# NAUTILUS

ENTERTAINMENT
DESIGN INC.

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# NAUTILUS ENTERTAINMENT DESIGN

Nautilus Entertainment Design provides technical facilities design services for entertainment and architectural projects, as well as lighting design services for television, special events and live productions worldwide.

NED's entertainment facility design services include architectural lighting design and technical facility consultation, encompassing lighting, rigging, special effects, show control, audio, video/film projection and broadcast systems. Founded by EMMY® award winner Jim Tetlow and driven by the requests of our repeat clients over the years, we have expanded our expertise, resulting in precise budgeting, fully integrated systems design, and comprehensive on-site management.

NED applies many years of practical live production know how to our permanent installation designs — and provides current, functional and technically superior solutions that can only come from hands on experience. Former and current projects include television studios, hotel interiors and exteriors, cruise ships and themed attractions throughout the world.

NED guides clients through the whole process — from a needs analysis and concept development, through design and specification of technical systems and backstage spaces, finally to monitoring the installation and supervision of systems commissioning. Sophisticated tools are used to communicate design concepts in an easily understood virtual environment.

Our 3D drawing and rendering capability provides highly accurate and detailed sightline studies and seating layout plans, while our 3D acoustic modeling provides sound reinforcement systems optimized for any size or shape room.

Our production lighting design services range from televised specials and theatrical productions to special events and corporate presentations. NED has designed and directed the live event and television lighting for both the Republican and Democratic National Conventions, the Presidential Debates and special ceremonies such as the Hong Kong Handover, the Macau Hand over, and Singapore 25th Anniversary of Independence.

Whether the project is a permanent installation or a live event, NED brings a unique design sensibility obtained from hundreds of successful projects and years of experience.

# W. JAMES TETLOW

Principal Consultant and Lighting Designer
Biography

Mr. Tetlow holds a Bachelor of Fine Arts degree in Drama from Carnegie Mellon University and has been working as a lighting designer and consultant for television, theatre, and architecture since 1975.

He is a member of the American Society of Theatre Consultants, the Academy of Television Arts and Sciences, International Cinematographers Guild #659, The Illuminating Engineering Society, The International Association of Lighting Designers and the American Society of Lighting Designers.

His awards include a 1990 Emmy Award for the lighting of "Sesame St."; a 1987 Monitor Award for "Courting", an original studio drama; and a 1985 Monitor Award for a music video with Jim Henson's Muppets. Additionally, he has received two other Emmy Award nominations and three other Monitor Award Nominations.

Live television credits include The 1992 "Democratic National Convention"; The 1984, 1988 and 1996 "Republican National Conventions", the "Daytime Emmy Awards", the NBC "Olympic Broadcast Center" in Barcelona, and The "Miss America Pageant" and seven years of the "Miss Universe Pageant" from locations around the world. Other television credits include such diverse productions as “The Tonight Show”; "Sesame St. at the Metropolitan Museum of Art"; The "Radio City Music Hall Christmas Spectacular"; "Life Magazine's 50th Anniversary Special"; and the world premiere of Andrew Lloyd Webber's "Requiem", for the BBC.

Live special events include the official Hong Kong and Macau Handover Ceremonies, numerous Presidential Inaugural Balls, the 2000 & 2004 Presidential Debates, the World University Games and the "Singapore 25th Jubilee Spectacular”.

In Las Vegas, he has designed the lighting for "Night Dreams" at the Dunes Hotel, relighting of selected scenes in the “Folies Bergere” and the ten year run of "Enter the Night" at the Stardust. Similar projects include “The Shoji Tabuchi show” in Branson, Missouri; the production of “Beyond Belief” in Sun City, South Africa; and numerous productions onboard various ships for Carnival Cruise Lines.

Mr. Tetlow has also worked extensively as a lighting designer on corporate videos and live theatrical productions for such clients as Chrysler, Mercedes Benz, Porsche, Michelin, Polaroid, IBM, the entire 2007 GM Exhibit at the Detroit Auto Show and an interactive live/video presentation with Mummenschanz for AT&T.

