

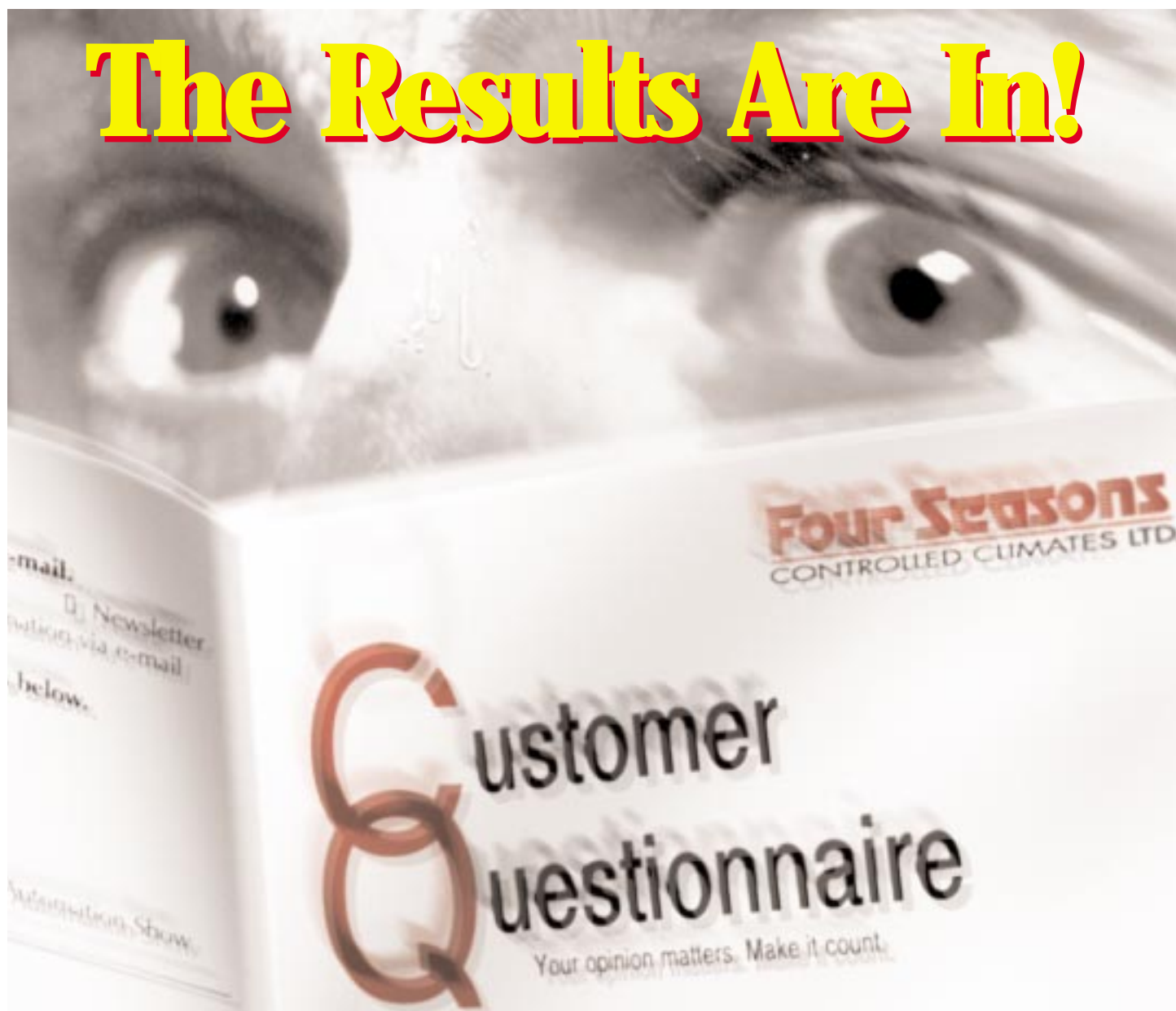
PilotLight

Four Seasons
CONTROLLED CLIMATES LTD.

