program
A new assembly plant for Maul Bros.

Winchester, Inc.

An architectural project to be executed by Steven Eppling in fulfillment of thesis requirements.

Program submitted, Sept. 29, 1975
Energy conservation is a major area which I intend to explore. Current industrial plant design theory advances the idea of a totally closed box with artificial systems support. This results in a tremendous waste of energy. By investigating site orientation, natural lighting and ventilation, solar radiation, materials properties, vegetation as a shading device and soil as an insulative device. I hope to reduce the energy bill as drastically as possible.

Industrial psychology is another area that will be a major source of attention. Hopefully, worker morale can be improved through better design. In addition, the design solution must respond to these general goal statements.

(1) Provide a facility which will respond to activities other than its primary activity.

(2) Provide each department with the ability to expand.

(3) Provide a facility that will allow better inventory control and more adequate supervision

(4) Provide a facility which will respond to the site.

(5) Provide a facility that meets investment and capital requirements.
THE SITE

The site lies on the northwest edge of Winchester, Indiana. It has a relatively low relief with a grade change of not more than ten feet. To the north lies the city sewage treatment plant and the city dog pound, and beyond this the White river. The Winchester sanitary landfill bounds the site at the northeast edge. On the eastern edge stands the Indiana State Highway Maintenance garage, the Winchester street maintenance department, and the Overmyer foundry. The southern edge of the site is bounded by a residential district. To the west lies a small stream and beyond that, open country.

The present Maul Bros. plant now occupies the site. Consequently, the site is fairly devoid of vegetation. It is largely covered by graveled lots. There is no outstanding vegetation that should be spared in developing a new facility.

The prevailing soil type is Miami Silt Loam. This material is light grayish-brown in color and provides excellent drainage. Miami Silt Loam has a pH value ranging from 5.3 to 7.4.
MAJOR ASSEMBLY

The main purpose of this area is for the re-assembly of the glass container machines and their subsequent testing and shipping. Major assembly's present hours of use are day shift only, 7:00 A.M. to 3:30 P.M. Approximately 25 personnel are employed in this area, plus one general supervisor and one departmental supervisor. This space has the following characteristics and equipment needs.

- a service entrance, an outside exit, lie on main circulation corridor and be relatively close to employee parking.

- space is a noise generator

- space should be open and functional in plan.

- present means of service is by carts and skids

- furniture consists of a work bench or desk for the supervisor and a work bench at each station for the rebuilding of the machine.

- equipment required is an overhead crane, exhaust vents for fumes when testing, lockers for laborers.

- hi-level incandescent lighting, daylighting desirable

- 110 and 220 voltage outlets. No. yet to be determined

- fire alarms, emergency lights, and inter-plant telephone communications

- floor drains required in some areas of the space.

- compressed air will be needed at each work bench

- width of space will be determined by width of overhead crane

- projected area: 8750 sq. ft.

Be sure to develop this kind of info so you become the designer and not the plant manager's drafter.
SUB-ASSEMBLY

The purpose of this area is the dismantlement of steam cleaned parts, their repair and the subsequent rebuilding of the parts. Present hours of use are 6:00 A.M. to 4:30 P.M., the day shift. There are 15-20 hourly personnel employed in this area headed by one departmental supervisor. This space has the following characteristics and equipment needs.

- outside exit, lie on main circulation corridor and lie relatively close to employee parking.

- this space is a noise generator

- requires visual control by departmental supervisor

- presently serviced with carts and skids

- furniture required is a desk or bench for supervisor
  12 work benches for employees.

- approx. 20 lockers for employees

- fluorescent or incandescent lighting. Daylighting highly desirable.

- 110 and 220 voltage outlets required. No. yet to be determined.

- inter-plant telephone communication

- floor drains and a drinking fountain required

- compressed air required at all work benches

- portable fire extinguishers

- projected area: 5000 sq. ft.
STOCK ROOM

The function of this area is the storage of parts used in the rebuilding of machines. The storage of parts manufactured in the machine shop for the purpose of shipping to customers. Present hours of use are 8:00 A.M. to 4:30 P.M. This area employs approximately 12 hourly workers plus one clerk, one secretary and one departmental supervisor. This space has the following characteristics and equipment needs.

- outside exit, service exit, should lie on main circulation corridor and be relatively close to employee parking.

- requires visual control

- presently serviced by grocery carts, two-wheelers, carts and skids.

