# MECHANICAL ENGINEERING NEWS

COADE® Engineering Software

For the Power, Petrochemical and Related Industries

October 1990


## BULLETIN POLICY

The COADE Mechanical Engineering News Bulletin is published on a quarterly basis from the COADE offices in Houston, Texas. The Bulletin is intended to provide information about software applications and development for Mechanical Engineers serving the power, petrochemical and related industries. Additionally the Bulletin will serve as the official notification vehicle for software errors discovered in those Mechanical Programs offered by COADE.

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## PC HARDWARE FOR THE ENGINEERING USER (PART 10)

The last installment of PC Hardware discussed the various hardware problems we have discovered over the last couple of years. Recently two more anomalies have been uncovered which affect the operation of CAESAR II.

The first problem concerns the math coprocessor. Late last year COADE purchased an Epson Equity 386 for use in development. Since the 3.0 release of CAESAR II, we had noticed erratic behavior of the program on this machine. We initially attributed this behavior to memory management problems and changes we were making to the program. However, the problems escalated to a point where we, in exasperation, began running system diagnostics. The diagnostics uncovered a "system board" error. This error was reported to Epson, who suggested that we check the settings of two jumpers on the mother board. The Epson support person stated that sometimes when a math coprocessor was installed, the installer would forget to change the jumper settings,. and that this could produce erratic timing problems with math intensive programs. Upon checking the jumpers, we found they were indeed set improperly.

The problem of a poor installation is bad enough, but in most cases **CAESAR II** ran just fine, and SYSCHK never reported a problem. The only thing that saved us from wasting additional time looking for a nonexistent software bug was the diagnostics disk. This problem illustrates two points users should be aware of. First, computers and peripherals should always be purchased from reputable manufacturers that can support the product. The thousand or so dollars that you save purchasing a clone can easily cost many times this in wasted time down the road, when the compatibility issue comes back to haunt you. Second, even reputable manufacturers can make a mistake or utilize hardware that has a bug (recall the problems NEC found with the Zymos chip set). A reputable manufacturer will put forth the effort to find out what is wrong with the hardware.

Within the last month, we have received two queries concerning the acceptability of an IIT math coprocessor, in lieu of an Intel math coprocessor. Hardware vendors report the IIT chip is compatible with the Intel chip, however, SYSCHK reports an accuracy failure! Recalling the statements of the previous two paragraphs, we strongly recommend that all COADE software be executed on machines with an Intel math coprocessor. We have never run across the IIT chip and we have not tested the IIT chip. Therefore, we are not in a position to approve its use with our products. (In light of the behavior of SYSCHK, we would lean towards disapproval.)

The second hardware anomaly uncovered since the last issue of *Mechanical Engineering News* concerns IBM PS/2 machines. Two different users reported that the PS/2 locked up during the keydisk check in the "statics" portion of **CAESAR II.** By performing a warm boot (CTRL-ALT-DEL), the machine was usable again, but would still not run **CAESAR II**. To make a long story short, the problem was traced to a "shareware" word processor, PCWRITE. Anytime this program was used, succeeding attempts to use **CAESAR II** always locked the machine. The only way to rectify the problem was to perform a cold boot (power off / power on). **CAESAR II** would then execute fine, until PCWRITE was used again.

Due to the continued problems associated with "cloned" machines, DOS bugs, and keydisks, we will be implementing a new form of software security protection. We are currently investigating external software locks (security devices). We should be able to implement this new protection scheme in Version 3.2 of **CAESAR II** and Version 2.6 of **PROVESSEL**.

## VIRUS UPDATE

As more is learned about VIRUSES and their possibly destructive nature, articles will appear in *Mechanical Engineering News* describing these experiences collected both from COADE and Users. The first article on VIRUSES appeared in the July, 1990 issue of *Mechanical Engineering News*. Copies of this issue may be requested from COADE.

It cannot be emphasized enough that viruses are very real and very destructive. Once present they can spread quickly, and thoroughly. Disks found to contain viruses should be handled as if they contain the plague, and should only be "used" by a computer installation expert. For these reasons several "common-sense" precautions should be taken:

1 Copies of software should not be used unless the user is sure that they are properly archived copies made on new diskettes.

