COMPANY CONFIDENTIAL

S P E C I A L T Y P R O D U C T S

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H I G H L I G H T S

SPECIALTY PRODUCTS RESEARCH

ACCOMPLISHMENTS IN 1972

Key Research Highlights

I. Fluids

* Reformulated Pydrauls

* New NC, N_2C phosphate ester process, AR project and manufacture

* Santosol 100 - product definition, process, interim plant, AR, full scale plant

* Identified biodegrable PCB and non-PCB capacitor dielectric

  Initial attempts for emulsified biphenyl failed

* DPO process, heat transfer conversions - Goodyear success

  Initiated process work o-PP/p-PP

  Contract work
  NASA - Lubricants and hydraulic fluids for space shuttle
  EPA - Fluids for converting heat into mechanic work - Rankine cycle engine

II. E/VCl Latex Binders

Paper Applications

Pigment Binder

E/VCl trialed on commercial equipment at Continental Can, Federal Board and Eastex

Saturation - Web and Beater

Developed formulas for wall covering at Imperial Paper

Demonstrated E/VCl in paper-nonwovens at C. H. Dexter

Functional Coatings

Clear coatings recommended at Resistane, York, Strahan

Coated cups and plates at Continental Can

Textile Applications

Carpeting

* Helped Water Carpet increase E/VCl usage; solved backside blowing problem.
* Used E/VCl as a precoat to foam at Coronet East

  Failed on froth applications with Textile Rubber

Nonwoven and finishing

Demonstrated need for hot tensile (crosslinkable or 30°C. Tg E/VCl) at Globe

Called at Norton and Ballanger for E/VCl in abrasive and buffing wheels

New Products

* Developed Tg 30 "plastic" latex

  Initiated development of self-crosslinking E/VCl

Process

Initiated continuous process work - tube + stirred reactor

III. Paper

Surface Sizing

* Scripset at size press plus rosin at wet end boosted sizing efficiency
* Dyeing at size press plus Scripset provided new route to color paper
* Demonstrated solvent/non-solvent process for Liquid Scripsets - Montreal plant project, start-up, production
* Demonstrated Scripset 808, dry ammoniated powder - product definition, process, trials, interim production

Wet Strength

* Supported sales of Santo-Res 21/23 ($1.4M rate fourth quarter)
* Supported Commercial Development in obtaining FDA approval on Santo-Res 21/23
* Made new product RPC-1110-1114 for bleached tissue

Internal Sizing

Produced Mersize LCS and efficient TFL at Seattle

Resolved poor emulsion properties of Mersize TFL

* Initiated Neuphor replacement product and process work

IV. Penta

* Developed additive package - best Penta quality-wise on market

Monitored dioxins in plant product and developed distillation purification process

* Developed process for converting by-product scrubber solutions to saleable 30% solution

D E T A I L S

FLUIDS

HYDRAULICS AND LUBRICANTS

L. R. Stark
P. D. Fowlkes
P. F. Heimsch
L. F. Smith

F.R. Hydraulics

Reformulated Pyrdaul E (phosphate esters) and Pydraul C (phosphate ester-hydrocarbon) fluids.

J. F. Herber
J. D. Sullivan
W. C. Warren
D. L. Kocher

Phosphate Esters

NC phosphate, a new high molecular weight non-cresylic phosphate was produced using nonylphenol (N) and cumylphenol (C) as raw materials. Cumylphenol was produced commercially for the first time. Queeny Plant achieved 99% of AR rate and yield 6 months after start-up of NC phosphate.

J. F. Herber
L. W. Bannister
R. L. Green
P. F. Pellegrin

Skydrol Fluids

Developed a Suggested Procedure for a monoepoxide stabilizer for Skydrol fluids. The monoepoxide effectively reduced hydraulic pump shaft seal leaks. Skin sensitivity is a problem. New compounds were synthesized to minimize sensitivity.

Presented paper to SAE showing superior erosion properties of Skydrol vs. competitive fluids. Skydrol shows no signs of valve erosion after 3000 hrs. of valve tests while competitive fluids from Stauffer and Chevron show signs of erosion in 100 hrs.

Provided extensive customer service of Skydrol deposits to PAA and BOAC on Skydrol 500C problems.