- supervisor's office requires 2 desks, 2 file cabinets and storage units for inventory control

- clerk requires a desk and filing system.

- lockers should be provided for employees

- fluorescent or incandescent lighting required. Daylighting desirable. Emergency lighting required.

- 110 voltage outlets required. No. yet to be determined

- inter-plant telephone communication

- hazardous fire area. Sprinkler system should be provided. Portable extinguishers as supplement

- floor drains and a water fountain are needed

- projected area: 10,500 sq. ft.
WELD SHOP

The purpose of this area is to provide support for major assembly and sub-assembly and provide general maintenance for the plant. Present hours of use are 8:00A.M. to 4:30P.M. Approximately six people are employed in this area. This area has the following characteristics and equipment needs.

- Should have an outside exit, lie on secondary circulation and be close to employee parking.
- space is a moderate noise generator
- presently serviced by carts, skids and towmotor
- lockers should be provided for employees
- incandescent or fluorescent lights. daylight desirable emergency lights
- 110 and 220 voltage outlets. No. yet to be determined.
- inter-plant telephone communication
- exhaust system required to draw off weld fumes
- floor drains, water fountain snared with carpenter shop
- compressed air desired at work benches
- portable fire extinguishers(CO₂ type) should be provided.
- projected area of space: 500 sq. ft.
CARPENTER SHOP

The purpose of this area is to make crates for shipping of machine parts. Secondary purpose is general maintenance work throughout the plant. Present hours of use are 8:00 A.M. to 4:30 P.M. There are approximately 4 to 6 people employed here. This space has the following characteristics and equipment needs.

- should lie on secondary circulation, have an outside exit and be close to employee parking.

- Space is a moderate noise generator

- presently serviced by carts, skids and towmotors

- lockers should be provided for employees

- incandescent and fluorescent lights. daylighting desirable. emergency lights.

- 110 and 220 voltage outlets. No. yet to be determined.

- interplant telephone communication

- floor drains and water fountain shared with weld shop.

- portable fire extinguishers

- projected area: 500 sq. ft.
MACHINE SHOP

The purpose of this area is the machine tooling of parts that fit on machines that manufacture glass containers. Present hours of operation are 6:00 A.M. and 3:00 A.M.; a day shift and a night shift. Present number of employees is approximately 60. This area has the following characteristics and equipment needs.

- two outside exits, lie on both main and secondary circulation and be close to parking.

- space is a noise generator

- requires visual control

- provisions must be made for removal of iron and steel filings from the machines plus any left over scrap iron or steel.

- presently serviced by carts, skids and towmotors

- supervisor's office will require desk and chair.
  machine shop area will require 3 time clocks and 3 bulletin boards

- supervisor's office requires letter size filing cabinet

- lockers for employees, work benches at every machine.

- floor finish should be non-slip

- incandescent and fluorescent lighting, emergency lighting daylighting desirable.

- 110 and 220 voltage outlets. No. yet to be determined.

- interplant telephone communications

- floor drains and water fountain required

- compressed air at all machines

- fire protection; sprinkler system and portable extinguishers

- projected area: 20,000 sq ft
PAINT SHOP, DEBUR AND INSPECTION

The function of this area is to smooth rough spots on machine parts, inspect to make sure the job is done right and subsequently paint the pieces to match the machines they go on. The present hours of use are 7:00A.M. to 1:00 A.M. There are approximately 15 people employed in this area. This area has the following characteristics and equipment needs.

- should lie on main circulation corridor and be near employee parking.

- deburring is a moderate noise generator. inspection and painting will provide very little noise.

- visual control is required

- presently serviced by carts, skids and towmotors.

- departmental supervisor will require a desk at his station

- lockers should be provided for employees

- approximately a dozen work benches required

- fluorescent or incandescent lighting, emergency lighting daylighting desirable

- 110 and 220 voltage outlets required. No. yet to be determined.

- interplant telephone communication

- floor drains and drinking fountain desirable

- compressed air required for deburring.

- fire protection: CO₂ system in paint shop. portable extinguishers.

- projected area: 4000 sq. ft.
TEAR DOWN AND STEAM ROOM

The purpose of this area is the dismantlement and steam cleaning of glass container machines which come in for overhaul. Present hours of use are 7:00 A.M. to 3:30 P.M. This area employs 4-6 employees plus a departmental supervisor. It has the following characteristics and equipment needs.