2 Game software not straight from the shrink wrap, and from a reputable dealer should be banned from any machine where the loss of data or other software is undesirable.

3 Any diskettes coming into the company from outside sources should be scanned for viruses before being installed on any company PC.

4 Virus check software should be run frequently, and can easily be installed in a users autoexec.bat file to be run each time the computer is booted.

5 Archived diskettes used after January 1988 should be checked for viruses before being used again. Once checked these diskettes should be marked as "clean" as of a certain date, and version of the scan software.

These are all precautions taken at COADE. The recommended SCAN and CLEAN software used at COADE is provided by McAfee Associates. McAfee Associates can be reached at 1-408-988-3832.

Viruses are typically found to infect boot and partition tables or executable and binary files. The CLEAN software offers a good possibility of removing the virus with as little damage to files as possible. In some cases files can become cross-linked, changed, deleted, or changed into directories. In these situations, use of a program like Norton's "Disk-Doctor" will help to recover some of the data. While virus experience/infestation does not currently seem to be widespread in the engineering community, it is none-the-less there, and should be guarded against. The Stoned virus has been discovered at a number of companies in the United States and Canada, and the Jerusalem virus has been seen in CANADA. Except for one instance, we have not received reports of viruses outside of the United States or Canada. The Stoned virus exists in the boot and partition areas on disks, and when activated, randomly begins changing files into directories and directories into files. The Jerusalem virus attaches itself to executables and causes unpredictable results when running. Present day forms of the Jerusalem virus cause executable and .COM files to grow slowly in size without bound, until found and removed.

It was stated in the previous article in *Mechanical Engineering News* that the virus on the WRC 107 supplemental diskette sent to some users could only cause infection if the user attempted to make the diskette a "bootable" disk. This also includes just trying to "boot" off of this diskette. Unfortunately this can happen to a user without warning if the computer is cold or warm booted when the virus infected diskette is in drive A.

## STATUS OF CAESAR II AND PROVESSEL

In early September, **CAESAR II** Version 3.1 began the "QA" test procedures. We anticipate that this version of **CAESAR II** will begin shipping this fall.

Version 3.1 will have all of the "loose ends" of Version 3.0 polished up. The major additions to Version 3.1 are: an automatic soil modeler, additional spring hanger data tables, (LISEGA, FRONEK, Piping Technology) additional listing format files, additional external interfaces, rotating equipment updates per 1989 code, the reinstallation of the graphics RANGE and HILITE options, improved hidden line removal, and numerical conditioning checks. Version 2.45 of **PROVESSEL** shipped to users in late August. This version consisted of only minor enhancements to the code. The major difference between Version 2.45 and Version 2.41 is the implementation of the latest version of the Microsoft FORTRAN compiler. This new compiler is also being used for the updated modules of **CAESAR II** Version 3.1. The compiler issues are discussed in a following article.

## CAESAR II VERSION 3.1 SPRING HANGER DESIGN

Several changes are being made to the spring design algorithm in this version of **CAESAR II** to let the user get more practical results from the spring design algorithm.

The basic problem whenever the computer does "design", is that design in-itself implies the ability to "think", this of-course computers do not do. Because spring hanger design can be a conceptually difficult topic for someone not working with it on a daily basis, allowing the computer this freedom can sometimes lead to difficulty. The entire series of articles in *Mechanical Engineering News* on spring hanger design are intended to keep the somewhat unfamiliar user aware of all of the possible things the **CAESAR II** software can, and cannot do with regard to the task of spring hanger design.

Previous versions of **CAESAR II** only permitted the user to design 40 springs in a single run. (The number of already designed springs was essentially unlimited, but the number of springs to be designed was limited to 40.) This limitation even existed in "LARGE" jobs. (LARGE jobs are those whereby the user includes models together that are collectively too large to fit in core for preprocessing.) Version 3.1 of **CAESAR II** has increased the number of springs permitted in a single run from 40 to 850, (and even the 850 is a somewhat artificial limit that could be expanded should users find it practically limiting). The 40 limit for a single "part" still exists, but any number of "parts", each containing 40 springs can be included together into a single "LARGE" job.