A newsletter for the valued customers of Four Seasons Controlled Climates Ltd.

Winter 2000

The Results Are In!



- **Four Seasons Controlled Climates helps Chrysler handle a hot issue**
- **Humidification:**
Controlling the water we breathe

- **Radiant Tube Heaters:**
Heat at the speed of light
- **Old Willy**

...and much more!

FSCC helps Chrysler handle a “hot” issue

Chrysler’s aluminum casting plant is a Toronto hot spot. The facility, located in Etobicoke district and shown here, is where Chrysler processes the tons of molten aluminum that go into making various vehicle components.



Taking the heat

Working with large quantities of molten metal in a high-production environment presents some daunting challenges. One of those challenges at the Chrysler facility was dealing with the intense heat that radiates from the vats of molten aluminum which are carried about the plant by manned cranes. The heat often made working conditions difficult for the crane operators and was subsequently slowing down production.

Hot place, tight space

The solution to the problem was obvious: cool the crane cabs with conditioned air supplied by dedicated cooling units that could be affixed to each crane cab. However the amount of space available in which to install a cooling unit was very limited. They tried off-the-shelf, portable air conditioners but no unit that was small enough to fit was powerful enough to do the job. Knowing of the custom equipment design and fabrication services offered by Four Seasons Controlled Climates, Chrysler asked FSCC to come up with a workable solution.

Size does matter

Since larger capacity necessitates bigger components (bigger blower, bigger compressor, bigger coils) in air conditioning design, the greatest challenge was to arrange the specified components in a package that fit the available space without restricting air flow, placing excessive loads on the system, reducing performance, compromising reliability, or affecting the crane’s range of motion.

FSCC designers utilized CAD (Computer Aided Design) software to design an optimized arrangement of the tightly-packed components and to create a virtual prototype. The design was massaged until the optimum package was achieved. Once the unit was designed, the plans were handed over to the FSCC fabrication department for the construction of a prototype.

After the construction of the chassis and the installation of the various components, the proto-

type was equipped with sophisticated, yet rugged computerized controls that would keep the unit operating efficiently under the fluctuating, extreme loads it would face inside the plant.

The finished prototype was subjected to a battery of in-house testing. Once it passed the in-house tests it was time to put the unit into trial operation inside the Chrysler facility. The prototype was installed on one of the crane cabs and tested under the most extreme working conditions for an extended period. On several particularly hot days in mid-summer the compact unit was able to maintain a comfortable 75 °F inside the cab while the ambient temperature reached an almost oven-like 150°. Although the long-term test revealed the need for some fine-tuning of the unit’s operation, both FSCC and Chrysler were confident that the design was sound and that the units would do the job very well.

On the success of the prototype, Chrysler ordered a total of six units, two for each crane in operation. The cooling units are designed for quick connect/disconnect so that if an installed unit requires repair or maintenance it can be replaced with minimal down time.



1: The prototype cooling unit, sans exterior panels.
2: The sophisticated computerized control system
3: A crane cab with the prototype unit installed



Humidification

Controlling the water we breathe



Of the indoor environmental conditions that affect human comfort and equipment performance (temperature, cleanliness, air movement, and relative humidity) relative humidity is often paid the least amount of attention. All of us will recognize and react more quickly to temperature changes, odors or heavy dust in the air, drafts, or radiant heat from sunlight or a radiator, than we will to a change in relative humidity. However, as relative humidity interrelates with temperature and others of these variables, it becomes a vital ingredient in total environmental control. To understand why, let's first define our terms and examine the interrelationship between temperature and relative humidity.

What is "humidity"?

Humidity is the water vapour or moisture that is constantly present in the air. The level of humidity can be taken as an absolute measure: the amount of water vapour in a unit of air, but a more meaningful measurement is *relative humidity*. Relative humidity (RH) is the amount of water vapour in the air compared to the total amount the air can hold at a given temperature.

