

AUTHORITY: PL 98-524
COMPLETION: Voluntary (Consideration
for funding will be possible only if form is
returned.)

**COMMUNITY COLLEGE SUMMARY REPORT
FOR SELF-STUDY EVALUATION OF OCCUPATIONAL PROGRAMS
July 1, 1990 to June 30, 1991**

SUBMITTING EDUCATIONAL AGENCY	Name of College Oakland Community College	College Code 23A/2804
	Project Contact Person Dr. David A. Doidge	
	Title Dean, Academic Services	Telephone (313) 471-7707
	Program Title Fluid Power Technology	
	CIP Code 15.9999	PIN 0090

GENERAL INSTRUCTIONS:

Complete this Summary Report for each occupational program according to the college evaluation schedule. Submit it as the Program Evaluation is completed, but no later than June 30, 1991. This will allow the college to continue uninterrupted through the Program Planning Process.

A complete copy of the total evaluation document for each program must be kept on file at the college. This document may be requested at a later date for state or federal audit purposes. Specific definitions, guidelines, program components, and reporting requirements related to this Summary Report are found in Section 5 of the "Dean's Guide to Federally Reimbursed Community College Occupational Programs."

PART I. SUMMARY REPORT FORMAT

The following data and comments are recorded to summarize the results of the college Self-Study Evaluation:

1. PROGRAM ENROLLMENT (Previous Three-Year Figures)

Year	Unduplicated Headcount	Student Credit Hours for Specialty Courses	Student Contact Hours
1987-88	214		642
1988-89	118		354
1989-90	135		405

**2. PROGRAM GRADUATES (Previous
Three-Year Figures)**

Year	Unduplicated Headcount
1987-88	0
1988-89	0
1989-90	0

3. a. Summary of Evaluation Perceptions by Administrators and Faculty

Number of Administrators
and Faculty Participating 3

Comments:

1. The Fluid Power program is a viable program which should produce technicians that are employable in automated machine repair and/or installation in the many small and large manufacturing companies throughout the Oakland County area.
2. Business, manufacturing, and training partnerships should be explored that will enhance curriculum development, equipment improvement, development of faculty, and marketing opportunities. For the last four years, OCC has been in partnership with Rexroth, a hydraulics components and manifold manufacturer. This partnership is now being reviewed for renewal.
3. A new director of placement and marketing needs to be sought to ensure complete success of the program.
4. An active advisory committee needs to be established and maintained.
5. Presently, this program satisfies the requirements for the OCC Apprentice program but produces very low enrollment in the high level courses.
6. The Hydraulics lab equipment is excellent, and some course improvement and development has occurred.
7. Workshops and short courses have been provided to area industries by Rexroth Corporation. More emphasis needs to be placed on how this partnership benefits the Fluid Power program, i.e. curriculum, equipment, placement, and overall development.

Recommendations:

1. Continue to develop effective business and training partnerships that will enhance all aspects of the Fluid Power program.
2. Monitor the progress of existing students to permit the proper scheduling required of Fluid Power courses.
3. Cultivate the interest and commitment of full-time and adjunct faculty to support and participate in the overall development and teaching of the Fluid Power program.
4. Formulate a new and active advisory committee that will lend guidance and support for curriculum and placement opportunities.
5. Continue to update and develop curriculum that will maintain the Fluid Power program as viable, current, and futuristic.
6. Develop an effective articulation plan with area high schools (Tech Prep 2+2).
7. Develop an effective marketing plan to properly advertise the employment benefits and worth of the Fluid Power program.

3. b. Summary of Evaluation Perceptions by Students

Number of Students
Participating 36

Comments:

1. The Fluid Power program needs more attention.
2. Advanced courses need to be offered on a more regular basis.
3. The employment opportunities in the Fluid Power area are vague.
4. Placement needs to be made available to students in this program.
5. Co-op opportunities would help the students in this program.
6. Students should have the opportunity for field trips.

Recommendations:

1. Administration should seek ways to improve the enrollment in this program.
2. Advanced courses should be offered more frequently.
3. Placement and co-op should be an integral part of this program.
4. Identify the businesses/industries and job classifications for graduates of this program.

3. c. Summary of Evaluation Perceptions by Advisory Committee Members

Number of Advisory
Committee Members Participating 6

Comments:

1. The Fluid Power program is a very important program to the college and the community.
2. Graduates from this program will have excellent opportunity for employment.
3. The existing Fluid Power program's curriculum needs to be reviewed and possibly improved.
4. A strong targeted marketing program needs to be developed to improve the enrollment in this program.
5. Partnerships should be explored that will benefit the program and the student.

Recommendations:

1. Maintain an active advisory committee.
2. Review the curriculum and the appropriate scheduling of classes.
3. Develop a sound marketing plan.
4. Formulate viable partnerships with business and industry.
5. Continue to improve the lab facility.

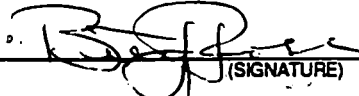
4. SUMMARY OF COMMUNITY COLLEGE ACTION PLAN

(Include comments on goals and objectives, processes and resources. Use additional sheets if necessary.)

1. The Fluid Power curriculum will be reviewed and improved.
2. The job market for the graduates of this program will be identified.
3. The laboratory will be maintained and improved.
4. A market plan will be developed.
5. Partnerships will be arranged to provide technical assistance, curriculum guidance, staff development, and placement.

PART II. SIGNATURES

I certify that the information submitted on this report is true and correct to the best of my knowledge.

DATE 6/13/91 PROGRAM EVALUATOR 
(SIGNATURE)

DATE _____ OCCUPATIONAL EDUCATION CONTACT PERSON _____
(SIGNATURE)

Fluid Power Certification Board

c/o FPS, 2433 North Mayfair Road, Suite 111, Milwaukee WI, 53226 • Phone: (414) 257-0910 • FAX: (414) 257-4092

CERTIFICATION TEST APPLICATION

Please fully complete form.

Preferred mailing address: Home Work

Name: _____

Employer: _____

Home Address: _____

Work Address: _____

City: _____ State: _____ Zip: _____

City: _____ State: _____ Zip: _____

Telephone: _____

Telephone: _____

Social Security Number: _____
(Serves as your Test ID Number)

Present Job/Title: _____

Educational Information: (Check highest level attained)

Test Date/Site: _____

Grade School Years _____

Send me complete membership information

High School Years _____ Diploma _____

Send me information on special review sessions

Technical Institute Years _____ Degree _____

Send me information on other levels of certification

College Years _____ Degree _____

Which test do you intend to take? (Check one)

Amount

- Industrial Hydraulic Mechanic
- Mobile Hydraulic Mechanic
- Pneumatic Mechanic
- Hydraulic Technician
- Pneumatic Technician
- Specialist

Test Fee _____

Retake Fee _____

Answer Book # _____

Total Amount Due _____

NOTE: Payment by check or money order, in U.S. funds only, is to be made at time of registration to: Fluid Power Certification Board, c/o FPS.

	INDUSTRIAL HYDRAULIC MECHANIC	MOBILE HYDRAULIC MECHANIC	PNEUMATIC MECHANIC	HYDRAULIC TECHNICIAN	PNEUMATIC TECHNICIAN	FLUID POWER SPECIALIST
TEST FEE AND CANDIDATE'S SELF-STUDY MANUAL	\$130/95/45 (MANUAL #218)	\$130/95/45 (MANUAL #220)	\$130/95/45 (MANUAL #222)	\$160/110/45 (MANUAL #224)	\$160/110/45 (MANUAL #226)	\$160/110/45 (MANUAL #208)
CANDIDATE'S SELF-STUDY MANUAL ONLY	\$45/10/10 (MANUAL #218)	\$45/10/10 (MANUAL #220)	\$45/10/10 (MANUAL #222)	\$45/10/10 (MANUAL #224)	\$45/10/10 (MANUAL #226)	\$45/10/10 (MANUAL #208)
ANSWERS TO QUESTIONS IN CANDIDATE'S SELF-STUDY MANUAL	\$25/10/10 (MANUAL #219)	\$25/10/10 (MANUAL #221)	\$25/10/10 (MANUAL #223)	\$25/10/10 (MANUAL #225)	\$25/10/10 (MANUAL #227)	\$25/10/10 (MANUAL #209)
WRITTEN TEST RETAKE	\$25	\$25	\$25	\$35	\$35	\$35
HANDS-ON TEST RETAKE	\$50	\$50	\$50	N/A	N/A	N/A
FPS SPONSORED REVIEW SESSION (INCLUDES TEST FEE AND CANDIDATE'S SELF-STUDY MANUAL)	\$335/300/150 (MANUAL #218)	\$335/300/150 (MANUAL #220)	\$335/300/150 (MANUAL #222)	\$360/310/150 (MANUAL #224)	\$360/310/150 (MANUAL #226)	\$360/310/150 (MANUAL #208)

Prices are listed as Non-Member/Member/Full-Time Student. (Full-time student equals 12 credit hours or more.)