Exhibit lighting designs include the IBM and Apple exhibits at COMDEX, an AT&T exhibit at EPCOT, and temporary exhibits for Porsche, Universal Pictures and Sony HDTV.

Architectural projects include both the interior and exterior lighting of the Silver Star Hotel & Casino in Philadelphia, Mississippi; special architectural lighting onboard the Holland America ship “Rotterdam IV”; and the Fountain of Angels in Carthage, Missouri.

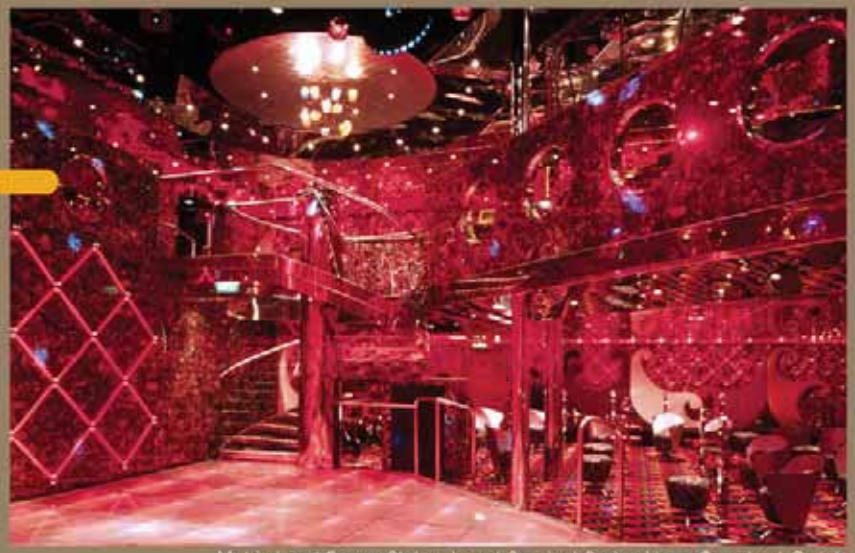
In 1993 and 1994, Mr. Tetlow consulted for Singapore Broadcasting Corporation, providing lighting training and design services for new studios and upgrading current facilities.

Mr. Tetlow is the principal consultant of Nautilus Entertainment Design Inc., a firm that provides entertainment facility designs including lighting, audio, video, and special effects. Current projects include a redesign of both the architectural and television lighting of the Senate Chamber in the United States Capitol and a multi-purpose production facility for Hewlett Packard. Nautilus Entertainment Design is also the entertainment consultant for all new ship construction for Carnival Cruise Lines, Holland America Line, Cunard, and Costa Cruises.

# ENTERTAINMENT FACILITY DESIGN

900 seat theatre onboard Carnival Cruise Lines ***Carnival Spirit***

Nautilus Entertainment Design specializes in technical facilities consultation and design, including systems for lighting, sound reinforcement, rigging, special effects, film/video projection and broadcast systems. Our experience includes innovative design solutions for multi-purpose spaces in both land-based and maritime facilities.



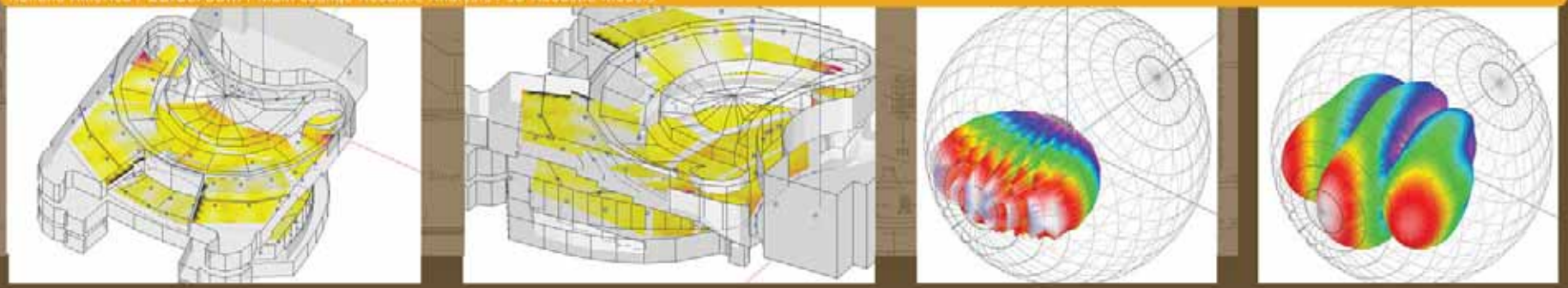
Multi-tiered Dance Club onboard Carnival Cruise Lines ***Carnival Spirit***

