

# The Case for Design-Build Cleanroom Facilities Delivery

BY SCOTT E. MACKLER

In the past, most large construction projects used a system called *design-bid-build*. Now, pharmaceutical companies planning cleanrooms have begun using an improved system, *design-build*, which can save millions of dollars and cut months from construction schedules. Design-build also can provide better quality end results than design-bid-build.

Traditionally, at least in the United States, an architectural engineering firm throws a design over-the-transom (unsolicited) to a cleanroom contractor. This practice, known as “plan and spec” or design-bid-build, originated in the early 20th century as new building technologies drove skills specialization, creating a fertile climate for finger-pointing (and lawsuits) when projects didn’t go as planned. Another disadvantage to this approach is that by the time the cleanroom contractor (the design-builder) sees the project, the design is mostly complete and the only useful input the contractor can offer is in terms of means and methods — a relatively trivial contribution in light of the overall construction costs. Ultimately, the limitations of the design-bid-build system impede useful innovation.

The design-build approach (sometimes called a “design-assist” project) is a better solution than design-bid-build to many of the current issues in therapeutic protein manufacturing, especially now that time-to-market has become a primary industry driver. The focus on time-to-market means that the shorter schedule of a design-build project can easily translate into millions of dollars. For example, some projects can be completed up to six months sooner with design-build than with design-bid-build.

## Know Your Project

Savvy contractors know when to walk away from bad projects long before sunk costs make abandonment emotionally difficult. Bad projects provide a windfall only for the litigation team if and when they finally close the job out — usually



years after a failed commissioning (one in which the project was not shown to work well).

Pharmaceutical companies want to shorten their approved contractor list while retaining both breadth and depth of support. Owners want contractors to understand their business, process technology, and competitive pressures. Most of all, they want contractors to focus on time-to-market.

Contractors know that as information about a project becomes more specific, price constraints tighten. More precise specifications and improved tools for design and information transfer result in increasing pressure to make everything cheaper, perfect, and immediate. Owners grow ever more demanding as they face:

- Changing competitors (both vigorous new ones and energized old ones),
- the commoditization (loss of differentiation) of products,
- downsizing and increased task loads for personnel,
- rapidly advancing technology (e.g. bioinformatics and genomics),
- a growing wave of mergers and acquisitions, and
- market flux that affects production capacity and product life cycles.

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In response to those pressures, facilities are now designed and built through a collaborative effort that engages both owner and contractor, who share knowledge and spread the costs and risks by working as a team. The lack of meaningful interaction and the conflicting expectations inherent in the old design-bid-build process are unacceptable. Today, people know that to succeed they must work together. Team members are selected on the basis of their experience, references, design solutions, financial capability, project approach, and staffing plans. Loyalty, long a hallmark of the old system, has not evaporated; it has simply become more rational. Loyalty now belongs to the most reliable performer rather than to somebody's good buddy contractor or favorite brother-in-law.

### Why Design-Build?

The design-build process uses a single contract between the owner and the contractor — which means single-point responsibility for both design and construction. Typically, the contractor provides performance, price, and schedule guarantees. Such warranties often guarantee the operation of the completed cleanroom for a period of time (usually one to two years) after initial testing to establish baseline satisfactory (contractual) performance. That testing may be performed either by the contractor or an independent third party hired by the owner.

In a design-build project, after basis of design (BOD) development and selection of a primary contractor, responsibility for most of the mechanical, electrical, and piping (MEP) detail design (including submittal prints and construction) is delegated to subcontractors. If an architect or engineer is involved, that person usually has responsibility for overall project coordination, including team interactions, scope review, and detail design review.

The traditional design-bid-build approach, with its separate design and construction contracts, suffers from drawbacks such as higher design costs and longer time frames. Those problems result from design-bid-build's

inherently sequential nature and, to a lesser extent, from the adversarial relationships that can arise under design-bid-build contracting arrangements. Design-bid-build projects also frequently suffer from large numbers of change orders.

### More Rewarding, Less Stressful

Design-build is faster than design-bid-build partly because of the elimination of multiple contracts and the resulting responsibility handoffs. A value-engineering component (designing with maximum value at minimum cost) also develops through the interaction and cooperation of the team and can provide life cycle cost evaluation criteria that rarely appear as promised in the design-bid-build environment. However, the success of a design-build project depends upon the presence of a strong and decisive project manager for the owner. The project manager has to think about not only building the facility, but also about team spirit, commitment, attitude, motivation, and the group's process. Although design-build is more demanding, it is also far more rewarding and less stressful than design-bid-build.