REFUND POLICY - If you cancel your review session/test registration, you will be charged a \$50.00 administrative fee. To cancel, you must call the Certification Board Secretariat at 414/257-0910 AT LEAST SEVEN (7) WORKING DAYS prior to the scheduled review session/test to obtain a cancellation number. If you cancel less than seven days prior or you do not follow this procedure, you will be liable for the full fee. With the Certification Board Secretariat's approval, however, a portion of this charge may be applied to a future review session/test, and enrollment substitutions may be made at any time. Prices subject to change without notice. Registration for a test will be closed seven (7) working days prior to the test date. Quantity discounts are available, consult FPCB Secretariat, c/o FPS. Rev. 2/93



DEPARTMENT OF THE AIR FORCE

325TH MISSION SUPPORT SQUADRON (TAC)
TYNDALL AIR FORCE BASE FL 32403-5000

15 Jan 91

Professor Edward Konopka
Oakland Community College, Auburn Hills Campus
5900 Featherstone Road
Auburn Hills, MI 48059

Dear Professor Konopka

Enclosed please find a Cooperative Education Program Working Agreement to establish a program between Tyndall Air Force Base, Florida and Oakland Community College. Please obtain the appropriate signature and complete the signature element for the educational institution on the lower left of page 1. Please return the executed agreement to this office for our records. Also enclosed is a copy of the Federal Personnel Manual governing co-op positions.

The SF 171, Application for Federal Employment, and SF 181, Race and National Origin, are for your use when and if we do get a co-op position established and begin recruitment.

Should you have any questions or wish to discuss this information, you may contact me at (904) 283-4531/4532. Our mailing address is: 325 MSSQ/MSCS, Stop 29, Tyndall AFB, Florida 32403-5705.

We look forward to providing a rewarding and profitable work experience to your students.

A handwritten signature in cursive script that reads "Vera R. Heath".

VERA R. HEATH
EEO & Staffing Specialist

- 4 Atch
1. Agreement
 2. Federal Personnel Manual
 3. SF 171
 4. SF 181

Advisory Committee Categories

CODE "M" FOR MANUFACTURING:

CODE "M1" FOR MANUFACTURING PNEUMATIC COMPONENTS

CODE "M2" FOR MANUFACTURING HYDRAULIC COMPONENTS

CODE "M3" FOR MANUFACTURING HYDRAULIC DRIVES

CODE "M4" FOR MANUFACTURING HYDRAULIC POWER UNITS

CODE "B" FOR BUILDERS:

CODE "B1" FOR THOSE BUILDING EQUIPMENT WHICH USES HYD.& PNEU.

CODE "B2" FOR THOSE WHO DO PIPE AND WIRE

CODE "B3" FOR THOSE WHO BUILD PNEUMATIC CONTROL PANELS

CODE "D" FOR DESIGNERS:

CODE "D1" FOR THOSE DESIGNING EQUIPMENT USING HYD. & PNEU.

CODE "D2" FOR THOSE DESIGNING THE CONTROLS FOR THIS EQUIPMENT

CODE "S" FOR SUPPLIERS:

CODE "S1" FOR THOSE SUPPLYING HYDRAULIC COMPONENTS

CODE "S2" FOR THOSE SUPPLYING PNEUMATIC COMPONENTS

CODE "S3" FOR THOSE SUPPLYING HOSE ASSEMBLIES

CODE "S4" FOR THOSE SUPPLYING FITTINGS AND PIPING COMPONENTS

CODE "U" FOR USERS OF HYDRAULIC AND PNEUMATIC COMPONENTS

CODE "U1" MOBIL EQUIPMENT

CODE "U2" WELDING EQUIPMENT

CODE "U3" CONVEYORS AND TRANSFERS

CODE "U4" PRESSES, STAMPING

CODE "U5" PRESSES, EXTRUSION

CODE "U6" PRODUCT TESTING FACILITIES

CODE "E" FOR EDUCATORS:

CODE "E1" FOR HIGH SCHOOL

CODE "E2" FOR COLLEGE

CODE "E3" FOR INDUSTRY

Business Name: AMERICAN HYDROSTATIC, INC

Last Name: DELL

First Name: JOE

Business Phone: 313-548-9636

Title: PRESIDENT

Department:

Street Address: 3055 HILTON

City: FERNDALE

State: MI

Postal Code:

48220

Fax #:

Car Phone:

Home Phone:

First Catagory: M4

Second Catagory: S1

Business Name: ASTRUM TECHNOLOGIES CORP.

Last Name: MALTESE

First Name: SAMUEL J.

Business Phone: 313-528-2840

Title: PRESIDENT

Department:

Street Address: 2200 STEPHENSON HIGHWAY

City: TROY

State: MI

Postal Code:

48083

Fax #:

Car Phone:

Home Phone:

First Catagory: D1

Second Catagory:

Business Name: BIRMINGHAM PUBLIC SCHOOLS

Last Name: PIERO

First Name: MICHAEL C.

Business Phone: 313-433-8440

Title: DEPT. CHAIRMAN

Department: INDUSTRIAL TECHNOLOGY

Street Address: 2436 W. LINCOLN

City: BIRMINGHAM

State: MI

Postal Code:

48009

Fax #: 313-642-6059

Car Phone:

Home Phone:

First Catagory: E1

Second Catagory:

Business Name: CLEARR INDUSTRIES

Last Name: APFEL

First Name: EDWARD J.

Business Phone: 313-548-0700

Title: VICE PRESIDENT

Department: MANUFACTURING

Street Address: 450 FAIR STREET

City: FERNDALE

State: MI **Postal Code:**

48220

Fax #:

Car Phone:

Home Phone:

First Category: B1

Second Category:

Business Name: DOIG ASSOCIATES

Last Name: DOIG

First Name: GEORGE

Business Phone: 313-334-9563

Title:

Department:

Street Address: 1687 S. TELEGRAPH

City: BLOOMFIELD HILLS

State: MI **Postal Code:**

48013

Fax #:

Car Phone:

Home Phone:

First Category: B3

Second Category:

Business Name: FORI AUTOMATION, INC

Last Name: MAGNAN

First Name: MICHEAL

Business Phone: 313-247-2336

Title: APPLICATIONS MANAGER

Department:

Street Address:

City: MT. CLEMENS

State: MI **Postal Code:**

48044

Fax #: 313-247-3126

Car Phone:

Home Phone:

First Category: B1

Second Category:

Business Name: GIDDING & LEWIS

Last Name: GIFFORD

First Name: JERRY

Business Phone: 313-293-3000

Title: PROJECT ENGINEER

Department: CONTROLS

Street Address: 17801 14 MILE ROAD

City: FRASER

State: MI

Postal Code:

48026

Fax #:

Car Phone:

Home Phone:

First Category: B1

Second Category:

Business Name: GM

Last Name: LABADIE

First Name: TOM

Business Phone: 313-685-6392

Title: ENGINEER

Department: TEST LAB. BLDG.24A

Street Address:

City: MILFORD

State: MI

Postal Code: 48380-3726

Fax #: 313-685-6140

Car Phone:

Home Phone:

First Category: U6

Second Category:

Business Name: GM POWERTRAIN DIV.

Last Name: SIMPSON

First Name: JIM

Business Phone: 419-474-5267

Title: INSTRUCTOR

Department: EDUCATION & TRAINING

Street Address: P.O. BOX #909

City: TOLEDO

State: OH

Postal Code:

43692

Fax #: 419-474-5097

Car Phone:

Home Phone: 419-474-2169

First Category: E3

Second Category:

Business Name: H. E. LENON, INC.

Last Name: ANGELELLA

First Name: PHIL

Business Phone: 313-474-6624

Title: SALES REPRESENTATIVE

Department:

Street Address: 24148 RESEARCH DRIVE

City: FARMINGTON HILLS

State: MI

Postal Code:

48024

Fax #: 313-474-3416

Car Phone:

Home Phone: 313-477-3687

First Category: S4

Second Category:

Business Name: HALLOCK HYDRAULIC, INC.