- service entrance, emergency exit, lie on secondary circulation and be near employee parking
- space is a moderate noise generator
- requires visual control

- presently serviced by cart, forklift and overhead crane

- supervisor needs a desk. tear down should have a work bench
- lockers should be provided for employees
- part of floor shall be steel grate. rest shall be non-slip concrete

- incandescent or fluorescent light. emergency light daylight desirable.

- 110 and 220 voltage outlets required. No. of outlets yet to be decided.

- inter-plant telephone communications

- humidity will be a problem

- hot and cold water supply, water cooler, urinal, toilet, shower and sink
- steam supply, compressed air
- portable fire extinguishers
- projected area: 2500 sq. ft.
PRODUCTION CONTROL

The purpose of this area is to provide control of manufacturing, improve efficiency through time motion studies, and set standards for manufacturing. Present hours of use are 8:00 A.M. to 5:00 P.M. There are 12 employees; all management and support staff. This area has the following characteristics and equipment needs.

- centrally located within plant; should lie on main circulation, be near outside exit and have easy access to parking.
- requires acoustical isolation from plant noise activity
- each employee requires a desk, chair and filing cabinet
- all clerks require a typewriter
- tile floors, acoustical ceiling
- incandescent or fluorescent lighting; emergency lighting daylighting desirable
- 110 voltage outlets. No. yet to be determined
- inter-plant telephone communication; all employees
- water fountain, access to plant washrooms and toilets
- fire protection; sprinklers and portable extinguishers
- projected area: 1000 sq. ft.
RECEIVING AND SHIPPING

The purpose of this area is the processing and packaging of incoming and outgoing materials. The present hours of use are 8:00 A.M. to 4:30 P.M. There are six employees in this area.

- service entrance, outside exit and lie on a main circulation corridor
- requires visual control
- present service is by carts, skids and towmoters
- work desk should be provided for supervisor, tables for wrapping packages
- files for supervisor
- lockers should be provided for employees
- incandescent or fluorescent lighting, emergency lighting daylighting desirable
- 110 and 220 outlets. No. yet to be determined
- floor drains required. water fountain shared with stock room
- fire protection: sprinkler system and portable extinguishers
- projected area: 7500 sq. ft.

Footnote: Note: Concerning the water cooling of the components (add...
ADMINISTRATIVE OFFICES

The purpose of this area is to handle paper work for the plant and act as an intermediary between customers, community and plant. Present hours of use are 8:00 A.M. to 5:00 P.M. There are approximately 35 employees in this area. This area has the following characteristics and equipment needs.

- outside exit, public entrance, emergency exit near employee and visitor parking

- acoustical control

- furniture and equipment will be provided according to the general layout recommendations on the following page.

- tile floor, acoustical ceiling

- fluorescent or incandescent lighting. emergency lighting daylighting optional

- 110 voltage required. no. of outlets yet to be determined.

- interplant telephone communication

- men's and women's restroom. drinking fountain

- fire protection: sprinkler system, portable extinguishers

- projected area: 8500 sq. ft.
ZONING

The site is presently zoned for industrial use. Long range
plans still have the site zoned industrial.

BUILDING CODES

The building shall conform to requirements set forth in the
Uniform Building Code.

BIBLIOGRAPHY

Blum, Milton L. and Naylor, James C. Industrial Psychology, Its
Theoretical and Social Foundations, Harper and Row, New York
1968.

Grube, Oswald W., Industrial Buildings and Factories, Praeger Publish-

** Special thanks is extended to Ron Jones, Plant Manager of
Maul Bros. Inc., Winchester, Indiana without whose cooperation
it would have been impossible to attempt this project.

In closing it must be remembered that any architectural
program is never in a static and final state. This is just
the beginning and I hope to add information to this program
throughout the year.
1. Administration

The following organizational relationships must be worked out before the planning of this area can be developed:

- a. Reception Room
  Number of seats
  Receptionist—special or part of the general office, extra duties (typing, etc.), equipment

- b. Executive Area
  Private Offices—number, occupant of each, size of each, furniture and equipment for each, closets

- c. Departments and/or Divisions
  Accounting, bookkeeping, production, etc.