### COLD LOAD SPRING HANGER DESIGN: (Version 3.1)

The intention of the spring design algorithm is to support the weight of the pipe when it is in its hot position. The load the springs support in the cold position will not be equal to the weight because of the (k)(d) product, where (k) is the stiffness of the spring and (d) is the springs travel in going from the hot to the cold position. In most cases the spring supports exactly the weight of the piping system in the hot case and more than the weight of the piping system in the cold case. (This is true when the travel from cold to hot is "up". If the travel from cold to hot is "down" then the spring supports less than the weight of the piping system in the cold condition.) The fact that the load on the spring in the cold condition is not exactly equal to the weight of the pipe can cause problems in some situations during installation. These problems are:

1 Stops may be difficult to remove.

2 Once the stops are removed the piping may move away from its supposed "neutral position" by several inches causing concern from field personnel.

3 Unless a separate calculation is made to get the actual cold load on the spring, adjusting the cold hanger position to the theoretical, instead of actual, cold load can produce problems.

Cold load hanger design avoids these difficulties, but introduces some of its own. The difference between cold and hot load hanger design, (remember the current **CAESAR II** method is hot load design), is that the hot load design supports the pipe weight when the system is hot, and the cold load design supports the pipe weight when the system is cold. The cold load method introduces the following advantages:

1 Springs may be adjusted in the cold position.

2 Removing stops is easy.

3 There is no excessive movement from the neutral when the piping system is cold.

The disadvantage is that the incremental load (k)(d) is not supported by the spring, and thus is transferred back to the next support, (typically the piece of equipment being protected). The hot load method tries to protect rotating equipment when the system is running. The cold load method assumes that the (k)(d) error is not going to significantly effect any rotating equipment, while it does eliminate the problems with hot load design described above.

The decision to use hot or cold load hanger design rests with the user. Springs close to sensitive equipment should probably use the hot load method. Springs on a part of the system that is very flexible, and removed from equipment can possibly benefit from the cold load method of design.

The ability to use cold load design at various hanger locations exists in the 3.1 version of **CAESAR II**. Cold load design can be used at some hangers and hot load design at others in the same run.

DESIGN TO THE MIDDLE OF THE HANGER TABLE: (Version 3.1)

It is not infrequent that piping designers will want springs to carry the hot load as close to the middle of the spring working range as possible. The current method in **CAESAR II** will select a spring as long as both the cold and hot loads are within the working range, regardless of the hot loads position within the range. Version 3.1 of **CAESAR II** makes an attempt to move the hot load to the middle of the spring working range whenever the hot load is within 10% of the end of the spring working range. If the new spring is not satisfactory then the old one will be used even though the 10% criteria has not been satisfied. This is an option available in Version 3.1.

## CAESAR II INTERFACES

There are two new interfaces available to send geometric input into **CAESAR II** from isometric CAD packages. Users interested in a particular interface should call COADE and make a request for the software. The interfaces are shipped to users only when requested.

The "**PRO-ISO**" interface (Applications Development, Inc.) has been completely rewritten. This interface now conforms to the **CAESAR II** standard neutral file as discussed in Chapter 13 of the User's Guide.

An interface has been developed for the "**CADPIPE**" package (International Software Systems, Inc.). This interface reads the "**CADPIPE**" neutral connectivity file and builds a **CAESAR II** input file.

## PC COMPILER ISSUES & SHORT COMINGS

As many users have noticed, Version 3.0 of **CAESAR II** suffered from some unexpected behavioral problems that were not detected during our QA runs. These problems consisted of major program aborts in various places, memory problems, and overlay loading problems.

The overlay problems can be attributed to pushing the Microsoft linker to its limits. Version 3.0 of **CAESAR II** was the first version that used overlays (to reduce the memory image of the program), and our first experience at using this particular linker. The behavior of this linker caused the slow down in the force/stress computations (only apparent on 8088 and 80286 machines), and the sudden limitation of only a single "large" included job.