Last Name: HALLOCK

First Name: HARRY

Business Phone: 313-663-5100

Title: PRESIDENT

Department:

Street Address: 661 AIRPORT BLVD.

City: ANN ARBOR

State: MI

Postal Code:

48108

Fax #: 313-663-2747

Car Phone:

Home Phone:

First Category: S1

Second Category: M4

Business Name: HI-TECH TOOL INDUSTRIES, INC.

Last Name: WAHL

First Name: EDWARD

Business Phone: 313-649-0690

Title: VICE PRESIDENT-SALES

Department:

Street Address: 1600 W. MAPLE RD.

City: TROY

State: MI

Postal Code:

48084

Fax #: 313-544-1827

Car Phone: 313-670-2551

Home Phone:

First Category: B1

Second Category:

Business Name: HPS HYDRAULIC POWER SYSTEMS, INC.

Last Name: PALEY

First Name: EDWARD D.

Business Phone: 313-547-0150

Title: PRESIDENT

Department:

Street Address: 12900 CAPITAL AVENUE

City: OAK PARK

State: MI

Postal Code:

48237

Fax #:

Car Phone:

Home Phone:

First Catagory: M2

Second Catagory: M3

Business Name: INDUSTRIAL DESIGN & SUPPLY, INC.

Last Name: STACZEK

First Name: JAMES J.

Business Phone: 419-666-8784

Title: PRESIDENT

Department: FLUID POWER SPECIALISTS

Street Address: P.O. BOX 33

City: TOLEDO

State: OH

Postal Code:

43692

Fax #: 419-66-8236

Car Phone:

Home Phone:

First Catagory: D1

Second Catagory:

Business Name: ISI AUTOMATION PRODUCTS GROUP

Last Name: BLATT

First Name: JOHN

Business Phone: 313-463-3000

Title: PRESIDENT

Department:

Street Address: P.O. BOX 1130

City: MT. CLEMENS

State: MI

Postal Code:

48046-1130

Fax #: 313-463-6360

Car Phone:

Home Phone:

First Catagory: M1

Second Catagory:

Business Name: J. H. BENNET

Last Name:

First Name:

Business Phone:

Title:

Department:

Street Address: 41369 VINCENTI COURT

City: NOVI

State: MI

Postal Code:

48050

Fax #:

Car Phone:

Home Phone:

First Category: S

Second Category:

Business Name: J.N. FAUVER

Last Name: GORDON

First Name: CONRAD

Business Phone: 313-585-5252

Title: CHIEF ENGINEER

Department:

Street Address: 1500 EAST AVIS DRIVE

City: MADISON HEIGHTS

State: MI

Postal Code:

48071

Fax #:

Car Phone:

Home Phone:

First Category: S1

Second Category: S2

Business Name: KILSBY ROBERTS

Last Name: BROOK

First Name: DON

Business Phone: 313-477-1400

Title: OPERATION MANAGER

Department: THE TUBING COMPANY

Street Address: 23680 RESEARCH DRIVE

City: FARMINGTON

State: MI

Postal Code:

48024

Fax #:

Car Phone:

Home Phone:

First Category: S4

Second Category:

Business Name: KUNDINGER FLUID POWER

Last Name: KUNDINGER **First Name:** BRIAN

Business Phone: 313-589-1885

Title: VICE PRESIDENT

Department: SALES AND MARKETING

Street Address: 32388 EDWARDS

City: MADISON HEIGHTS **State:** MI **Postal Code:** 48071-5699

Fax #: 313-588-5699 **Car Phone:**

Home Phone: **First Category:** S1 **Second Category:** S2

Business Name: MED-KAS HYDRAULIC, INC.

Last Name: MEDICI **First Name:** EDWARD J.

Business Phone: 313-585-3230

Title: PRESIDENT

Department:

Street Address: 1419 JOHN R

City: TROY **State:** MI **Postal Code:** 48084

Fax #: **Car Phone:**

Home Phone: **First Category:** M2 **Second Category:**

Business Name: MILLER FLUID POWER

Last Name: ROY **First Name:** KENNETH H.

Business Phone: 800-323-2520

Title: MANAGER OF SPECIFICATIONS

Department: AUTOMOTIVE

Street Address: 13400 STARK ROAD

City: LIVONIA **State:** MI **Postal Code:** 48150

Fax #: **Car Phone:**

Home Phone: 313-477-2453 **First Category:** M1 **Second Category:** M2

Business Name: MOOG CONTROLS

Last Name: RATLIFT

First Name: BRIAN

Business Phone: 313-380-5400

Title: SALES ENGINEER

Department: SALES, APPLICATION & DEVELOPMENT

Street Address: 24301 CATHERINE INDUSTRIAL DR SUITE 1

City: NOVI

State: MI Postal Code:

48375

Fax #: 313-380-5402

Car Phone:

Home Phone:

First Catagory: M2

Second Catagory:

Business Name: MORRELL, INC.

Last Name: TALLMAN

First Name: STEVE

Business Phone: 313-373-1600

Title: CEO

Department:

Street Address: 2333 COMMERCIAL DRIVE

City: AUBURN HILLS

State: MI Postal Code:

48326

Fax #: 313-373-0612

Car Phone:

Home Phone:

First Catagory: S1

Second Catagory: S2

Business Name: MOTION CONTROL CORP.

Last Name: LANTRY

First Name: MICHEAL W.

Business Phone: 313-478-1640

Title:

Department:

Street Address: 23414 INDUSTRIAL PARK COURT

City: FARMINGTON HILLS

State: MI Postal Code:

48335

Fax #: 313-478-8450

Car Phone:

Home Phone:

First Catagory: S1

Second Catagory:

Business Name: MRM, INC

Last Name: RIGATO

First Name: JOHN

Business Phone: 313-348-6900

Title: PRESIDENT

Department:

Street Address: 22777 HESLIP

City: NOVI

State: MI

Postal Code:

48050

Fax #:

Car Phone:

Home Phone:

First Category: S2

Second Category:

Business Name: NORCO PRODUCTS, INC.

Last Name: THOMAS

First Name: JERRY

Business Phone: 313-362-4310

Title: SALES/OPERATIONS MAMAGER

Department: FILTER DIVISION

Street Address: 2139 HEIDE

City: TROY

State: MI

Postal Code:

48084

Fax #:

Car Phone:

Home Phone:

First Category: M2

Second Category:

Business Name: NORGREN

Last Name: MERSMAN

First Name: HAROLD

Business Phone: 313-591-6800

Title: NATIONAL AUTOMOTIVE ACCTS. MGR.

Department:

Street Address: 36740 COMMERCE STREET

City: LIVONIA

State: MI

Postal Code:

48150

Fax #:

Car Phone:

Home Phone:

First Category: M1

Second Category:

Business Name: NUMATICS, INC.

Last Name: FLEISCHER

First Name: HENRY PE CMFGE

Business Phone: 313-887-4111

Title: DIRECTOR OF ENGINEERING

Department:

Street Address: 1450 NORTH MILFORD ROAD

City: HIGHLAND

State: MI **Postal Code:**

48031

Fax #:

Car Phone:

Home Phone:

First Catagory: M1

Second Catagory:

Business Name: NUMATICS, INC.

Last Name: SCHENKE

First Name: HENRY B.

Business Phone: 313-349-0033

Title: REGIONAL SALES MANAGER

Department: PNEUMATIC CONTROLS

Street Address: 28900 WALL S TREET

City: WIXOM

State: MI **Postal Code:**

48393

Fax #: 313-349-2436

Car Phone:

Home Phone:

First Catagory: B3

Second Catagory: M1

Business Name: OAKLAND ENGINEERING COMPANY

Last Name: EVANS

First Name: TONY

Business Phone: 313-858-7575

Title: OWNER

Department:

Street Address: 915 OAKLAND

City: PONTIAC

State: MI **Postal Code:**

Fax #:

Car Phone:

Home Phone:

First Catagory: B1

Second Catagory:

Business Name: OIL GEAR CO.

Last Name: DeWITT

First Name: TOM

Business Phone: 313-478-3300

Title: AREA MANAGER

Department:

Street Address: 41287 VINCENTI COURT

City: NOVI

State: MI

Postal Code:

48050

Fax #:

Car Phone:

Home Phone:

First Catagory: M2

Second Catagory:

Business Name: OPDYKE STAMPING

Last Name: DOWNS

First Name: DICK

Business Phone: 313-628-9596

Title: GENERAL MANAGER

Department:

Street Address: 700 GLASPIE

City: OXFORD

State: MI

Postal Code:

48371

Fax #:

Car Phone:

Home Phone:

First Catagory: U4

Second Catagory:

Business Name: PABCO FLUID POWER CO.