- d. Public Offices in Each Department
  Number, occupant of each, size of each, furniture and equipment for each, closets

- e. General Work Areas in Each Department
  Personnel in each, equipment in each, storage requirements for each

- f. Special-Purpose Rooms/Areas
  Conference room
  Library
  Projection room
  Mail and shipping
  Reproduction room
  Secretarial pools
  Telephone equipment rooms
  Hospital areas
  PBX room—type of board
  Number of positions
  IBM room
  File room
  Private toilets and showers
  Stock and storage rooms
  Rest rooms

- g. General Information
  Interrelationship of person and department
  Clothing space
  Time clocks
  Water coolers

Fig. 3 Basic area relationships.

(a) PRESIDENT 300 SQ. FT
(b) COMPTROLLER AND SENIOR V.P. 196 SQ. FT
(c) ASSISTANT V.P MANAGEMENT 150 SQ. FT
(d) AUDITORS (SHARED OFFICE) 150 SQ. FT
(e) ACCOUNTING 130 SQ. FT

(g) SUPERVISOR (DEPARTMENT HEAD) 80 SQ. FT
(h) EXECUTIVE SECRETARY 85 SQ. FT

(i) GENERAL OFFICE SPACE NO OUTSIDE CONTACT 46 SQ. FT
SOLAR AND CLIMATOLOGICAL DATA

Potential Natural Vegetation
beech-maple forest

Mean Annual Precipitation (in inches)-------------------40
Mean Annual No. of Days with Precipitation-----------130

Monthly Precipitation (in inches)

<table>
<thead>
<tr>
<th>Month</th>
<th>Precipitation (in inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>3</td>
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<td>September</td>
<td>3</td>
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<tr>
<td>October</td>
<td>3</td>
</tr>
<tr>
<td>November</td>
<td>3</td>
</tr>
<tr>
<td>December</td>
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Mean Annual Snowfall (in inches)---------------------20

Mean Monthly Winds

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<th>Velocity</th>
<th>Direction</th>
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<td>3.5 MPH</td>
<td>W-SW</td>
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<tr>
<td>April</td>
<td>2.9 MPH</td>
<td>SW</td>
</tr>
<tr>
<td>July</td>
<td>1.2 MPH</td>
<td>SW</td>
</tr>
<tr>
<td>October</td>
<td>1.2 MPH</td>
<td>SW</td>
</tr>
</tbody>
</table>

Solar Radiation (in langleys)

<table>
<thead>
<tr>
<th>Month</th>
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<tbody>
<tr>
<td>January</td>
<td>150</td>
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<tr>
<td>April</td>
<td>400</td>
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<tr>
<td>July</td>
<td>550</td>
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<tr>
<td>October</td>
<td>300</td>
</tr>
<tr>
<td>Annual</td>
<td>350</td>
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</table>
Mean Monthly Sunshine (in hours)

<table>
<thead>
<tr>
<th>Month</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>110</td>
</tr>
<tr>
<td>February</td>
<td>130</td>
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<tr>
<td>March</td>
<td>190</td>
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<td>April</td>
<td>220</td>
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<td>May</td>
<td>280</td>
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<tr>
<td>June</td>
<td>310</td>
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<tr>
<td>July</td>
<td>340</td>
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<td>August</td>
<td>300</td>
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<td>September</td>
<td>260</td>
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<td>October</td>
<td>220</td>
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<tr>
<td>November</td>
<td>140</td>
</tr>
<tr>
<td>December</td>
<td>110</td>
</tr>
</tbody>
</table>

Mean Annual Sunshine (in hours) = 2600
SITE PLAN

Utilities

KEY:
- electric
- gas
- water
- sewage

Utilities shown on the site plan include electric, gas, water, and sewage lines. The site also includes locations for sewage treatment, sanitary landfill, and various buildings and streets. The map indicates the presence of Indiana State Hwy. Garage, Winchester Maintenance, Over hyster Foundry, Perry's Motel, and residential areas.
SITE PLAN

scale: 0 50 100 200 300

vegetation

key:
tree cover
grass vegetation
presently paved or otherwise void of vegetation

white river
senage treatment
sanitary landfill

indiana state mt.
garage

winchester
m. maintenance

overmyer foundry

perry's motel

gravel pit

north st.

marlin st.
creek

residential

residential

1050
1060
1070
SITE PLAN

Drainage

KEY:
surface water
flood plains and drainage channels
well-drained land

WHITE RIVER

U.S. HIY 27

1060

1060

1070

1080

GARAGE

OVERMYER FOUNDRY

PERRY'S HOTEL

ININDIANA STATE HWY.