Most of the sudden aborts were caused by a "supposed" feature of the FORTRAN compiler. The problem only occurred when numbers were in the range of E-39 to E-42. In this range, the exponent was extended into the mantissa, to maintain the magnitude of the number. This is ok as long as you don't try to perform a computation with the number--if you do, the result is either the "real indefinite" or "not a number" error message. (The appropriate thing for the compiler to do would be to set the value to zero.) This "feature" of the compiler only surfaced after using the overlay linker. The **CAESAR II** source code affected has been unchanged for several releases.

As a result of these, and other problems, we changed compilers. Within the first month of using the latest FORTRAN compiler available from Microsoft (version 5.0), we discovered two major anomalies that can affect the compilation or execution of a program. This leads us to the topic of Software Quality Assurance, which is the subject of the next article.

During the second month of using this compiler, a major error was discovered. This error (confirmed by Microsoft) affects all programs compiled under Version 5.0 and subsequently executed on XT class machines. The error in the math library causes the XT machines to produce the wrong results.

## SOFTWARE QUALITY ASSURANCE

Compiler and linker problems are virtually always discovered the first time an attempt is made to execute the program. Such was the case with two of the three problems discovered with the new FORTRAN compiler. However, there are some problems that can only be detected during the analysis of particular input data sets on specific hardware. This is why the testing of a new version requires so much time.

The QA procedure at COADE begins with the testing and verification of new features. This stage of checking is performed during the development of the software. This checking consists of verifying general program behavior and the integrity of the results. Once development is complete, the software begins the formal QA program.

The formal QA consists of running approximately two hundred jobs on the new version of the software. These QA jobs are made up of verified jobs from clients, other pipe stress programs, hand computations, and published benchmark jobs. The current results are then compared to previous version results via a verification program (values are compared down to 1.0E-6). Any discrepancies are reported and resolved. If the resolution of a discrepancy involves a change to the program, the entire QA series of test jobs is rerun. The reports from the QA comparisons are filed with the jobs in the event problems occur or an audit is requested.

How do these procedures compare with industry excepted standards. Currently, some software vendors are claiming that their software has been quality assured to **10CFR50 Appendix B.** A review of this document will not reveal any direct discussion regarding software. This specification is targeted more towards plants and equipment, than software. However, this document does discuss general quality control guide lines, verification, and documentation procedures that can be applied to software. A much better specification, specifically for software, is **IEEE Standard Guideline #370.** This document discusses the particulars of software and documentation, and the verification of these items.

Having met the requirements of a software quality assurance specification, can a program obtain "approval" from a governing agency or organization. *To the best of our knowledge, there is no agency or organization (such as ASME, ABS, or the NRC) that will formally approve (in writing) an engineering software program.* (**CAESAR II** does have certain unofficial verbal approvals. These approvals consist of stating that there will be no objections to computations performed using **CAESAR II**.) Governing agencies approve, or disapprove, contractors and engineering firms, not the tools they use in the performance of their work. <u>If a software vendor claims to have obtained a certain approval, ask for proof.</u>

## HANGER DESIGN DISCUSSIONS (PART 2)

In the March issue of Mechanical Engineering News, the basic hanger design parameters (deadweight, travel, and stiffness) and the **CAESAR II** hanger design procedure were described. This article will build upon those basics by reviewing additional hanger design terms and the optional hanger design parameters, and by stating how, once installed, hangers affect the piping analyses. The **CAESAR II** User Guide pp. 8-34 through 8-53 gives a good description of the hanger design parameters and how to manipulate them. Rather than repeating that information here, the significance of the most used items will be discussed.

**Hanger Design Terms (required):**

Hot Load - (Calculated by or specified for **CAESAR II**):
The hanger load in the operating condition. This is the only spring position where a variable support supplies the load which balances the deadweight. If calculated, **CAESAR II** installs a rigid Y restraint at the node and runs the first load case (usually weight alone) to compute this number. The user may specify this number for hanger design by entering an operating (hot) load for spring design.