Last Name: ROKICKI

First Name: ROGER

Business Phone: 313-585-8525

Title: SALES ENGINEER

Department:

Street Address: 700 MANDOLINE

City: MADISON HEIGHTS

State: MI

Postal Code:

48071

Fax #: 313-585-0229

Car Phone: 313-530-8637

Home Phone:

First Catagory: S1

Second Catagory: M4

Business Name: PARKER FLUID CONNECTORS

Last Name: COSTANZA

First Name: JOHN A.

Business Phone: 313-589-4774

Title: TERRITORY MANAGER

Department: FLUID CONNECTORS

Street Address: 651 ROBBINS DRIVE

City: TROY

State: MI

Postal Code:

48084

Fax #: 313-589-4769

Car Phone:

Home Phone:

First Category: S4

Second Category:

Business Name: PARKER FLUID POWER

Last Name: GORSKI

First Name: KEN

Business Phone: 313-589-2400

Title: HYDRAULIC APPLICATIONS ENGINEER

Department: HYDRAULIC & PNEUMATIC PRODUCTS

Street Address: 651 ROBBINS DRIVE

City: TROY

State: MI

Postal Code:

48309

Fax #: 313-853-8298

Car Phone:

Home Phone:

First Category: M2

Second Category: M1

Business Name: PENINSULAR, INC.

Last Name: PATERSON

First Name: BRENT P.

Business Phone: 313-775-7211

Title: PRESIDENT

Department:

Street Address: 27650 GROSEBECK HWY.

City: ROSEVILLE

State: MI

Postal Code: 48066-2781

Fax #: 313-775-4545

Car Phone:

Home Phone:

First Category: M1

Second Category:

Business Name: PLYMOUTH CANTON HIGHSCHOOL

Last Name: SIEDLIK

First Name: MARK

Business Phone: 313-

Title:

Department:

Street Address:

City:

State:

Postal Code:

Fax #:

Car Phone:

Home Phone:

First Catagory: E1

Second Catagory:

Business Name: RACINE BOSCH GROUP

Last Name: WOLSKE

First Name: KEN

Business Phone: 414-554-7100

Title: DIRECTOR OF TECHNICAL TRAINING

Department: TECHNICAL TRAINING CENTER

Street Address: 7505 DURAND AVENUE

City: RACINE

State: WI

Postal Code:

53406

Fax #: 414-544-7117

Car Phone:

Home Phone:

First Catagory: E3

Second Catagory:

Business Name: REO HYDRAULICS & MFG, INC.

Last Name: OBRECHT

First Name: BOB

Business Phone: 313-891-244

Title: PRESIDENT

Department:

Street Address: 18475 SHERWOOD

City: DETROIT

State: MI

Postal Code:

48234

Fax #:

Car Phone:

Home Phone:

First Catagory:

Second Catagory:

Business Name: RITE-ON INDUSTRIES, INC

Last Name:

First Name:

Business Phone: 313-937-2000

Title:

Department:

Street Address:

City:

State:

Postal Code:

Fax #:

Car Phone:

Home Phone:

First Category: B1

Second Category:

Business Name: ROBERT J. WAGNER & ASSOCIATES

Last Name: WAGNER

First Name: ROBERT J.

Business Phone: 313-628-4065

Title: PROFESSIONAL ENGINEER

Department:

Street Address: 500 LAKES EDGE DRIVE

City: OXFORD

State: MI

Postal Code:

48371

Fax #:

Car Phone:

Home Phone: 313-628-4065

First Category: D1

Second Category: D2

Business Name: SMC PNEUMATICS, INC.

Last Name: GRAHAM

First Name: WILLIAM R.

Business Phone: 313-463-2300

Title: AUTOMOTIVE PRODUCT MANAGER

Department:

Street Address: 24511 N. RIVER ROAD

City: MT. CLEMENS

State: MI

Postal Code:

48043

Fax #: 313-463-2344

Car Phone:

Home Phone:

First Category: M1

Second Category:

Business Name: STELLAR ENGINEERING, INC.

Last Name: SMITH

First Name: LEE

Business Phone: 313-978-8444

Title: PROJECT ENGINEER

Department:

Street Address: 5505 13 MILE ROAD

City: WARREN

State: MI

Postal Code:

48092

Fax #: 313-978-2315

Car Phone:

Home Phone:

First Category: D1

Second Category:

Business Name: THE BUDD COMPANY

Last Name: FREYTAG

First Name: NORMAN A.

Business Phone: 313-391-9174

Title: PROJECT ENGINEER

Department: AUBURN HILLS TECH CENTER

Street Address: 1515 ATLANTIC BOULEVARD

City: AUBURN HILLS

State: MI

Postal Code:

48326

Fax #: 313-391-0325

Car Phone:

Home Phone:

First Category: U6

Second Category:

Business Name: THE H M S COMPANY

Last Name: VIAZANKO

First Name: TOM

Business Phone: 313-689-3232

Title: PROJECT ENGINEER

Department:

Street Address: 1230 EAST BIG BEAVER ROAD

City: TROY

State: MI

Postal Code:

48083

Fax #: 313-689-0665

Car Phone:

Home Phone:

First Category: D1

Second Category:



MEMORANDUM

To: Willie L. Lloyd, Director
Career Placement

From: Martin A. Orlowski, Director
Office of Institutional Planning & Analysis

Subject: Job Opportunity

Date: May 10, 1993

The Office of Institutional Planning & Analysis is currently in the process of assessing the College's Fluid Power program. As part of this assessment we conducted a survey of sixty employers who hire employees with skills in hydraulics and pneumatics. As standard practice, I send a thank you letter to each employer who participated in the survey.

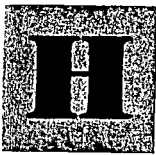
In response to my thank you letter, I received a letter from William Hallock (Hallock Hydraulic Incorporated) expressing his interest in possibly hiring an OCC student in his company (see attachment). This is an excellent opportunity for the College to meet the needs of the community. If you have any students who might meet Mr. Hallock's needs, please inform them of this opportunity.

Should you have any questions concerning this matter, please do not hesitate to contact me at 7746.

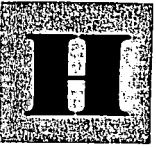
Attachment: Letter, Hallock Hydraulic Incorporated: May 4, 1993

pc: B. Rose
D. Jaksen
E. Konopka

/s



HALLOCK HYDRAULIC INCORPORATED



837 Airport Blvd.
Ann Arbor, Michigan 48108
(313) 663-5100 FAX (313) 663-2747



May 4, 1993

OCC
Oakland Community College
Orchard Ridge Campus
27055 Orchard Lake Rd.
Farmington Hills, MI 48018

Attn: Mr. Martin A. Orlowski

Dear Martin:

Thank you for your letter of April 28, 1993. If your placement people have a young man or woman who would be particularly well suited to inside sales & applications please forward resumes with your recommendations.

Sincerely,

William W. Hallock
Hallock Hydraulic Inc.

WH:jt

Fluid Power Job Titles

- ① Pipe Fitter Trainee \$8
Pipe Fitter (2) \$7 \$18 } Pipe Fitter

- ② Service Worker \$6
General Laborer \$6
Laborer-electrical
Shop Personnel (3) \$12 \$8.50 } General Laborer

- ③ Assistant Engineer \$50,000
Junior Engineer \$16
Civil Engineer \$35,000
Mechanical Engineer (2)
Engineer (5) \$17.50 \$40,000 \$20,000
Hydraulics Engineer \$32,500 \$19
Systems Engineer
Pneumatics Employee \$15 } Engineer

- ④ Assembler (8) \$7 \$8 \$9 \$9.50 \$11 \$10
~~Assembly Technicians \$19,000~~
Shop Assembly \$9 } Assembler

- ⑤ Detailer (4) \$24,000 \$17,000
Engineering Draftsman
Sketcher of Product Drawings \$25,000
Designer (4) \$24,000 \$22,500 \$17,000
Layout (2) \$24,000
Production Person
Sheet Metal Model Maker \$5.50
CAD Person } Designer

- ⑥ Machine Builder (3) \$7.50 \$16
Tool Maker
Machinist (7) \$9 \$8 \$6 \$12 \$10
Power Unit Builder
Upgrader
Fabricator (2) \$10 \$15,000 } machinist