SANITARY LANDFILL

WINCHESTER ST. MAINTENANCE

RESIDENTIAL

RESIDENTIAL

MARTIN ST.

WHITE RIVER

SEWAGE TREATMENT

GRAVEL PIT
SITE PLAN

Soil properties

KEY:
- Genesee silt loam
- Brookston silt loam
- Crosby silt loam
- Miami silt loam

SCALE:

0 50 100 200 300

WINTER
SITE SECTIONS  vegetation

SCALE: 0 50 100 200

KEY:

Site fringe

100' or less from site

more than 100' from site

LONGITUDINAL SITE SECTION (viewer facing west)

TRANSVERSE SITE SECTION (viewer facing north)
SITE SECTIONS

Solar-wind

Site dimension 630'

LONGITUDINAL SITE SECTION (viewer facing west)

Winter wind 2-3mph (avg.)
Summer wind 1-2mph (avg.)

TRANSVERSE SITE SECTION (viewer facing north)
Requirements for the first jury were a complete site analysis and two concepts. Based upon the things I had investigated, the jury concurred with my site composite and the probable location of the building on the site.

The jury's comments on the concepts were as follows:

COSTELLO—This project is different from the others we have seen. You are space oriented. This project is process oriented. Begin working with schematic diagrams of movement: people, parts, and machines. Let the processes dictate the form. A systems analysis would be helpful to catalog all of the systems involved. Begin to work with expansion by departments, rather than overall expansion.

KOESTER—Examine the views out from all areas of the plant. Then go outside and examine how the plant would look from the outside.

FAROQUE—Identify and list problems within the plant. How did you arrive at your concepts?
PRESENT FLOW OF INCOMING MATERIALS

* AREAS SIZED ACCORDING TO NO. OF PEOPLE THAT WORK THERE

□ = ONE PERSON

INCOMING GOODS

STEAM ROOM (2 PEOPLE)

TEAR-DOWN (2 PEOPLE)

SUB-ASSEMBLY (20 PEOPLE)

PAINT 5

DESIR 5

MAJOR ASSEMBLY (29 PEOPLE)

STOCK ROOM (7 PEOPLE)

WELD SHOP

SHIPPING RECEIVING (2 PEOPLE)

CARPENTER SHOP (2 PEOPLE)

MACHINE SHOP (84 PEOPLE)
PRESENT PROCESS OF OVERHAUL OF GLASS MACHINES

* AREAS SIZED ACCORDING TO NO. OF PEOPLE THAT WORK THERE

□ = ONE PERSON

Diagram:
- 9 People Weld Shop
- Carpenter Shop 2 People
- Steam Room 2 People
- Stock Room 7 People
- Major Assembly 29 People
- Inspect 4 People
- Paint 5
- Sub-Assembly 20 People
- Tear Down (2 People)
- Dirty Machines
- Rebuilt Machines
- Machine Shop 84 People
AVERAGE DAILY TRAFFIC - ADMINISTRATIVE SERVICES TO PLANT

- AREA SIZED ACCORDING TO NO. OF PEOPLE THAT WORK THERE

□ = ONE PERSON

PROD. CONTROL

Machine Shop
84 PEOPLE

Plant Managers Office
4 PEOPLE

Administrative Offices
35

Material Assembly
24 PEOPLE

Stock Room

Carpenter Shop
2 PEOPLE

Weld Shop
9 PEOPLE

Shipping Receiving

Paint 5

Coating 5

Tear Down
2 PEOPLE

Assembly 2.0

Steam Room
2 PEOPLE

□ = ONE PERSON
AVG. DAILY TRAFFIC - PLANT PERSONNEL TO ADMINISTRATIVE SERVICES

* AREAS SIZED ACCORDING TO NO. OF PEOPLE THAT WORK THERE

□ = ONE PERSON

Diagram details:
- Weld Shop: 9 People
- Steam Room: 2 People
- Shipping and Receiving
- Tear Down: 2 People
- Sub-Assembly: 20 People
- Paint 5
- Deburr 5
- Major Assembly: 24 People
- Stock Room
- Office: 4 People
- Plant Manager: 94 People
- Machine Shop: 94 People
- Administrative Offices: 35
- Product Control: 12
PRESENT FLOW OF OUTGOING MATERIALS
**AREAS SIZED ACCORDING TO NO. OF PEOPLE THAT WORK THERE**

