MODULE based development, beyond concurrent design

Today's short design cycles need to be executed in a fundamentally different way. Research & Design, Inc. has found a different concept in design and devlopment that improves on previous methods.

Old fashion sequential design has given way to concurrence, or doing things in parallel, to arrive at completion earlier. This approach works well *assuming* you have internal resources to do all the tasks concurrently. But, better managers have seen, that without *all* the resources needed at hand, some individuals are going to be doing more than their share. Often you are right back to the old sequential method, schedules slipping, products late, enormous pressure on people. This same situation was plaguing early efforts at managing software projects.

Since that time techniques have evolved to provide the tools needed to keep their projects on track. Software managers have found that *modular development* is the only way to go. This technique has broad application and is not limited to software. Research & Design, Inc. is in the forefront with this philosophy. Any design project whether product, test, or retrofit/upgrade, when properly planned succumbs to module based development. Not only does it provide convenient strategy for design, but in this age of mass customization and flexible manufacturing, module based development provides agility in the marketplace.

With increasing pressure on cost, few can afford to do complete redesigns to upgrade products. Module based development can rescue this situation also.

Modular design allows you to easily maintain and upgrade product. This may be as simple as a piggyback board above other components, addition of an entirely new circuit function without disturbing the existing circuit, or as complex as a rack mounted drawer with multiple boards.

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Physical modules can be developed in a variety of technologies. Depending on the particular situation; leaded PCB, PEC, SMT, or Thick Film Hybrid may be employed. Module based development is also a efficient way to try *new* ideas to see if they will work, before you commit to major changes. *(See next page for case history)*

Design modules can be directly placed into a design, along with other modules which may also have been developed independently. This provides flexibility in features and its imbedded nature is often an advantage in a competitive economic environment, a decided advantage for smaller companies that can't afford a dedicated design personnel. *(See next page for case history).*

For module based solutions contact Robert Kylbat

Research & Design, Inc.

(319)984-5923

Case history: embedded Design module in custom circuits

A division of a major corporation was behind schedule on a next generation design. Only one engineer was assigned to the project. His expertise lie in designing high stability analog circuits with severe environmental demands. A portion of the design required a high efficiency, wide Vin/Pout ratio switching power supply with high MTBF. A trial design had been attempted but fell short of the requirements.

The design module was delineated and specifications drawn up. Prior to this an emergency prototype module was produced within one week, solving an immediate crisis, allowing other parts of the design to proceed.

Specifications were agreed upon, development proceeded. The customer was kept apprised of the design module progress, milestones, and current test results as they became available.

As a result the power supply ceased to be an issue in the progress of the project and the design module was incorporated into the product. It retained its separateness only because it was assigned a separate schematic page. In all respects it is now part of the customer product.

This same design module, with minor variations, has since been incorporated in other products produced by the company, thus multiplying the effectiveness of the development effort.

For more information on these topics contact
Robert Kylbat
Research & Design, Inc.
(319)984-5923
E-mail:resdes@hotmail.com subject:more information

Case history: Physical modules in test system

A high volume contract manufacturer desired a functional test/debug station for a state of the art high speed data storage controller subassembly. It would also be used for limited production test. General purpose instruments (on IEEE-488) were used as much as possible, however large numbers of custom signal conditioning and conversion circuits were needed. The project would contain a large software effort integrated along with the test design.

The project was decomposed (just like software,) into a number of separate tests, each corresponding to a parameter which the specification required be tested. These were then grouped into tests of like measurements. (i.e. time, frequency, voltage, or combinations.) The system design consisted of defining how the groups of test would access the general purpose instruments and conditioning/conversion circuits. In some cases the output of conditioning/conversion circuits were the input of other conditioning/conversion circuits.

To further compound matters, jig delay and line loading were critical, mandating certain components be located physically close to the device under test (DUT).

First level of system design was the multiplexing of signals. A module consisting of switching circuits and impedance buffers located immediately below the DUT was defined.

Second level modules, containing all the required circuits were located on separate cards connected via a backplane board. Each module had a separate schematic and function description.

However, midway into the project a large number of *new* requirements were demanded! Without a modular approach the design would have had to *start over*. As it was, another person was assigned to develop the new modules, as needed for the added requirements. Software was simplified by using software modules corresponding to the hardware modules. •