYD BELL INC.	27
FRABA	62
IGUS INC.	3
IMI PRECISION, INC.	77

INTECH POWERCORE CORPORATION	40
JOB SHOP SHOWS, INC/THE EDWARD	BELLYBANDS
KEPNER PRODUCTS CO	75
KNF NEUBERGER INC.	7
KWIK MARK, INC.	70
LIN ENGINEERING	43
LUBRIPLATE LUBRICANTS CO.	60
MAXON MOTOR USA	18
METAL POWDER IND FEDERATION	64
MICROMO ELECTRONICS	34
MOLON MOTOR & COIL CORP.	68
MW INDUSTRIES	44
NABEYA BI-TECH KAISHA	56
NB CORP	29
NEUGART USA	31
NOVOTECHNIK US INC	13
OMS MOTION INC.	36
ORIENTAL MOTOR USA CORP	35
PAVE TECHNOLOGY CO.	79
PBC LINEAR	33
PFA INC	74
PHD INC	23
PHOENIX CONTACT	15
PHYSIK INSTRUMENTS LP	42
PORTESCAP	24
PYRAMID INC.	38
R & W AMERICA	14
REELL PRECISION MANUFACTURING	72,75
ROLLON	19
ROTOR CLIP CO	48

ROTOR CLIP CO	61
SCHMERSAL INC.	53
SCHNEEBERGER	49
SERVOMETER PRECISION MFG. GROUP LLC	39
SEW EURODRIVE	BC
SIKA USA, INC.	72
SMALLEY STEEL RING CO	69
SOLENOID SOLUTIONS, INC	67
SPIROL INTNL CORP	8
TDK-LAMBDA AMERICAS INC.	37
THE LEE COMPANY	45
TOLOMATIC	26
TRIM-LOK INC	20
VISUMATIC	22
WATSON MARLOW BREDEL CORP	59
YASKAWA AMERICA INC - A/P	41
ZF ELECTRONIC SYSTEMS	75

IN MOST CASES, ADVERTISEMENTS CONTAINED IN MACHINE DESIGN EMPLOYMENT SECTION INDICATE THAT THE COMPANIES ARE EQUAL OPPORTUNITY EMPLOYERS. THE FEDERAL CIVIL RIGHTS ACT OF 1964, AND OTHER LAWS, PROHIBIT DISCRIMINATION IN EMPLOYMENT BASED ON RACE, COLOR, RELIGION, NATIONAL ORIGIN, SEX, OR FOR ANY REASON OTHER THAN LACK OF PROFESSIONAL QUALIFICATION FOR THE POSITION BEING OFFERED. IT SHOULD BE NOTED THAT EMPLOYMENT ADVERTISEMENTS IN MACHINE DESIGN ARE PUBLISHED FOR THE READERS CONVENIENCE AND, IN NO WAY, TO THE BEST OF OUR KNOWLEDGE, PROMOTE UNLAWFUL DISCRIMINATION.