### Design-Bid-Build Problems

Statistical studies have shown that design-bid-build results in lower quality than design-build at project completion (turnover) as measured by ease of start-up, number of callbacks, and operating and maintenance costs. Design-bid-build also has lower system quality as measured by the quality of the architectural envelope (walls, ceilings, and floors), structure, and foundation; the interior space and layout; the environment, and the process equipment and layout.<sup>1</sup> Considering these factors, many contracting firms have embraced design-build as a favored method for facilities delivery.

However, some geographical regions are less friendly toward design-build than others. In parts of New England, for example, there is a historical bias against design-build that originated with public sector projects. This is

## Summary of Design-Build Advantages

- ✓ Early and accurate cost input
- ✓ Decision to proceed can be made before significant amounts of money are spent on engineering design
- ✓ Reduced project time and earlier facility use
- ✓ Single source responsibility — the design-builder guarantees a successful outcome
- ✓ Improved quality control
- ✓ Reduced legal fees
- ✓ Reduced scope creep and cost creep

Figure 1. Benefits of the design-build approach to facility design and construction.

because design-build can circumvent a state's normal practice of listing all sub-bids, sometimes called the "multiple prime contracts system."

Some people assume that design-build means a high level of financial risk. But for whom? In a design-bid-build project, the owner shoulders that risk. In a design-build project, the design-builder is at risk.

### Licensing & Liability

Licensing must be addressed state-by-state. Contractors know that without a license from the state in which you are performing work, the owner has no obligation to pay for any services that you provide. Design-build licensing laws, however, aren't quite as universal or simple. For example, in 1998, 19 states permitted engineers to act as prime contractors on design-build contracts, but only if they were licensed as general contractors. Similarly, contractors may be required to register as design professionals.

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Single-source project delivery is led by the party perceived to have the deepest pockets: the contractor or builder. Compared to pure design firms, contractors are more capital intensive, bondable, and therefore more comfortable taking on the financial risks of design-build contracts. Owners like the design-build approach because the designer is held to a stricter standard than when there is a separate contract for design services. Although the designer is no longer the owner's consultant, the designer, like the contractor, has a stake in a successful outcome. Both the designer and the contractor in a design-build team venture should consider whether there is any need to modify deductibles or insurance policies (errors and omissions insurance generally excludes construction services and general liability insurance usually excludes professional services). Teams should also consider if the venture can or will be self-insured.

Those questions have been a large part of the drive toward the increasingly popular limited liability corporation (LLC) form of business incorporation. LLC allows small groups of participants to enjoy limited liability while operating under partnership-type rules. A design firm, for example, can form a LLC and channel the design-build business solely through this separate legal entity. However, LLCs have not yet been substantially tested in the courts so there is not much case law to refer to.

### Contracts

Confusion often exists about which forms to use in contracts. Many design-builders write their own contracts because, until recently, there has been an absence of standard forms similar to those of the American Institute of Architects (which favor owners and architects) or of the Association of General Contractors of America (which favor contractors and discourage the owner from contracting with a design-builder to perform the conceptual work). Such "home grown" contracts have been viewed with suspicion by the normally open and trusting members of the construction industry's legal com-

munity. Owners and contractors in a design-build project should consider using the Design-Build Institute of America's recently released final contract documents:

1. Standard Form of Preliminary Agreement Between Owner and Design-Builder
2. Standard Form of Agreement Between Owner and Design-Builder – Lump Sum
3. Standard Form of Agreement Between Owner and Design-Builder – Cost Plus Fee with an Option for a Guaranteed Maximum Price
4. Standard Form of General Conditions of Contract Between Owner and Design-Builder

### Reminder to the Wise

In the absence of a clear, up-front scope definition (a well developed BOD), fixed price contracts can turn adversarial and, in that situation, the lowest first price is never the cheapest project when the smoke finally clears. Scope development — a fee-for-service activity — is a good way for owners to screen design-build firms.

So why do contractors pursue design-build work? One reason is that the benefits don't accrue only for owners. If the contractor performs well, the work usually leads to repeat business. And, boosting the customer retention rate is the most effective way for any cleanroom construction company to improve profits — through lowered cost of sales. Repeat business leads to sole-source negotiated contracts, and successful design-builders have found that good projects often lead to long-term strategic alliances that balance out the varying workloads inherent in the business. Long-term relationships with owners also provide contractors with opportunities for increased scope and broader geographic diversification.

### REFERENCES

1. Sanvido V, Konchar M. Selecting project delivery systems. The Project Delivery Institute; 1999.