Hanger Travel - (Calculated):
The range of vertical positions through which the hanger must operate, usually the distance from the installed position to the operating position. This number is computed from the second load case in a hanger design run; this load case is usually an operating load case including weight, thermal, displacement, and force components. Now, instead of the rigid Y restraints at the hanger nodes, constant force "supports" are installed for this load case. The positive Y support load equals the load carried by the rigid Y restraint in the first load case. With this upward force in place, the calculated vertical displacement from this analysis will be same as the travel from installation to operation. The hot load and this hanger travel are used to enter the hanger table and select an appropriate support, for this discussion a spring support is assumed.

Hanger Table Number - (Specified):
The **CAESAR II** number assigned for each spring manufacturer whose hangers are loaded in the program. Currently there are four manufacturers referenced by **CAESAR II** (Version 3.1 will have seven). The data which **CAESAR II** uses are the spring rates, minimum and maximum spring loads for each size, and the spring can length. The basic spring sizing algorithm always uses the spring rates and load limits; the length is checked only if a maximum clearance is specified (see below). Each hanger table has two load ranges available; the recommended range which leaves about one quarter inch of unused travel at the top and bottom, and the maximum range which does not leave this safety margin.

Theoretical Cold Load - (Calculated):
The hot load plus hanger travel times the hanger spring rate; the hanger travel is a signed value (Y deflection from cold to hot). This value is used to check the springs load limitations against the service requirements. If specifying an existing spring in **CAESAR II** input, this value is required with the spring rate to fully define the pre-loaded spring hanger. In most cases this value is close to the spring can's cold load setting (see Actual Cold Load below).

**Optional Hanger Design Parameters:**

Load Variation - (Specified):
The ratio of the change in the spring load to the hot load. The change in the spring load is calculated as the hanger travel times the hanger spring rate. Load variation, expressed as a percentage, indicates the load shift to or from the hanger in its travel from the installed to the operating position. An ideal, constant effort hanger would have zero load variation (in fact 6% is typical). While fairly arbitrary and subject to several exceptions, spring hangers should

be limited to 20% or 25% load variation. If specified as hanger input, **CAESAR II** will pick a spring that satisfies this criterion. Typically, moving to a longer range spring (same size) will cut load variation in half. If necessary, the sizing algorithm will try to place two hangers at the node if load variation is still exceeded thereby resetting the design procedure around a smaller spring. If no spring still meets the load variation criterion, a constant effort support will be chosen.

Freed Anchors or Restraints - (Specified):
Supports that are "disconnected" in the first hanger design load case which calculates hanger hot loads. If used properly, this technique will transfer deadweight off equipment (the freed anchor or restraint) and onto the designed hangers. When viewed along the Y axis, the hangers which are to carry the deadweight should be close (a few pipe diameters) to the freed restraint so that added moments are minimized. This "closeness" is not checked by **CAESAR II**.

Actual Cold (Installation) Load - (Calculated):
Theoretical cold load minus vertical deflection due to installation imbalance (a signed value) times the hanger spring rate. The spring hanger can only supply a balancing load at one position - the operating position. At all other positions, the hanger load will allow deadweight deflection. If this deadweight deflection is great at installation, then the spring cold load should not be set to the theoretical cold load but instead to this recalculated actual cold load. **CAESAR II** calculates this load, if requested, in the third hanger design load case. In most situations this analysis is not required. However, if the system is quite flexible at the hanger node and/or the theoretical cold load is quite different from the hot load, the actual cold load should be calculated and used for the cold spring setting. If this additional analysis is not run, the hanger load can be checked in the sustained analysis after hanger sizing; if this load is close to the theoretical cold load, the actual cold load is not required.

Minimum and Maximum Hanger Travel - (Specified):
Upper and lower travel limits on the spring selection. If the hanger travel is below the Rigid Support Displacement Criteria, a rigid rod will be selected by the program. Usually, piping with less than one tenth inch vertical displacement can accept rigid (rod) hangers. Piping near rotating equipment or other load sensitive points should not use this criterion. If the hanger travel is above the Maximum Allowed Travel Limit, a constant effort support will be selected. This item is usually specified to force the selection of a constant effort support. If not specified, these criteria will not guide the selection.