Air temperature and humidity

The amount of water vapour air can hold depends on the temperature of the air. Warm air has the capacity to hold more moisture than cold air. For example, air at a temperature of 70°F can hold more than ten times the water vapour of the same volume of air at 10°F.

Humidity and human comfort

Conditions and circumstances vary, but generally speaking, relative humidity maintained between 35% and 55% seems most conducive to human comfort.

When air is dry, moisture evaporates more readily from the skin and produces a feeling of chilliness even with the temperature at 75°F or more. As we mentioned earlier, human perception of relative humidity is the least evident of the variables that make up our environment. However, changes in RH are often sensed as changes in temperature. Drier air feels cooler than more humid air at the same temperature.

This universal human tendency to wrongly sense a condition of relative humidity as a condition of temperature reinforces the benefits of controlled relative humidity. For example, you can achieve a comfortable condition during the heating season at lower temperatures in a humidified building than in a building where RH is not controlled. The savings in heating costs can be significant over the course of just a single heating season.

Evaporative cooling and hygroscopic materials



Changing RH can cause temperatures to change. As moisture in the air evaporates, it removes heat from the air, thereby cooling it. This is the principle of evaporative cooling. The moisture can come from people or from wood, paper, textiles and other *hygroscopic* materials (materials that can absorb and release moisture) in the building. Conversely, if hygroscopic materials absorb moisture from humid air, the vapour condenses as it is absorbed and gives off heat to the air, thereby warming it.

The amount of moisture that hygroscopic materials absorb or give off depends on the relative humidity of the surrounding air. No single level of relative

humidity provides adequate moisture content in all hygroscopic materials. Moisture content requirements vary greatly from one material to the next.

Humidity and static electricity



Static electricity is being generated around us at all times, caused by the movement of materials of high electrical resistance against one another. Typical examples are people walking across carpeted floors, paper going through a printing press, or sheets coming off a flatwork ironer.

Only when atmospheric conditions allow static electricity to accumulate does it become a problem. People may receive unpleasant shocks; paper, films and fabrics are repelled or attracted to each other or to processing machinery; the components inside computers can become damaged. Sparks from static electricity are extremely dangerous in the presence of gases, volatile liquids, or explosive dusts such as is found in munitions plants, paint spray booths, rubber cement plants, flour mills and other places where volatile chemicals are used or stored.

How relative humidity deters the accumulation of static electricity charges

For most environments, maintaining sufficiently high RH levels provides the most effective and economical means of preventing the build-up of static charges. When RH is sufficiently high, an invisible film of moisture forms on surfaces in the room. The presence of normal impurities makes this film a conductor that carries static electricity harmlessly to the ground before it can build up to a spark-producing potential.

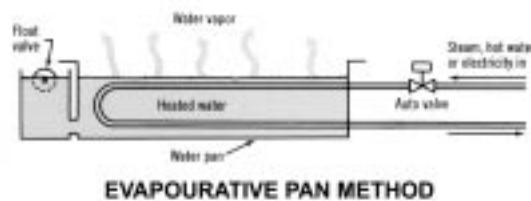
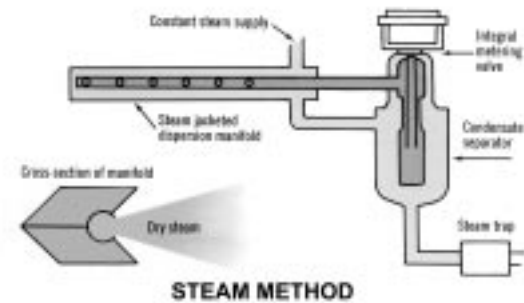
A relative humidity of at least 45% is needed to reduce or prevent the accumulation of static charges, although some materials such as wool and certain synthetic fabrics may require higher RH levels. Similarly, heat-generating machines may require higher relative humidities to provide sufficient moisture in proximity to the machine to dissipate static charges.

How to humidify

If you are humidifying a hospital operating room, obviously your design criteria are different than those for humidifying a textile mill, an office building, or even a laboratory. Different types of operations have substantially different requirements for the achievement of proper relative humidity. These requirements determine what means of humidification you should use.