Carnival Cruise Lines / ***Carnival Pride*** / Atrium

Cunard / *Queen Mary 2* / Illuminations (Auditorium) Control Room 3D Rendering

Holland America / *Zuiderdam* / Main Lounge 3D Rendering

Holland America / *Zuiderdam* / Main Lounge Acoustic Analysis / 3D Acoustic Models



## TYPICAL SERVICES:

- >> Develop a dialogue with the architects who design the space and the creative/technical staff that will operate the facility to determine system requirements.
- >> Design systems that meet the technical production requirements as well as the conceptual architectural intent, assuring that the integrity of the space is maintained.
- >> Rapid and accurate development and communication of design concepts.
- >> Complete drawing packages and fully integrated system designs.
- >> System budgeting and cost estimating for accurate bid analysis.
- >> Project Management on behalf of the Owner throughout the entire process.
- >> On-site inspection of system installations and complete system commissioning.

Carnival Cruise Lines / *Carnival Victory* / Club Arctic

Carnival Cruise Lines / *Carnival Pride* / David's Supper Club

1100 seat theatre onboard Carnival Cruise Lines *Carnival Victory*

# ENTERTAINMENT FACILITY DESIGN

# ENTERTAINMENT FACILITY DESIGN

**Broadway Style/Musical Theatres** [Audio – Video – Lighting – Rigging – Stage Machinery – Effects System Design & Commissioning]

| | | | | |
|---|---|---|---|---|
| Victoriana | Carnival Freedom | 1400 Seats | 14,000 sqft | 2007 |
| Atene Theatre | Carnival Concordia | 1380 Seats | 14,000 sqft | 2006 |
| Venetian Palace | Carnival Liberty | 1400 Seats | 14,000 sqft | 2005 |
| The Palladium | P&O Arcadia | 738 Seats | 16,000 sqft | 2005 |
| Ivanhoe Theatre | Carnival Valor | 1400 Seats | 14,000 sqft | 2004 |
| Teatro Urbino | Costa Magica | 1380 Seats | 14,000 sqft | 2004 |
| Vista Lounge | Holland America Line's Westerdam | 738 Seats | 16,000 sqft | 2004 |
| Phantom | Carnival Miracle | 1159 Seats | 17,674 sqft | 2004 |
| Teatro Rex | Costa Fortuna | 1380 Seats | 14,000 sqft | 2003 |
| Royal Court Theatre | Cunard Line's Queen Mary 2 | 1094 Seats | 10,000 sqft | 2003 |
| Illuminations | Cunard Line's Queen Mary 2 | 505 Seats | 9,400 sqft | 2003 |
| Queen's Room | Cunard Line's Queen Mary 2 | 562 Seats | 10,550 sqft | 2003 |
| Vista Lounge | Holland America Line's Oosterdam | 738 Seats | 16,000 sqft | 2003 |
| Amber Palace | Carnival Glory | 1400 Seats | 13,600 sqft | 2003 |
| Teatro Osiris | Costa Mediterranea | 1170 Seats | 13,986 sqft | 2003 |
| Vista Lounge | Holland America Line's Zuiderdam | 738 Seats | 16,000 sqft | 2002 |
| Toulouse-Lautrec Lounge | Carnival Conquest | 1400 Seats | 14,000 sqft | 2002 |
| Follies Lounge | Carnival Legend | 1167 Seats | 10,600 sqft | 2002 |
| Taj Mahal | Carnival Pride | 1170 Seats | 10,600 sqft | 2001 |
| Pharaoh's Palace | Carnival Spirit | 1170 Seats | 10,600 sqft | 2001 |
| Caribbean Lounge | Carnival Victory | 1400 Seats | 14,000 sqft | 2000 |
| Teatro Caruso | Costa Atlantica | 1167 Seats | 18,289 sqft | 1999 |