Restraint Stiffness for Hot Load Calculation - (Specified):
The Y *restraint* stiffness from the first hanger design load case which calculates the hanger hot loads. By default, this stiffness is rigid (1.0E12 lb./in.) but it may be changed by the SETUP file command line - HGR_DEF_RESWGT_STIF=value (see User Guide page 2-19). Lowering this stiffness will smooth out the load distribution at the proposed hanger locations by allowing some sag in the pipe where loads are large, shifting part of these loads to neighboring supports. Be aware that the hanger travel calculated in the second load case will be reduced by the sag allowed here.

(If 1.0E12 lb./in. is too great a stiffness to properly distribute the loads on neighboring hangers in a fairly stiff piping system, what is a "better" stiffness to use - keeping in mind that the sag described above should not be too great? Let's say that a highly loaded spring carries 50,000 lb. If the acceptable amount of sag is 0.001 in., then the new HGR_DEF_RESWGT_STIF=(50,000/0.001)=5.0E6 is appropriate. This value is still 5 orders of magnitude smaller than the default. A good HGR_DEF_RESWGT_STIF value is a function of the allowable sag and the largest expected load on any one spring in the system; therefore, this parameter is system dependant. A good estimate for the HGR_DEF_RESWGT_STIF value for a particular system is calculated by dividing the maximum hanger load by 0.001.)

Partial Hanger Design - (Specified):
Using existing springs in a system redesign. If a Spring Rate (but no Theoretical Cold Load) is listed as Predefined Hanger Data, CAESAR II will attempt to reset the hot and cold spring loads for that spring using the spring's working load range found in the program's hanger table. If the new hanger loads do not fit within the load range or if the spring rate does not match a rate found in the table, the support will be sized without regard for the specified spring rate.

## CAESAR II Analysis After Spring Design and Installation:

CAESAR II Methods:
Once CAESAR II has finished the two (or three) analyses to collect and size the hangers, the selected stiffnesses (rigid for rods, table spring rate for springs, or no value for constant effort supports) are included in the model for all additional analyses. The appropriate preloads will be included in all analyses which have constant forces (F) specified as in W+T1+P1+F. The preload used here will be the same that is specified in Predefined Hanger Data that is, the Theoretical Cold Load. CAESAR II does not break up the hanger preload into two components (a sustained and an expansion component) as done by some software. This approach is totally consistent with CAESAR II's algebraic difference methods of calculating operating position and installed position (hot and cold) and then subtracting them to produce the displacement range for expansion stresses. This technique produces identical results with both machine calculated and hand entered springs.

Hanger Preloads and Sustained Stress Calculations:
One caution is necessary with CAESAR II's management of hanger preloads. As indicated above, CAESAR II is programmed to calculate the system's structural response to operating loads and installed loads and, using these results, calculate expansion stresses. The installed loads are also used to calculate the sustained stresses in the system. In most cases, CAESAR II's method of adding pressure to the installed analysis will be all that is required to correctly produce this stress report. There is an inconsistency, though, that should be addressed. The sustained stresses are calculated using the installed support configuration. This means a poorly sized spring (large load variation) in a very hot system may provide a large out of balance load (see Actual Cold Load above). On rare occasion, this applied Theoretical Cold Load may result in sustained stresses which exceed the allowable. Keep in mind though, that these cold position stresses are compared to the hot allowable. While conservative, this may not be warranted. To adjust, simply check these sustained stresses against the cold allowable. Run a second analysis with the supports set to the hot configuration and springs preloaded to the hot loads. Review only the sustained case in this analysis to check the system's sustained stresses in the hot position.

## COLD SPRING DISCUSSION

QUESTION: When I add cold spring to a job, it increases the sustained stresses, and since my system is very hot, the sustained stress allowable is small. Why?

ANSWER: In reality there are two sustained cases. One is the hot sustained case and the other is the cold sustained case. There can be a difference between the two the cases in three situations:

1: When there are nonlinear restraints in a job that change state during the cold to hot transition.