Three main humidifying methods are available: *steam*, *evaporative pan* and *water spray*. Each has particular advantages and limitations which determine its suitability for a particular application.

Steam is ready-made water vapour that needs only to be mixed with the air. With evaporative pan humidification, air flows across the surface of heated water in the pan and absorbs the water vapour. Both steam and evaporative pan humidification do not affect the temperature of the humidified air. Water spray humidification disperses water as a fine mist into the air stream where it evaporates. As it evaporates it draws heat from the air and cools it.



Recommended applications:

Steam — Recommended for virtually all commercial, institutional and industrial applications. Where steam is not readily available, self-contained steam generating units or central system steam humidifiers are most effective and economical.

Evaporative Pan—Recommended only as an alternative to self-contained steam generating unit humidifiers for small load commercial or institutional applications.

Water Spray—Recommended for industrial applications where evaporative cooling is required. It is typically employed in textile mills in the southern U.S. during summertime.

When properly specified and installed, humidification systems offer great benefits for the safe operation of machinery and equipment, the optimization of employee comfort and large potential savings in heating and cooling costs.

Source: The Armstrong Humidification Handbook

HOW IT WORKS

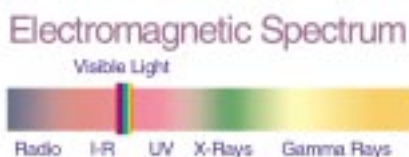
Radiant Tube Heaters

Heat at the speed of light

Radiant tube heaters are compact, self-contained direct heating devices. They can be used to heat factories, warehouses, foundries, gymnasiums, loading docks, race track stands, arena bleachers, outdoor restaurants, swimming pool surrounds and many other areas. Radiant tube heaters can also be used for snow melting and de-icing, as well as in car washes and other hostile environments.

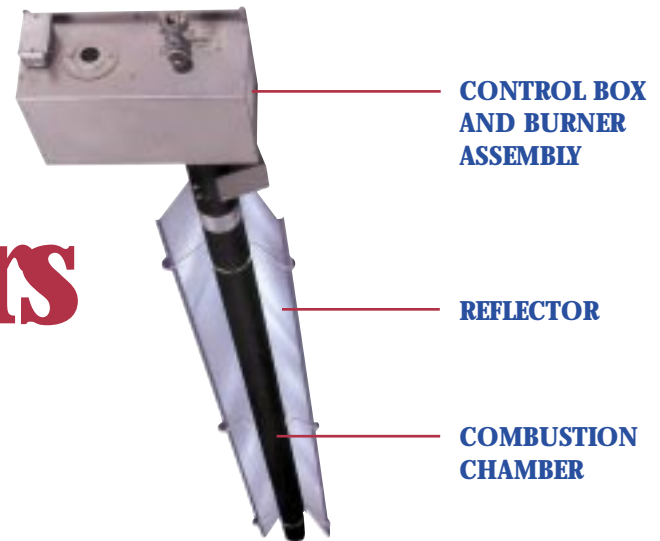
The sun in a tube

Radiant tube heaters heat buildings in essentially the same manner that the sun heats the earth— with infra-red (I-R) energy.



Infra-red energy is a form of electromagnetic (EM) radiation. It makes up a portion of the *electromagnetic*

spectrum and has wavelengths close to the wavelengths of visible light, but infra-red energy cannot be seen by the human eye. Infra-red energy, like all



EM radiation, travels in straight lines at the speed of light.

Infra-red energy is commonly thought of as heat, but infra-red energy only creates heat when it contacts things with mass.