- ⑦ Helper (2) \$5
Machine Tool Helpers \$9
Trainees (3) \$7.50 \$13.50
Machine Apprentices } Trainee

Assembly Tech

Engineering Technician \$9
Technician \$10
Service Technician \$21,000
Lab Technician
Hydraulics Technician \$11
Field Technician

Technician

Technical Sales Rep \$21,000
Hydraulic Sales
Sales (4) \$18,000 \$18,500
Field Service
Purchaser

Sales

Pneumatic Tool Repairer \$7.50
Tool Repairman \$8
Hydraulic Repairman \$4.50
Machine Repairer
Mechanics (2) \$15 \$6
Installation Services Mechanic
Maintenance Person (4) \$13.50 \$6 \$11.50
Installers (2)
Press Operator \$6.50
Machine Operator (2)
Saw Operator

Maintenance

COURSE DESCRIPTION

ATF148 PNEUMATIC AUTOMATION AND LOGIC CONTROL SYSTEMS:COMPUTER DESIGNED CIRCUITS: A study of the principles of pneumatic automation circuits and sequencing; computer software application (CAD) for automation circuit design and drawing; solid state and moving parts control logic system design and practical application;trouble shooting and building of pneumatic control panels from control ladder diagrams; and interfacing of pneumo-electronic systems and Programmable Logic Controllers and/or Computers.

This course is part of a series of **FLUID POWER TECHNOLOGY COURSES** which help to prepare personnel for a certification test as a **CERTIFIED FLUID POWER SPECIALST** given by the **FLUID POWER SOCIETY.**

SYLLABUS

TEXT	PRACTICAL AIR CIRUITS
GRADE	50% of average on quizzes and exams(Exams count double grade); 30% of average of Lab Reports; and 20% for control circuit and semester project.
DUE LIMITS	Lab Reports due no later than a week after Lab Assignment; Test make-up the following week (Special notice to instructor)
COURSE GOALS	Student will get instruction and work with: A) Control logic and operational power circuitry for pneumatic sytems applicable to industrial automation. B) Basics of solid state and moving parts logic control gates /devices. C) Basics in the interface of pneumatic logic controls/networks with Electronic Programmable Controllers. D) Conversion of electric control ladder diagrams to Pneumatic Logic Networks and Relay Control ladder diagrams. E) Basic Pneumo-Electro operational circuits. F) Robot pneumatic logic control circuits and operations. G) Automation and robot control diagrams and charts. H) Time base flow charting of automation and robot control parameters. I) Boolean control expressions and control script and network integration. J) Hands-On laboratory experiences and procedures to reenforce the Goals. K) Computer software (CAD) design and diagrams of Pneumatic Circuits.

ATF 140 BASIC HYDRAULICS
OAKLAND COMMUNITY COLLEGE AUBURN HILLS CAMPUS
SYLLABUS

EJK 9/92

COURSE DESCRIPTION

ATF 140 BASIC HYDRAULICS; A basic study of the principles, laws, and practical applications parameters for hydraulic systems used in industrial manufacturing automation, robotics, mobile equipment and automotive units. The course also incorporates some orientation of advanced technology considerations for applications of hydraulics in astronomical space equipment ie. space lab, servo-telerobotics and servo-mining equipment.

Basic trouble shooting and maintenance of hydraulic systems is also discussed and practiced at basic levels.

This Basic Hydraulics Course is part of a series of **FLUID POWER TECHNOLOGY COURSES** which help prepare the student for certification tests by the **FLUID POWER SOCIETY** for a **CERTIFIED FLUID POWER MECHANIC** or a **CERTIFIED FLUID POWER SPECIALIST** as well as a part of the curriculum leading to an **ASSOCIATE DEGREE**. The Course also meets one of the requirements for coop training in industry and/or aero-space technology. 3 cr. hrs.

CONTACT PHONE# 340-6618 (Leave Message)

******SYLLABUS******

- TEXT** INDUSTRIAL HYDRAULICS--VICKERS;1989 2nd.ed and CLASSROOM HAND-OUTS
- GRADE** 75% of average on quizzes/exams
25% of average on Lab Reports
- DUE LIMITS** Lab Reports are due no later than a week after their assignment. LAST DATE TO DROP COURSE (W) _____
Test Make-up; following week after absence-NOTIFY INSTRUCTOR AT BEGINNING OF CLASS.(ONLY 1 TEST MAKE_UP)
- COURSE GOALS;**
- A) Practical applications of basic operational principles and laws for hydraulics in industry, mobile/automotive hydraulics, robotics, and astronomical consideration.
 - B) Hydraulic power source operations, sizing requirements, math models and input prime mover parameters.
 - C) Hydraulic circuit basics for robotics, automation, machine systems, and mobile equipment and automotive.
 - D) Hydraulic control valve mechanisms, symbols, circuit requirements, sizing, valve operators, and Delta P considerations.
 - E) Hydraulic actuators; cylinders and motors, force and torque considerations, force balance, force vectors and torque models for applications in automation devices and robotics, and basic closed loop control in artificial intelligence systems.
 - F) Hydraulic auxiliary devices; conductors, filters, gauges, accumulators, heat exchangers and reservoirs; their systems applications parameters.
 - G) Basic understanding of servo-valves and proportional valves and their applications in robotics, automation, mobile equipment, and astronomical tele-equipment.
 - H) Introduction to automation control logic and programmable logic controllers (PLC) and control diagrams.
 - I) Electro-hydraulics; basic control by PLC programming in automation systems.

**ATF 140 BASIC HYDRAULICS
OAKLAND COMMUNITY COLLEGE AUBURN HILLS CAMPUS
SYLLABUS**

EJK 9/92

COURSE DESCRIPTION

ATF 140 BASIC HYDRAULICS; A basic study of the principles, laws, and practical applications parameters for hydraulic systems used in industrial manufacturing automation, robotics, mobile equipment and automotive units. The course also incorporates some orientation of advanced technology considerations for applications of hydraulics in astronomical space equipment ie. space lab, servo-telerobotics and servo-mining equipment.

Basic trouble shooting and maintenance of hydraulic systems is also discussed and practiced at basic levels.

This Basic Hydraulics Course is part of a series of **FLUID POWER TECHNOLOGY COURSES** which help prepare the student for certification tests by the **FLUID POWER SOCIETY** for a **CERTIFIED FLUID POWER MECHANIC** or a **CERTIFIED FLUID POWER SPECIALIST** as well as a part of the curriculum leading to an **ASSOCIATE DEGREE**. The Course also meets one of the requirements for coop training in industry and/or aero-space technology. 3 cr. hrs.

CONTACT PHONE# 340-6618 (Leave Message)

******SYLLABUS******

- TEXT** INDUSTRIAL HYDRAULICS--VICKERS;1989 2nd.ed and CLASSROOM HAND-OUTS
- GRADE** 75% of average on quizzes/exams
25% of average on Lab Reports
- DUE LIMITS** Lab Reports are due no later than a week after their assignment. LAST DATE TO DROP COURSE (W)
Test Make-up; following week after absence-NOTIFY INSTRUCTOR AT BEGINNING OF CLASS.(ONLY 1 TEST MAKE_UP)
- COURSE GOALS;**
 - A) Practical applications of basic operational principles and laws for hydraulics in industry, mobile/automotive hydraulics, robotics, and astronomical consideration.
 - B) Hydraulic power source operations, sizing requirements, math models and input prime mover parameters.
 - C) Hydraulic circuit basics for robotics, automation, machine systems, and mobile equipment and automotive.
 - D) Hydraulic control valve mechanisms, symbols, circuit requirements, sizing, valve operators, and Delta P considerations.
 - E) Hydraulic actuators; cylinders and motors, force and torque considerations, force balance, force vectors and torque models for applications in automation devices and robotics, and basic closed loop control in artificial intelligence systems.
 - F) Hydraulic auxiliary devices; conductors, filters, gauges, accumulators, heat exchangers and reservoirs; their systems applications parameters.
 - G) Basic understanding of servo-valves and proportional valves and their applications in robotics, automation, mobile equipment, and astronomical tele-equipment.
 - H) Introduction to automation control logic and programmable logic controllers (PLC) and control diagrams.
 - I) Electro-hydraulics; basic control by PLC programming in automation systems.