2: When there is cold spring in the job.

3: When there are springs in the job.

The allowable for the hot sustained case is Sh. The allowable in the cold case can justifiably be taken to be Sc. The sustained stress limits are designed to prevent yielding due to primary loads. Because of the three effects described above there is one set of primary loads acting when the system is hot, and another set acting when the system is cold. Yielding will occur when the piping is hot if the stress reaches approximately 3/2 Sh, and when the piping is cold if the stress reaches approximately 3/2 Sc. When the differentiation between cold and hot sustained loads is important, the following ALTERATION to the normal **CAESAR II** procedure is recommended: (This differentiation is typically required when the piping system is very hot.)

1: The normal **CAESAR II** recommended load cases properly evaluate expansion stresses and cold primary loads, and as such, the sustained allowable for the **CAESAR II** recommended sustained load case must be Sc, instead of the typically used Sh.

2: When there are nonlinear restraints that lift off, when there is cold spring, or when there is hanger design, another set of primary loads will exist in the hot, or operating condition. The stresses produced by the hot primary loads should be compared to Sh. A "hot" sustained case requires a separate **CAESAR II** run. The user must remove nonlinear supports that have lifted off, must insert spring design hot loads (without spring stiffnesses), and must eliminate cold spring. The resulting computed stresses should then more properly be compared to Sh.

This approach will be included in the 3.2 version of **CAESAR II** as an option.

## THE LIGHTER SIDE OF SEMINARS

Often after spending five days, and about as many evenings with a group of engineers in a seminar environment, events arise that are not necessarily worthy of technical note, but they are worthy of recognition because of the event's ability to help us keep things in perspective. This article appears at the request of several of the seminar attendees as a sort of official chronicle of some of the events that fall into this category.

A now good friend sent in a seminar response form and answered several of the questions as follows:

- COMPARED TO YOUR EXPECTATIONS, THE COST OF THE SEMINAR WAS:

  -- "small compared to the bar tab".

- IN GENERAL THE EXPERIENCE AT THE SEMINAR WAS:

  -- "worrisome to my wife since I was always out at night, and had her sister's car."

- INSTRUCTORS ABILITY TO HELP ATTENDEES UNDERSTAND THE COURSE WAS:

  -- "good, instructor was very tolerant of students falling asleep, and offered to take a nap himself."

- THE MATERIAL PRESENTED AND THE ACTIVITIES CONDUCTED WERE:

  -- "of questionable taste..."

- COMMENTS:

  -- "Instructors should not wear the same shirt 2 days in a row, it is a dead giveaway. Phonetic spelling only works for people without Texas accents."

  -- "The instructor's personal life is very complex. More time should be spent with examples."

  -- "Instructors were very conscientious and helpful, especially with the female attendees and waitresses."

So far the course has been conducted in nine different countries, and has been presented to over 800 engineers. At one seminar, a number of the group was out having a fairly energetic dinner when the desert tray was brought to the table. In line with earlier festivities, one of everything from the desert tray was ordered. A particular piece of chocolate cake was placed on the table that would have proved difficult for any five people to eat. One particularly gregarious Canadian that was involved in some earlier wagering was bet that he could not get the entire piece of cake in his mouth at one time. [Now I have not before, nor since met a Canadian that would turn down what at the time seemed like a reasonable bet, and so the challenge was accepted.] Four minutes later, and with an entire restaurant not believing what it had just witnessed, the chocolate cake was gone, (with a few small exceptions). The Canadian gentleman refused to accept his reward, satisfied that the quality of the cake, and its ample quantity was payment enough. The restaurant was Willie G's, just outside of downtown Houston, and is recommended as a pleasant, informal eatery to those that will at some time have the opportunity to enjoy Houston.