**Discothèques And Dance Halls** [Audio – Video – Lighting – Effects System Design And Commissioning]

| | | | | |
|---|---|---|---|---|
| Tattooed Lady | Carnival Liberty | 211 Seats | 4,515 sqft | 2005 |
| Electra | P&O Arcadia | 61 Seats | 2,650 sqft | 2005 |
| One Small Step | Carnival Valor | 211 Seats | 4,515 sqft | 2004 |
| Discoteca Grado | Costa Magica | 156 Seats | n/a | 2004 |
| Northern Lights | Holland America Line's Westerdam | 61 Seats | 2,650 sqft | 2004 |
| Dr. Frankenstein's Lab | Carnival Miracle | 150 Seats | 3,767 sqft | 2004 |
| Discoteca Vulcania 1927 | Costa Fortuna | 231 Seats | n/a | 2003 |
| G32 | Cunard Line's Queen Mary 2 | 251 Seats | 6,100 sqft | 2003 |
| Northern Lights | Holland America Line's Oosterdam | 61 Seats | 2,650 sqft | 2003 |
| White Heat | Carnival Glory | 211 Seats | 4,515 sqft | 2003 |
| Discoteca Selva | Costa Mediterranea | 154 Seats | 3,002 sqft | 2003 |
| Northern Lights | Holland America Line's Zuiderdam | 61 Seats | 2,650 sqft | 2002 |

**Discothèques And Dance Halls** [Audio – Video – Lighting – Effects System Design And Commissioning]

| | | | | |
|---|---|---|---|---|
| Henri's | Carnival Conquest | 211 Seats | 4,920 sqft | 2002 |
| Medusa's Lair | Carnival Legend | 118 Seats | 2,800 sqft | 2002 |
| Beauties Dance Club | Carnival Pride | 120 Seats | 3,750 sqft | 2001 |
| Dancin' | Carnival Spirit | 118 Seats | 3,765 sqft | 2001 |
| Club Arctic | Carnival Victory | 211 Seats | 4,900 sqft | 2000 |
| Discoteca Dante's | Costa Atlantica | 162 Seats | 4,615 sqft | 1999 |