ATF 143 HYDRAULIC AUTOMATION COMPONENTS AND
COMPUTER AIDED DESIGN
OAKLAND COMMUNITY COLLEGE
SYLLABUS

ejk 1/91

COURSE DESCRIPTION

ATF 143 HYDRAULIC AUTOMATION COMPONENTS AND COMPUTER AIDED DESIGN; Prerequisite; ATF 140 or equivalent industrial experience. A study of hydraulic component operational characteristics in automation circuits for industry, robotics, heavy construction equipment and tele-operated astronomical systems. The course also provides basic "Hands-On" experience in Computer Aided circuit design and component operations circuits. ATF 143 is part of a series of FLUID POWER TECHNOLOGY COURSES which help prepare the student for certification tests by the FLUID POWER SOCIETY for CERTIFIED FLUID POWER SPECIALIST or for a CERTIFIED FLUID POWER MECHANIC as well as part of the curriculum leading to an ASSOCIATE DEGREE. 3 Credits Course Fee.

SYLLABUS

TEXT

Using Industrial Hydraulics; T.C. Frankenfield and Classroom Hand-Outs.

GRADE

50% of the average grades on Quizzes/Exams
25% on Lab Test Reports: Graphs; and Circuit Design
25% on Computer Aided Designs and Simulations

DUE LIMITS

Lab reports are due no later than a week after assignment.
Test Make-Up: Following week after absence-NOTIFY INSTRUCTOR AT BEGINNING OF CLASS.

PHONE CONTACT

340-6618 (Leave Message)

COURSE GOALS

The student will have opportunity for experiences in:
A) Basic Computer Aided design principles and operation of Hydraulic circuits.
B) Circuit analysis of hydraulic valve applications for force, velocity and open loop and servo loop circuits.
C) Math modelling and graph development for hydraulic valve components performance; Cv and Cd.
D) Key aspects of fluid mechanics and basic force balance in applied mechanics for system development.
E) Basic Tele-operated hydraulic proportional valve and servo-valve systems.
F) Basic PLC controlled hydraulic systems.
G) Basics in heavy Construction and Mobile Equipment hydraulic components and circuits.

1st MTG

1.0 Course Description,
1.1 Goals, Text, Hand-outs, Calculator.
1.1 Grade, Due Limits.
1.2 Phone Contact
1.3 Co-Op and Scholarships
1.4 Review Basics Ch. 1 pp.1 to 14 Energy, Work, Force, HP, Acceleration, Power, Heat, Areas, Volume, GPM.
** Ch. 1; Hand-Out #1 Basic Circuits Components and Functions; Self-Evaluation #1

A:LES252.SYL ATF 252 COMPUTER DESIGNED FLUID POWER
CIRCUITS and SIMULATIONS ANALYSIS
OAKLAND COMMUNITY COLLEGE
SYLLABUS

ejk 2/91

COURSE DESCRIPTION

ATF 252 COMPUTER DESIGNED FLUID POWER CIRCUITS AND SIMULATION ANALYSIS: Prerequisite; ATF 143 or 2 year experience on computer design CAD and/or hydraulic design specifications. Course involves a study and computer keyboard experience in design, specification and operational simulation and analysis of hydraulic and pneumatic automation, robotic, and generic circuits and components. A familiarization with appropriate software applicable to DOS operating systems. Software is available to the student on successful completion of the course. 3 Credits Course Fee

SYLLABUS

TEXT

Classroom Hand-Outs and Instruction Manual and Documentation

GRADE

25% on average of Quizzes
50% on Computer Design Assignments
25% on Semester Project (Commercial Design)

DUE Limits

Lab work is due no later than week after assignment. Quiz Make-Up; following week after absence-NOTIFY INSTRUCTOR AT BEGINNING OF CLASS.

PHONE CONTACT

340-6618 (Leave Message)

COURSE GOALS

The student will have the opportunity for instruction and experiences in:

- A) Operational use of hydraulic and pneumatic computer software for the design and operational simulation of automation, robotic and generic circuits.
- B) Computer analysis of generic hydraulic and pneumatic component performance in circuit systems.
- C) Analysis and outputs of pressure, flow, heat and force/torque performance of designed circuits.
- D) Analysis of pneumatic servo-mechanisms rate, position equations, and time integration using a Runge Kutta integration algorithm.
- E) Computer outputs on line sizes, actuator flow rates, system flow rate, pump horse power, and heat in-put.
- F) Dynamic simulation of entire hydraulic systems.
- G) Study of the dynamic response of all hydraulic system parameters pursuant to specific designs.
- H) Hydraulic systems performance evaluations methods.

NOTE: Computer Equipment used in Laboratory is IBM Software requires DOS ability.

ATF 254 DIRECTED STUDY:FLUID POWER FABRICATION TECHNIQUES
 CIRCUITS and SIMULATIONS ANALYSIS
 OAKLAND COMMUNITY COLLEGE
 SYLLABUS

COURSE DESCRIPTION

ATF 254 BASIC COMPUTER DESIGNED FLUID POWER CIRCUITS:
 SIMULATION ANALYSIS: FABRICATION: 3HR CREDIT

Course involves a study and computer keyboard experience design, specification of hydraulic circuits using CAD like software; A familiarization with appropriate software applicable to DOS operating systems. Practice in design, fabrication, repair of hydraulic robot or pneumatic circuit boards for Semester Project.

SYLLABUS

TEXT

Classroom Hand-Outs and Instruction Manual and Documentation

GRADE

20% on average of Quizzes
 20% on Computer Design Assignments
 60% on Semester Project Hydraulic Robot or Circuit Board

DUE Limits Lab work is due no later than week after assignment.

Quiz Make-Up; following week after absence-NOTIFY
 INSTRUCTOR AT BEGINNING OF CLASS.

PHONE CONTACT 340-6618 (Leave Message)

COURSE GOALS The student will have the opportunity for instruction and experiences in:

- A) Operational use of hydraulic and pneumatic computer software for the design and operational simulation of automation, robotic and generic circuits.
- B) Analysis and outputs of pressure, flow, heat and force/torque performance of designed circuits.
- C) Computer outputs on line sizes, actuator flow rates, system flow rate, pump horse power, and heat in-put.
- D) Dynamic simulation of entire hydraulic systems.
- E) Hydraulic systems performance evaluations methods.

NOTE: Computer Equipment used in Laboratory is IBM
 Software requires DOS ability.

CLASS ROOM AND LAB SCHEDULE EJK 1/93

- 1st MTG
1. Introduction to the course
 2. Course Goals
 3. Software basics
 4. Orientation to the IBM Computer Lab
 5. Due Limits
 6. Group operations;station share
 7. Robot or Circuit Boards :Group Designation

HAND-OUTS: SYLLABUS and SELF EVAL. #1

A:ATF147.SYL

**ATF 147 FUNDAMENTALS OF PNEUMATICS
OAKLAND COMMUNITY COLLEGE**

COURSE DESCRIPTION 9/90 EJK

ATF 147 FUNDAMENTALS OF PNEUMATICS; A study of the principles, laws, and practical applications parameters for pneumatics and vacuum systems used in industrial manufacturing automation, robotics, mobile and automotive units, and architectural environmental operation and control. The course also incorporates some orientation of advanced technology applications in astronautical space equipment ie.; space lab, servo-telerobotics, and servo-mining equipment.

Trouble shooting circuits and maintenance of pressure pneumatics and vacuum systems, on a generic level, is also discussed and practiced.

This basic Fundamentals of Pneumatics Course is part of a series of **FLUID POWER TECHNOLOGY COURSES** which help to prepare personnel for an Associate Degree or College Certificate; **FLUID POWER SOCIETY** certification tests are also offered for **FLUID POWER MECHANIC** or a **CERTIFIED FLUID POWER SPECIALIST**. The Course is taught by classroom presentation and laboratory experiments. 3CrH.

SYLLABUS

TEXT & HAND-OUTS

INDUSTRIAL PNEUMATIC TECHNOLOGY

GRADE 75% of average on Quizzes and Exams; 25% of average on Lab Reports.

DUE LIMIT Lab reports due no later than one week after assignment
Test make-up the following week; **(MAX) NOTIFY INSTRUCTOR**

COURSE GOALS : Students will be given classroom instruction and laboratory experiments in:

- A) Basic operational laws; technical and specification information; practical applications of Pneumatic and Vacuum systems and circuits.
- B) Safety considerations and procedures in Pneumatic and Vacuum applications, testing, maintenance, and fabrication.
- C) Pneumatic and Vacuum pump power source types, sizing requirements, and operation; math models and power auxiliaries.
- D) Circuits applications of Pneumatic and Vacuum power control valves: pressure, directional, flow velocity, and automation.
- E) Power valve sizing, symbols, Cv factors, mechanism operation, and circuit requirements.
- F) Pneumatic and Vacuum linear and rotary actuators: math models of actuator sizing and performance in operational circuits for automation, robotics, mobile and automotive, and environmental control.
- G) Pneumatic and Vacuum conductors, connectors, and closures; distribution circuit requirements and distribution circuit accessories.
- H) General Gas Laws and their operational effects in hostile environments such as, astronautic operations.
- I) An overview of the applications of Pneumatic Systems in astronautical space equipment.