On another occasion in Holland, a number of the English attendees (one of which taught squash in Birmingham) cajoled two of the course lecturers into a squash game after the day's classes. One instructor played in borrowed shoes and sweats, and another in the bottom part of a business suit. (The owner of the business suit was a college professor that swore he had never played squash before in his life, except that it appeared the suit had recently gone thru a number of similar squash games.) Once evicted from the squash courts by a night attendant at about 3:30am, the group found Ping-pong tables, and vending machines dispensing Heiniken. (The sole Texan in the party found this discovery most agreeable, with the single exception that Heiniken simply does not compare to Miller Genuine Draft). After exhausting a French contingency with a combination of Ping-pong, arm wrestling and stories about how the world owes most of its major scientific discoveries to Texans and Scotsmen, the group retired, for a few hours of well deserved slumber.

Not all seminars are filled with these types of antics, and the concerned future seminar attendee should know that their presence at the after-hours-functions is entirely optional.

## PIPING SEMINARS

There are currently four piping seminars scheduled for the end of 1990. These seminars will be presented by Mr. Anthony Paulin, the author of **CAESAR II**. The schedule is as follows:

| DATE | LOCATION | SPONSOR |
|---|---|---|
| October 28-31 | Bahrain | Uniglobe Technologies |
| November 5-9 | Bad Homburg, Germany | W. Fuchs Gmbh. |
| November 12-14 | Den Haag, Holland | Shell |
| November 19-23 | London, England | DATECH |

In addition, the following pipe stress seminars have also been scheduled:

| | |
|---|---|
| October 29-Nov. 2 | Edmonton, Alberta Canada |
| January 21-25, 1991 | Houston, Texas |
| April 15-19, 1991 | Houston, Texas |

For registration information, please call our Seminar & Training Department at 713-890-4566.

## MECHANICAL ENGINEERING BULLETIN BOARD

COADE invites those **CAESAR II** and **PROVESSEL** users that offer a variety of piping/vessel and related services to send cards, a brief description of their services or products, a short list of references that may be contacted, and a brief history of the company. Much of the information will then be printed in this column of *Mechanical Engineering News* (REFERENCES WILL NOT BE PRINTED).

This feature in *Mechanical Engineering News* is offered to help provide expertise to users of COADE software, and to the piping/pressure vessel industry as a whole. Those companies offering specialized expertise in dynamic measurements, strain gage measurements, and expertise in expansion joints and materials are especially requested to send cards and descriptions. Consolidating expertise only provides for a safer industry. It is truly unfortunate that we must often make the same engineering mistakes over and over because of a lack of company-to-company communication. Most clients are indeed finding that the cost of hiring a "consultant" today is decreasing because so much of the mundane tasks previously requiring a labor charge can now be done on a computer, therefore significantly reducing the overall job cost.

COADE does however reserve the right to edit any such delivered materials. COADE will make reasonable effort to assure that information printed is factual, but no such printing should be construed as an endorsement of any one particular company by COADE. Any company or individual wishing to get more information about the Bulletin Board may contact Mr. Scott Mayeux at COADE.

## CAESAR II SPECIFICATIONS

Class 1

1) A computation error in the formulation of the "B2" stress parameter for the NC and ND codes existed in the original Version 3.0 release. A letter of notification was sent to all potential users of these codes alerting them to this problem. Revised executables were sent to all users in mid August.

2) A major error has been discovered in the Microsoft Version 5.0 FORTRAN compiler. This error causes programs compiled with this compiler (using the math coprocessor library) to produce incorrect results when executed on XT class machines.

   The affected programs include:

   - **CAESAR II** Version 3.0, "bug fix disks" only
   - **PROVESSEL** Version 2.45, all EXE files
   - Any utility or interface programs distributed since July 15, 1990.

   Any users currently programming in FORTRAN with this version of the compiler should contact Microsoft for the same patch. Your programs will produce incorrect results on XT machines also!

Class 2

1) An overlay problem was discovered in OUTP01.EXE which caused the computation of the element forces and stresses to be approximately five times slower than the Version 2.2B program. This problem is only noticeable on XT and AT class machines.

2) An error has been found in the routine which displays element lengths in the graphics preprocessor. This error causes element lengths longer than 32,768 units to be displayed incorrectly. This is a graphics display problem only.

**NOTES:**