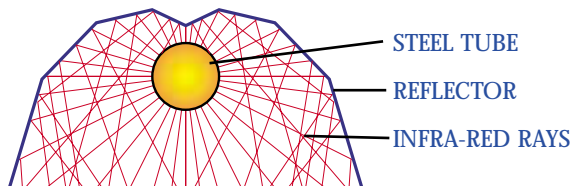
For example, infra-red energy is generated by the sun and travels through space relatively unaffected until it strikes the earth's surface where it is transformed into heat energy. The heat energy is stored in the ground and is given off to the air. Imagine yourself walking along a sandy beach on a very hot day. The sand is very hot on your feet even though the air temperature is considerably cooler. That is because the sand, with a lot of mass, readily absorbs the infra-red energy from the sun, while the air, which has very little mass, does not. The more mass

something has the more infra-red energy it can absorb and the more heat is generated.

Much like the sun, radiant tube heaters radiate infra-red energy. Heat is generated when the energy is absorbed by things with mass. An intermediate transfer medium such as air or water is not needed, nor are fans or pumps. Hardly any energy is lost between the infra-red source and the target area because air is a poor absorber of infra red energy. As personnel, floors and objects in the primary radiation pattern are warmed by the infra red energy, they tend to radiate heat to the surroundings by conduction and convection.

How radiant tube heaters work

In a radiant tube heater, a gas burner is connected to one end of a steel tube combustion chamber. Hot combustion gases are moved through the tube by a high-energy vacuum exhaust system. Combustion contaminants are exhausted at the other end of the tube to the outside. When combustion takes place inside the combustion chamber, the tube radiates infra-red energy. A highly polished aluminum reflector directs the infra-red rays to the target area.



The illustration above shows a simplified cross-section of a radiant tube heater. The steel tube radiates infra-red rays 360 degrees around the tube. A carefully designed reflector ensures all the rays are directed toward the target area.

Advantages over forced air heating systems

Lower Fuel Costs

When conventional forced air heaters are replaced with radiant tube heaters it is commonplace to achieve fuel savings of 30% - 50%. Fuel savings of greater than 50% are not uncommon.

Less Heat Loss

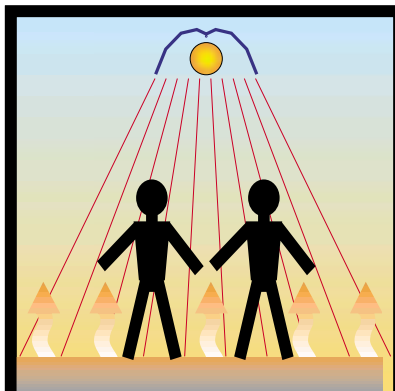
Because heat is generated and maintained at and near floor level, ceiling temperatures are lower, reducing heat loss through the roof.

Fast Heat

Fast heating-up time means the heat does not need to be turned on very far in advance of employees showing up for work.

Greater Comfort at Lower Temperatures

Because the heat is given off primarily from the floor and other surfaces and not the air, worker comfort can be maintained at lower thermostat settings. This also helps workers engaged in physical labour perspire less.



Target Heating

When several radiant tube heaters are employed in a given space such as a factory or warehouse, the heat can be efficiently delivered only to specific areas, such as those occupied by employees, by turning on only the radiant tube heaters for those areas. This saves the cost of heating unoccupied parts of the building.

Out-of-the-way Installation

Radiant tube heaters are installed overhead and out of the way. Their low profiles take up less space than conventional heating equipment.

Faster Heat Recovery

As radiant tube heaters do not rely on heated air to deliver heat, heat lost through an opened door is recovered much faster than with conventional forced air heating systems.

Unobtrusive Operation

With no noisy fans, radiant tube heaters are quieter than conventional forced air systems and because they do not move air they do not stir up dust.

What You Said...

Results from the Customer Questionnaire

We are very pleased to announce that the latest Four Seasons Controlled Climates Customer Questionnaire was a success. The response rate was high and the feedback was enlightening. We would like to thank all who took the time from their busy schedules to fill out and return the questionnaire. If you didn't do so yet, you can still send it in. Your feedback is important to us and, it's never too late to tell us how we can serve you better.

Following is a summary of the Customer Questionnaire results. The results are divided into the various sections as they appeared on the Customer Questionnaire.