FROM: Edward J. Konopka
TO: Dr. Bill Rose, Dean; Donald Tremper, Apprentice
Coordinator; and Larry Pennefather, Department Chairman
DATE: 12/10/90
SUBJECT: Progress Report #1 on Phase I of Fluid Power Technology
Update per Special Assignment PAF Dated 11/13-21/90

Persuant to the implementation of the Special Assignment PAF Dated 11/13-21/90 for the Update of the Fluid Power Technology Program, I am pleased to make this Progress Report #1 on Phase I of the Work Plan. (Preliminary Draft Dated 10/21/90)

Phase I, Sec.1., Par. C-Texts/Manuals/Computer Software

At the TECH 2000 EXHIBITS and SEMINARS at Washington, D.C., visited the 17 NASA established Tech Transfer Centers for Technology Transfer to the Private and Educational Sector; checked on any employability surveys and on access to Public Domain Software for Fluid Power Computerized System Design and Analysis. I was directed to the COSMIC Center at the University of Georgia.

ACTION TAKEN; Visited the COSMIC CENTER Display at Washington, D.C. and followed up for additional clarification by phone Dec. 5th
RESULTANT; Using the COSMIC CENTER CATALOGUE on the FLOPPY DISK on my 386 Computer, I was able to sort out and obtain Abstracts for a number of computer programs which would be apropos to the OCC updated Fluid Power Tech Program. (Software Abstracts Attached Hereto)

Phase I, Sec. 1., Par. D-Employability

Contacted Mr. James P. Mockler, Vice-President of Parker Hannifin Corporation and President Fluid Power Group on Employability Survey by the NFPA (National Fluid Power Association-The Fluid Power Manufacturers Group) and also on the "Fluid Power Megatrends 2000" Paper presented at the 1990 NCFP (National Conference on Fluid Power)

ACTION TAKEN; Phone call to Mockler's office

RESULTANT; Promised to sent information and to cooperate with OCC effort.

Visited the Tech 2000 Seminar and Exhibits in Washington D.C. Nov. 26-28/90 talked about the employability of Fluid Power Technicians with Associate Degrees and FPS (Fluid Power Society) Specialist Certification. Many would hire immediately. This also supported by advertisements In JOBS PUBLICATION

for Technicians in the NASA and other Aero-Space Companies Jobs in the G-11 and G-12 Categories paying \$20K to \$30K to start.
ACTION TAKEN; Attended the TECH 2000 Seminars Washington D.C.

Nov. 26-28-90

RESULTANT; Many jobs available for FLUID Power Techs in the AERO-SPACE Industries.

U.S. Academy Summer Scholarships for Cooperative Trainig for Fluid Power Students available for students with 16 CRHR and 3.5 GPA

PROGRESS REPORT #1 con't

Talked to Paul Hozian; presently teaching Fluid Power to employees at Down-River Ford Rouge and Inland Steel; Paul reported many apprentice opening for skill trades Fluid Power available; it is also reported that GM has opened 299 apprenticeships for various trades.

Phase I., Sec. 1., Par., E Program and Course Recommendations
Talked to John Nogosian, FPS (Fluid Power Society) , National Education and Grants Chairman, about the OCC Fluid Power Technology effort. He reported that the FPS was just completing a restudy of the courses and curriculum requirements for the Fluid Power Technician. The FPS was cooperating with American Association for Instructional Materials

ACTION TAKEN, Met with John Nagosian at the FPS meeting regarding grants and curriculum in Fluid Power Technology

RESULTANT; Nagosian promised to send the New Curriculum FPS recommendations to OCC attention as soon as available.

Talked to Steve Atma about the possibility of using the IBM XT's for Fluid Power Students implementing the COSMIC software. He responded cooperatively.

Talked to Doug St.Clair about the Robotics and TeleRobotics innovations and their relations to Fluid Power.

He responded Cooperatively.

Talked with Dave Mehre about the effort for Fluid Power Update. He responded enthusiastically.

This concludes Progress Report #1. I am continuing toward further action on the Fluid Power Technology Update. Plan to fly to Golden, Colorado for a two day visit to Martin Merriette to visit their labs for hydraulic telerobots and Space Station Liberty and talk about Fluid Power Technician qualifications.

DONATION TO OCC; Expenses incurred in the discharge of the PAF Contract responsibilities and the above Travel, Living, and Registration in the **TOTAL OF ; \$681.21** are herein **DONATED TO OAKLAND COMMUNITY COLLEGE, AUBURN CAMPUS; AUBURN, MICHIGAN.**

Respectfully Submitted
Edward J. Konopka

COPIES TO:
Dean. Bill Rose
App.Coor. Don Tremper
Dept. Chair Larry Pennefather
App. Tech. Harvey Eschenburg

TITLE: ROHDA- ROCKWELL HYDRAULIC DYNAMIC ANALYSIS

EQUIREMENTS: IBM 360 Series

LANGUAGE: FORTRAN IV

MEDIA: 9 Track 1600 BPI IBM IEHMOVE Format Magnetic Tape

SIZE: Approximately 5,830 source statements

PRICE: Program \$800.00/Documentation \$21.00

**** A B S T R A C T ****

This program, called ROHDA - Rockwell Hydraulic Dynamic Analysis, was developed to mathematically describe complete hydraulic systems in order to study their dynamic performance. Previous simulations of hydraulic systems employed computer models of individual system elements which used the method of characteristics to simulate the connecting lines. ROHDA can be used to conduct dynamic simulations of an entire hydraulic system (or individual segments), providing physical insight into problems which are obscured by previous approaches. The program will calculate the values of pressures, flows, and component variables throughout a hydraulic system. This allows the designer to study the dynamic response of any system parameter, such as actuator piston velocity, pump output pressure, or line pressures. ROHDA should prove a valuable tool to engineers with detailed performance results of aircraft, spacecraft, or similar hydraulic systems. ROHDA is a general purpose hydraulic simulation program which employs a building block approach in the form of subroutines which simulate the various components of a hydraulic system. These subroutines are then controlled by a main program. Component modules available include pumps, pressure lines, flow lines, flow reversing and pressure reversing lines, orifices, sinks and sources, regulators, fittings, reservoirs, accumulators, filters, valves, and actuators. The program is structured so that the user can include additional component modules as they are developed. The hydraulic system functional arrangement is defined by input data. The order of the elements in the data deck determines the order of system evaluation. The input to the hydraulic system is normally an actuator demand which causes a disturbance to propagate through the model. The output of the program consists of time histories of pressure and flows at any point in the system and component variables of interest, such as actuator velocity, position, and load. This program is written in FORTRAN IV for batch execution and has been implemented on an IBM 360 series computer with a central memory requirement of approximately 280K of 8 bit bytes. ROHDA was developed in 1977.

KEYWORDS:

HYDRAULIC CONTROL
HYDRAULIC EQUIPMENT
FLUID MECHANICS
AUTOMATIC CONTROL VALVES
SERVOMECHANISMS

MSC-19753

TITLE: SPACE SHUTTLE HYDRAULIC SYSTEM POWER ANALYSIS

EQUIREMENTS: IBM 370 Series

LANGUAGE: FORTRAN IV

MEDIA: 9 Track 1600 BPI EBCDIC Card Image Format Magnetic Tape

SIZE: Approximately 760 source statements

PRICE: Program \$500.00/Documentation \$14.00

**** A B S T R A C T ****

This is a fluid mechanics package containing five subroutines to determine required hydraulic fluid flow rates, hydraulic system power requirements, and heat input. The program is designed to contribute time savings in the determination of required system flow rates, horsepower, and heat inputs for hydraulic actuation devices. In the design of hydraulic control systems, it is necessary to determine the amount of power required to operate the hydraulic actuation devices. This program provides this capability when given the actuator design and performance requirements. The output of the program can then be used to determine the necessary transmission line sizes for providing power and fluid to the actuators. The program calculates actuator no-load flow rate from the flow limiting factor, actuator no-load design rate, and actuator flow gradient. Actuator servo valve leakage is determined from the number of servo channels and a function of the no-load flow rate. The actuator power spool leakage is also determined as a percentage of the no-load flow rate. The program also calculates actuator demand flow, actuator total flow rate, system flow rate, pump horsepower, and heat input to the system. The program is of a general purpose nature and can be used to determine system power requirements and transmission line sizes based on actuation device design and performance inputs. The program operates in interactive mode, requires a minimum of 184K bytes of storage, and has been implemented on the IBM 370/168. User supplied routines are required for CRT output.

