Figure 1. The Hillboro, Oregon facility.

Adaptive Reuse of Facilities

Stephen Rothrock

Biopharm companies can save up to one year in start-up time by converting semiconductor factories to their use.

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Facilities that make semiconductors and biopharmaceuticals have a lot in common. Both need high ceilings, pure water, cleanrooms, reliable electrical systems, and attractive to skilled workers. The semiconductor industry has hit hard times and as a result, is closing facilities in the US and opening them in Asia. Just in Oregon alone, SUMCO, DuPont Photomask, and Komastu closed manufacturing facilities. The spectacular cleanroom manufacturing facilities left behind can be purchased at bargain prices. The American biotech industry is on an upswing and finds converting these buildings an attractive option.

Some of the facilities remain in the semiconductor industry because of the valuable manufacturing equipment. Examples include Fujitsu's wafer fabrication (fab) plant in Gresham, OR, acquired by Microchip in 2002, and Philips' fab in San Antonio, TX, acquired by Maxim in 2003. For biopharm buyers, the shell has value because these facilities already contain required infrastructure, including cleanrooms and power. Companies can save six to twelve months in start-up time.

Recycling state-of-the-art technology buildings is a trend called adaptive reuse. Used facilities can be purchased at a fraction of the original cost. It is a buyer's market made to order for growth industries such as biopharmaceutical, health care, biotech, solar, and nanotechnology, which need to ramp production quickly and cost-effectively. Sellers will increasingly employ creative adaptive reuse strategies. Even the largest companies will evaluate existing facilities to save time and money.

Conversion of facilities from one use to another is a positive trend that keeps good paying jobs in local communities. Because of the commonality, a conversion really makes sense. Here are three examples of completed conversions and one waiting in readiness.

Springfield, Oregon

In 2004, PeaceHealth purchased Sony's former optical disk manufacturing facility in Springfield, OR for $16 million. PeaceHealth is converting the 327,000-ft^2 facility into a laboratory and support area for hospitals and clinics in Oregon, Washington, and southeastern Alaska. Jim Werfelmann, director of property planning and development for PeaceHealth, said, "It would cost about three times more to build similar space, and the option to purchase, rather than build, rapidly accelerates our master plan development."

Temple, Texas

Local governments are eager to participate in economic development. In March 2002, the City of Temple, TX bought a 500,000-ft^2 building with 503 acres of land from Texas Instruments for $4.35 million. The state and city reorganized this facility as Temple's Life Science, Research & Technology Campus. Texas wants to facilitate advances in biotechnology, nanotechnology, medical, and agri-bioscience research, medical device

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manufacturing, and education.

Then in December 2004 there was a land partition. Scott & White Memorial Hospital bought the building and 200 acres for $2.5 million from the Temple Health and Bioscience Economic Development District. The City of Temple retained approximately 300 acres at the site for other biotechnology industry development, and retained the right to lease back 200,000 to 220,000 ft² of the building from Scott & White to develop for other research partners. After five years, Scott & White may choose to use the space for its growing needs.

Durham, North Carolina

In August 2003, KBI BioPharma, Inc. acquired Mitsubishi's former semiconductor campus in Durham, NC for $15.5 million. Mitsubishi originally spent $270 million building and equipping the campus of 34 acres in the early 1990s. The attraction of the 340,000-ft² building was 52,000 ft² of cleanrooms and systems for producing highly filtered water and air. KBI plans to invest about $65 million in the next five years to become fully operational. As comparison, a new facility was built in Research Triangle Park for Biogen, cost $173 million, and took three years to build. Generally, new biomanufacturing space can cost $1,200 to $1,400 per ft² to construct, but by adapting the Mitsubishi facility, KBI reportedly spent just $600 to $700 per ft².

One of the main adaptive reuse challenges involved rearranging the ventilation and water systems in the clean space. KBI performed the necessary engineering studies to determine how to reroute the air circulation system to serve its biopharmaceutical manufacturing needs. The adaptive reuse plan also involved subdividing the large spaces into smaller suites. An additional benefit to KBI was an available workforce that included hundreds of former Mitsubishi employees already trained to work in a cleanroom environment.

Hillsboro, Oregon

Right now there is a 185,000-ft² facility in Hillsboro, OR for sale that Komatsu once used for silicon wafer manufacturing. It will be easy to convert for biotechnology uses. This facility sits on 44 acres and is priced at $37.5 million (Figure 1). For an additional $10 million, a purchaser can acquire 50 acres of adjacent, available land.

Inside dimensions include 127,000 ft² of cleanrooms and 58,000 ft² of general space. Also, the building is easily divisible into at least three separate sections and already has support areas and 32,500 ft² of office space in place. The large bay has a 41 ft ceiling in a ballroom configuration, well above the 30 ft needed by bioreactors. The reverse osmosis water system is rated at 620 — 930 gal/min. The buyer would have to add a WFI skid. The cleanrooms need new, cleanable surfaces. There is crossover of air to cleanrooms that will need engineering correction.

We performed a conceptual evaluation to determine the viability of adapting the site to support life sciences-based R&D or manufacturing operations. Considerations include the property's size and location, the nature and condition of the existing buildings, and the effort required to modify the campus. The advantages, compared to greenfield development, include:

- Significant savings in time-to-market (possibly six to twelve months) for start-up manufacturing; rßeduced design, permitting, and construction time
- Lower capital cost
- A linear floor plan design with large unobstructed areas could be divided into two or more segregated areas.
- High bay, open cleanroom space could support large-scale bioreactors or allow construction of mezzanines. An extensive 12-ft high cleanroom space could be modified for small-scale biotech or secondary pharmaceutical production.
- The buidings have shipping and receiving areas for handling raw materials and finished goods. Available office and general support spaces.
- On-site diesel generators provide up to 4 megawatts of emergency backup power.
- Process critical utility systems such as high-purity bulk gas and compressed air, installed and fully operational; an on-site, permitted, wastewater treatment plant includes a fully contained chemical delivery terminal.
- A high-quality, fully maintained 920-gal/min ultrapure water system could be modified to provide USP-purified water or feedwater to other clean utility systems.
- Many of the centralized energy center utility systems, designed to support future expansions, are in place.

The conceptual evaluation determined the campus is suitable for modification to support:

- Biotech or pharma R&D labs
- Small and large-scale biotech production (300-L to 10,000-L bioreactors)
- Small- and large-scale pharma production (chemical synthesis)
- Secondary pharmaceutical production (sterile or non-sterile)
- Medical devices manufacturing, especially *in-vivo* Class III devices
- Vivarium to support research and development activities. ◆