Service

- 57% were 'very satisfied' with our last visit.
- 43% were 'satisfied' with our last visit, with the exception of one customer whose equipment was down at the time
- 56% said our response time was 'excellent'
- 44% said our response time was 'satisfactory'
- **Reasons for choosing Four Seasons Controlled Climates as your mechanical services company:**
 - 1st:** quality of workmanship,
 - 2nd:** reliability/response time,
 - 3rd:** knowledge/expertise,
 - 4th:** price,
 - 5th:** range of services.

Some remarks on service:

"Keep up the good work."

"CSP was impressive."

"You provide an excellent service...[that is] often taken for granted. Thank you."

"I was extremely impressed with the presentation package and the representative. We had follow-up, but it was not done in an harassing fashion."

While we were pleased with the overall response, obviously we are not perfect. Our goal is to make 100% of our customers 100% satisfied, 100% of the time. An impossible goal? Maybe. But it doesn't hurt to try.

PilotLight

The feedback for PilotLight was by-and-large very positive. We are pleased to know that PilotLight is something our customers appreciate and can benefit from.

- 71% of respondents read all or some of each issue
- 29% said they don't have time to read it
- 87% want to receive future issues
- **Most popular features:** All features received comparable levels of feedback, however "How it works" is (by a very slight margin) the most popular.
- **Best way to improve PilotLight:** More frequent issues.

We will be looking into how we can accomplish this goal in a cost-effect, reliable manner. We'll keep you posted.

- **Most popular article topics:** *air quality, management issues, maintenance issues, work-place safety, automation, outsourcing.*

Look for articles on these topics in up-coming issues.

The Web and Online Services

- 47% use the web for work-related purposes.
- **Most requested online services:** *listings of industrial products and services, tech support, and equipment reference sheets.*

Plans are in the works to develop online services which we will add to our existing web site (www.fssc-online.com) We will keep you posted on the progress and launch dates.

Trade Shows

- 24% attended at least one trade show in '99
- **Most popular show:** Canadian Machine Tool Show

Magazines

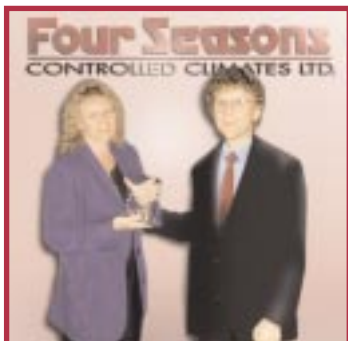
- **Most popular magazine:** *Plant Engineering and Maintenance.* **Second:** *Canadian Industrial Equipment News*

As mentioned in the previous issue of PilotLight, we plan to publish articles in trade magazines. This information helped us determine which trade magazines to publish in, in order to reach our customers and prospective customers.

Four Seasons honours long-time employees

Four Seasons Controlled Climates recently held a small ceremony to officially recognize the accomplishments of several employees.

The employees in question have recently reached the ten year mark. They are Nicole Finnegan, Business Manager; Stephen Frampton, Technical Sales Advisor; and Technicians Andy Tripo, Jack Kelly, Mike Ball, and Steve Rideout.



Franco DeNicola presents a commemorative plaque to Business Manager, Nicole Finnegan. Honouring ten years of dedication and teamwork.

“These days employer-employee relationships usually don’t last very long,” remarked Franco DeNicola, Four Seasons Controlled Climates President. “The fact that these employees have been with us this long, I think says something very positive about each one, not only as an employee, but also as a person. I think it also says something positive about the company.”



More insightful quotes from Willy's collection of favourites:

The greatest mistake you can make in life is to continually fear you will make one.

Your friend is the man who knows all about you, and still likes you.

– Elbert Hubbard

A man's greatest strength develops at the point where he overcomes his greatest weakness.

– Elmer G. Letterman

It's hard to detect good luck – it looks so much like something you've earned.

– Fred A. Clark

Don't try to be a great man, just be a man, and let history make its judgement.

– Zeffram Cochrane

Bodilee Functions



John Cerisano

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