□ = ONE PERSON

Diagram:
- **Weld Shop**
- **Carpenter Shop** 2 people
- **Stock Room** 7 people
- **Outgoing Goods**
- **Ship + Receive** 2 people
- **Steam Room** 2 people
- **Tear Down** 2 people
- **Sub-Assembly** 20 people
- **Deburr** 5
- **Paint** 5
- **Major Assembly** 29 people
- **Inspection** 4 people
- **Holding Area for Parts to be Deburred and Inspected**
- **Machine Shop** 84 people
MACRO CLIMATE

HEAT AND NATURAL LIGHT

PRECIPITATION

MICRO CLIMATE

14' MIN. DIMENSION FROM TOP OF FLOOR TO BOTTOM OF TRUSS

FUNCTIONS OF BUILDING ENVELOPE

MOISTURE

COLD AIR

HOT AIR

PEOPLE AND OBJECTS

SOIL PRESSURE

VIEW IN

VIEW OUT

AIR FOR VENTILATION

AIR FOR VENTILATION

5' 0"
DOUBLE CIRCLE CONCEPT

Acting on what Costello had said about working with processes instead of spaces, I began to look at various flows of materials. The double circle concept was one such option.

All materials and parts entering the plant had to enter and leave through shipping and receiving. The stock room acted as a holding area for incoming and outgoing materials.

Dirty machines would enter the plant through the tear-down and steam room area. Parts would be taken apart and completely rebuilt in sub-assembly. Machine parts are then reassembled, painted, and tested in major assembly.

Unfinished parts enter machine shop directly or they are taken from the stock room. Rough edges are smoothed in the debur area. Each piece is individually inspected before entering stock room or being shipped.

The spaces I created closely follow the actual flow of materials. I used a 30 foot structural module on this concept. The written comments on the sheet were input from the plant manager and my architectural critics.
LINE AND LINE CONCEPT

This is simply another solution in the area of processes. It is very similar to the table circle solution with the major change.

We had a circulation problem in the major and sub-assembly areas. If the finished machines left the plant at the same location that they entered the plant, condensed traffic would have resulted in inefficiency. After consultation with all parties concerned, we decided this was would function better as a lineal process.

In working with these concepts I always used a grid. It enabled me to size my plant correctly. I used a 4 foot structural module in this concept also. By assigning on a site plan I could work with landscaping and parking at the same time I developed interior space.
BRANCHING CONCEPT

The branching concept could just have easily been called the line and line concept. I attempted to create a line function through the shop area by dividing the stock room into two parts; one for shipping and one for receiving.

The scheme allowed an orderly flow of materials through the plant. However, the plant manager felt that inventory control problems would be insurmountable. The bad points far outweighed the good.

Other problems included major assembly and steam room not close enough to the ponds. The carpenter shop should relate to major assembly. The receiving yard was not large enough.

Owing to my concern for energy conservation I attempted to shield large glazed areas with deciduous tree shading and provide winter wind protection with coniferous trees.
This concept came about in an effort to cut down the cost of the site that needed grading. By using an east-west axis, trucks could back into the loading areas from a feeder road. In addition, it was able to increase the size of parking areas for personnel while still retaining a high percentage of the area as open green area.

This scheme was found desirable since the "lehre" needed a loading dock, the major assembly areas were too far from the ponds.
CIRCLE AND LINE CONCEPT
(45° angle)

This was an attempt to correct all of the criticisms of the first four concepts. In this scheme I succeeded in giving the "lehra" area a loading dock and placing the steam room and major assembly area close to the ponds. Every area has access to the stock room and all incoming and outgoing materials can be controlled through shipping and receiving.

I tried to catch the prevailing southwesterly breezes by orienting the structure at a 45° angle. However the bad points outweighed the good in this type of facility. I wasted too much of the site. Parking decreased drastically and expansion was greatly limited.
Concept 6 used the basic layout of concept 5 except returned to an east-west orientation. This concept got approval from all sides and was the one I chose to develop in the design development stage.

The flow of people and materials was logical and straightforward. All areas had the ability to expand and there was a good balance between paving and green areas on the site.