KEYWORDS:

SPACE SHUTTLES
HYDRAULIC EQUIPMENT
FLUID POWER
FLOW VELOCITY

C O S M I C Program Abstract

MFS-23295

TITLE: DYNAPS- DYNAMIC ANALYSIS OF PNEUMATIC SERVOMECHANISMS

REQUIREMENTS: UNIVAC 1100 Series

LANGUAGE: FORTRAN IV

MEDIA: 9 Track 1600 BPI EBCDIC Card Image Format Magnetic Tape

SIZE: Approximately 1,030 source statements

PRICE: Program \$500.00/Documentation \$19.00

**** A B S T R A C T ****

DYNAPS is a generalized computer program which can perform a dynamic analysis of almost any kind of pneumatic servomechanism and the system which it is controlling. The system and device to be modeled can contain up to 20 ullage chambers, 20 moving parts (pistons, poppets, etc.), and 40 flow lines. The program can be easily modified to model larger systems. DYNAPS calculates, as a function of time, the position of all moving parts within the system and servomechanism, pressures within the internal chambers of the servomechanism and in any ullage chambers in the complete system, and flowrates in each line of the system, including sensing lines and main flow passages. DYNAPS has been used in the Space Shuttle Program to make analytical assessments of the dynamic behavior of a regulator controlling the pressure in a tank which has liquid flowing in or out of it. DYNAPS should prove useful in the analysis of any kind of pneumatic servomechanism system, including pressure regulators, relief valves, pneumatic actuators or positioning devices, shock absorber systems, and surge chambers. The DYNAPS computer program is comprised of five major parts. The first part is the main routine, which handles all input-output functions and has the 'logic' to model the system from the input data. Moving parts, such as pistons, are assumed to be subjected to pressure area forces, spring forces, breakout friction, dynamic friction, viscous damping, flow drag, and vibration. Every volume is assumed to be comprised of a multispecies gas and to be connected to other volumes by one or more lines. Each volume may do work on a piston, the piston being either the surface of a moving part or moving liquid surface. The second and third components of the program set up the necessary rate and position equations and perform the time integration using a Runge Kutta integration algorithm. A fourth component of DYNAPS solves the flowrate, mass, and energy equations to determine the rate of change of the pressures, temperatures, and gas composition within each chamber and the flowrate in connecting lines. The fifth component solves the force balance equations and determines the acceleration history on all moving parts in the system. The DYNAPS program is written in FORTRAN V for batch execution and has been implemented on a UNIVAC 1108, under control of EXEC 8, with a central memory requirement of approximately 27K decimal of 36 bit words. DYNAPS can produce plots of the line histories of the system variables being studied. Plotting is accomplished on a SC-4020 plotter.

A Brief Description of Courses

First Semester

Introduction to Fluid Power

A course designed to familiarize the student with fluid power principles and the fluid power industry. It introduces the student to the many and varied hydraulic and pneumatic applications, the general fluid power system concept, and the principles of applied fluid mechanics.

Technical Mathematics I

The first course in a two course sequence. It includes the following major divisions: fundamental concepts and operations, functions and graphs, the trigonometric functions, systems of linear equations and determinants, factoring and fractions, quadratic equations, the slide rule, trigonometric functions of any angle or number, and vectors and oblique triangles.

Applied Physics I (Mechanics and Heat)

The first of two courses in applied physics. Study of the principles of physics emphasizing mechanics and heat including their applications in fluid power technology is accomplished during the first semester.

Fundamentals of Communications

(Reading, Writing, Speaking and Listening)

A course in which the student learns the fundamentals of these four communications media and improve his skills in each. This course also serves to integrate other subject areas.

Basic Technical Drafting

A basic course which provides freehand drafting experience and the development of basic skills with drafting tools. Includes knowledge of principles and practices, as well as the development of basic techniques.

Second Semester

Hydraulic Components and Circuits

A study of the principles of operations and

construction of components comprising a hydraulic circuit. A survey of the available types of components and their functions within circuits are included. Principles of simple circuit design (including proper symbology) and accompanying calculations are also covered.

Fundamentals of Pneumatics

A study of the applications and the physical laws governing the uses of pneumatic power and how they apply to pneumatic compression and distribution systems. It includes an analysis of the properties of air and how air is compressed and distributed. Methods of controlling pneumatic power are investigated by designing circuits and evaluating them in terms of their specific applications. The operating principles and design features of typical pneumatic systems and components are studied and demonstrated. The similarities and differences between pneumatic and hydraulic systems and components are also reviewed.

Technical Mathematics II

A continuation of Technical Mathematics I. It includes the following major divisions: exponents and radicals, the j -operator, logarithms, additional types of equations and systems of equations, inequalities, graphs of the trigonometric functions, additional topics in trigonometry, plane analytical geometry, basic concepts of the derivative, and basic concepts of integration.

Applied Physics II

(Electricity, Sound and Light)

Continuing study of applied physics. This course includes a study of basic electrical principles and the fundamentals of circuitry, including their applications in fluid power technology. The fundamental principles of sound and light are also presented.

Applications of Engineering Mechanics

An introduction to the relationship of forces, motion, work and power and the resulting effects on machine parts.

Third Semester

Fluid Power Circuits and Systems

Fluid power circuits are designed using appropriate symbols and language. Actual hydraulic, pneumatic and/or electrical components are then assembled and the circuit operation is tested. Techniques of circuit calculations, component selection factors and circuit troubleshooting are covered. Applications of fluid power systems to industrial situations are included.

Material Fabrication and Fluid Power Shop Techniques

This course is designed to provide the student a working knowledge of metals, elastomers, tools, and other equipment and supplies normally used in the fluid power industry when designing, building or maintaining fluid power equipment. It includes a study of the physical characteristics of both metals and elastomers with respect to their behavior during fabrication and usage. Methods of material removal, elementary aspects of machine tool operation and tooling requirements are studied. The student acquires initial skills with hand tools and with gas welding and brazing, and AC/DC arc welding.

Electricity and Electronics

A basic study of electrical power and controls, and electronic controls as they apply in particular to fluid power systems. Emphasis is made on the practical aspects of these controls. Lecture, demonstration and laboratory experiences are combined to acquaint the student with electrical and electronic components and circuits that are utilized for measurement and control functions.

Computer Applications in Industry

A review of the evolution and the uses and operations of computers and electronic data processing in industry. The student is provided an opportunity to do some fundamental data processing and programming exercises.

Industrial Organizations and Labor-Management Relations

A review and analysis of the roles of labor and management in the development of American

industry. Labor-management relations (including the growth of the labor movement, the development and structure of American business management, and the legal framework within which labor-management relationships and responsibilities are conducted) are covered, as well as in introduction to labor economics (i.e. labor supply and demand, unemployment and wage determination). Current practical aspects of an industrial society are emphasized.

Fourth Semester

Logic Systems

The fundamental principles of logic functions, digital control circuits and data organization are presented. Laboratory experiences serve to confirm and clarify the student's understandings of these principles. He sees their applications to several modes of control such as pneumatic, fluidic, electro-mechanical and electronic. Typical applications of fluid power logic systems in industry are represented.

Fluid Power Component and Circuit Performance

This course integrates the previous fluid power courses and laboratory work. It includes the study of performance characteristics of fluid power components, data acquisitions, and the analysis and evaluation of the requirements of fluid power circuits which are currently being adapted to industrial applications. Experiences are provided with measuring and testing instruments and related procedures.

Technical Reporting

A course in the practical aspects of preparing reports and communicating within groups using the basic skills acquired in the previous course "Fundamentals of Communications". This course includes the use of graphs, charts and diagrams in presenting ideas and significant points in formal or informal written and oral reports. The development of an appreciation for precise reporting and the use of audio-visual equipment are included.

Human Relations in Industry

Bases of human relations and the organization of individual and group behavior are



studied. Special emphasis is given to typical industrial relationships in everyday situations. Fundamental relationships between behavior and personal and group forces are examined. The student is stimulated to make an effort to be more effective in his relationships with others.