Areas of concern for in the design development stage were avoiding a stacked look with the administrative offices, working out parking problems and environmental controls.
Requirements for the second jury were the final schematic design and the process you went through to arrive at your final schematic. I presented six concepts and reviewed their good points and bad points. The jury's comments were as follows:

COSTELLO— I like the progress you have made this quarter. You have followed a well-defined process and have arrived at a logical solution. You now need to begin working in three dimensions in order to see how your processes work in space.

KOESTER— Examine different ways mechanical system can fit into plant. Work in three dimensions.

WYMAN— Good oral presentation. You are too close to the problem. Back away from it and reexamine. It is good to receive input from plant manager for an expert's view on functions of an assembly plant.
design development
After the jury, I went back and reexamined the manufacturing and assembly processes.

The first photograph indicates a step by step description of the manufacturing and assembly processes. There is also an attempt to display this information graphically on my final schematic. The options at the top of the sheet pertain to types of stock room facilities.

The second photograph describes the process that takes place when a machine part is ordered for shipment. The drawing is a rough schematic of materials flow.
In addition to processes, I studied the flow of materials and people in my last schematic.

This was another test to see if the schematic had any serious flaws. These tests showed that aside from a few minor problems the concept was strong and deserves further development.

The first photograph deals with the materials flow and the second deals with the people flow.
In addition to processes, I studied the flow of materials and people in my last schematic.

This was another test to see if the schematic had any serious flaws. These tests showed that aside from a few minor problems, the concept was strong and it called for further development.

The first photograph deals with the materials flow and the second deals with the people flow.
In order to develop the floor plan to a greater degree, I needed to determine the amount of space each machine would need.

The first print is an examination of these equipment space needs. Determining these space requirements led to the floor plan shown on the second print.

In this plan I have worked out the circulation pattern and have broken down the major areas into their respective sub-areas.
Once I felt that the
or plan had been ade-
tably developed I re-
ed to the site plan
began to explore var-
ways of developing it.

In the first scheme
green space worked out
ty well but I was way
rigid on the paved
us.

The second scheme
more successful. I al-
ed more paved area for
ing and storage. Ex-
nion possibilities were
explored.
The site plan in the first photograph is the one I presented at the midterm jury for the second quarter. There were only minor changes between it and the final site plan.

The second print involved a lighting study in the high bay area. I explored skylighting, fluorescent and HID lighting. For specific tasks in the sub-assembly area I proposed incandescent lighting.
This first photograph is a section I presented at the term jury. In it, I showed types of materials I wanted to use and investigated means of framing the skylights and porting the overhead crane. The second photograph showed structural and mechanical items in the administrative area. Means of enclosure and air control were also explored.
Finally, I needed to explore what goes on in the space I had created. This print is an interior perspective of the administrative area entrance. I used it to give people a feel for what they would experience in the space.

These quick sketches were a tremendous help.
The third jury was basically a check jury. Drawings were taken off of the board and pinned up. Students were encouraged to spend no time on presentation. Instead, the professors suggested that we work clean on standard size sheets of trash. I presented a site plan, floor plan, building sections, elevations, wall sections and a 1/8 inch scale model of the interior with all equipment.

The jury's comments were as follows:

KOESTER— I like your wall section. I get very excited about it. I suggest that you work with large scale elevations and sections. You can get a richer and more exciting project by working at a larger scale.

ROSENMAN— Don't forget that you must work advertising into the building. Signage is another design problem in itself.

REUTER— It concerns me to see a road to the back of the plant that only one truck will be using.

WYMAN— Work with larger sections and elevations.
assembly plant facility
winchester, indiana
The fourth jury was the last jury and as such required a design in its final state. Well rendered presentation drawings were also a requirement. My final drawings included a site plan, floor plan, elevations, building sections, wall sections and a reflected ceiling plan.

Jury comments were as follows:

KINST- Expansion in the plant seems limited. If floor is on one level there is more opportunity to expand. Agricultural dust could be a problem in fine machine tooling.

COSTELLO- Natural ventilation won't work. Draft must travel too far. Vents above rooftop units might let dangerous fumes into high bay area.

KOESTER- What consideration have you given to acoustics within the plant? Why do you have an irregular spacing of louvers on the windows?

GEDA- Parking that has cars backing into main roads is dangerous and should be avoided. Sunken courtyard will be hard to drain in the winter.

WYMAN- Good oral presentation. Good overall effort. Delve into space development next quarter.