**Cabaret Lounges** [Audio – Video – Lighting – Effects System Design And Commissioning]

| | | | | |
|---|---|---|---|---|
| International Lounge | Carnival Freedom | 430 Seats | 7000 sqft | 2007 |
| Victoria Lounge | Carnival Liberty | 425 Seats | 7,300 sqft | 2005 |
| The Stage | Carnival Liberty | 81 Seats | 1,900 sqft | 2005 |
| Piano Man | Carnival Liberty | 100 | 1,300 sqft | 2005 |
| The Globe | P&O Arcadia | 166 Seats | 6,200 sqft | 2005 |
| Eagles Lounge | Carnival Valor | 425 | 7,300 sqft | 2004 |
| Paris Hot | Carnival Valor | 81 | 1,900 sqft | 2004 |
| Lindy Hop | Carnival Valor | 100 | 1,300 sqft | 2004 |
| Salone Capri | Costa Magica | 434 Seats | 7,100 sqft | 2004 |
| Salad a Ballo Spoleto | Costa Magica | 76 Seats | 1,300 sqft | 2004 |
| Piano Bar Capo Colonna | Costa Magica | 68 Seats | 2,100 sqft | 2004 |
| Grand Bar Salento | Costa Magica | 266 Seats | 4,300 sqft | 2004 |
| Queen's Lounge | Holland America Line's Westerdam | 166 Seats | 6,200 sqft | 2004 |
| Explorer's Lounge | Holland America Line's Westerdam | 80 Seats | 2,700 sqft | 2004 |
| Ocean Bar | Holland America Line's Westerdam | 144 Seats | 3,200 sqft | 2004 |
| Crow's Nest | Holland America Line's Westerdam | 280 Seats | 7,050 sqft | 2000 |
| Mad Hatter's Ball | Carnival Miracle | 348 Seats | 6,674 sqft | 2004 |
| Maquire's Bar | Carnival Miracle | 67 Seats | 1,464 sqft | 2004 |
| Frankie & Johnnie's | Carnival Miracle | 135 Seats | 2,659 sqft | 2004 |
| Sam's | Carnival Miracle | 105 Seats | 1,722 sqft | 2004 |
| Salone Leonardo Da Vinci 1960 | Costa Fortuna | 425 Seats | 7,100 sqft | 2003 |
| Piano Bar Conte Rosso 1921 | Costa Fortuna | 100 Seats | 1,300 sqft | 2003 |
| alad a Ballo Conte Verde 1923 | Costa Fortuna | 81 Seats | 2,100 sqft | 2003 |
| Grand Bar Conte Di Savoia | Costa Fortuna | 147 Seats | 4,300 sqft | 2003 |
| Chart Room | Cunard Line's Queen Mary 2 | 88 Seats | 3,000 sqft | 2003 |
| Commodore Club | Cunard Line's Queen Mary 2 | 115 Seats | 3,390 sqft | 2003 |
| Golden Lion | Cunard Line's Queen Mary 2 | 123 Seats | 3,000 sqft | 2003 |
| Sir Samuel's | Cunard Line's Queen Mary 2 | 66 Seats | 1,600 sqft | 2003 |
| Queen's Lounge | Holland America Line's Oosterdam | 166 Seats | 6,200 sqft | 2003 |
| Explorer's Lounge | Holland America Line's Oosterdam | 80 Seats | 2,700 sqft | 2003 |
| Ocean Bar | Holland America Line's Oosterdam | 144 Seats | 3,200 sqft | 2003 |
| Crow's Nest | Holland America Line's Oosterdam | 280 Seats | 7,050 sqft | 2003 |
| Ebony Cabaret | Carnival Glory | 425 Seats | 7,310 sqft | 2003 |
| Ivory Club | Carnival Glory | 147 Seats | 4,000 sqft | 2003 |
| On the Green | Carnival Glory | 55 Seats | 1,100 sqft | 2003 |

**Cabaret Lounges** [Audio – Video – Lighting – Effects System Design And Commissioning]

| | | | | |
|---|---|---|---|---|
| Salone Giardino Isolabella | Costa Mediterranea | 355 Seats | 6,294 sqft | 2003 |
| Piazza Casonova | Costa Mediterranea | 286 Seats | 8,445 sqft | 2003 |
| Salone Orientale | Costa Mediterranea | 117 Seats | 4,841 sqft | 2003 |
| Lounge Talia | Costa Mediterranea | 90 Seats | 2,657 sqft | 2003 |
| Queen's Lounge | Holland America Line's Zuiderdam | 166 Seats | 6,200 sqft | 2002 |
| Explorer's Lounge | Holland America Line's Zuiderdam | 80 Seats | 2,700 sqft | 2002 |
| Ocean Bar | Holland America Line's Zuiderdam | 144 Seats | 3,200 sqft | 2002 |
| Crow's Nest | Holland America Line's Zuiderdam | 280 Seats | 7,050 sqft | 2002 |
| Degas Lounge | Carnival Conquest | 425 Seats | 7,100 sqft | 2002 |
| Vincent's | Carnival Conquest | 81 Seats | 2,100 sqft | 2002 |
| Blues | Carnival Conquest | 100 Seats | 1,300 sqft | 2002 |
| Gauguin's Bar | Carnival Conquest | 55 Seats | 1,000 sqft | 2002 |
| Alfred's Bar | Carnival Conquest | 147 Seats | 4,300 sqft | 2002 |
| Firebird Lounge | Carnival Legend | 348 Seats | 6,000 sqft | 2002 |
| Atlantis Lounge | Carnival Legend | 85 Seats | 2,800 sqft | 2002 |
| Dreamtown Bar | Carnival Legend | 67 Seats | 1,300 sqft | 2002 |
| Satchmo's | Carnival Legend | 135 Seats | 2,100 sqft | 2002 |
| Billie's Bar | Carnival Legend | 106 Seats | 1,500 sqft | 2002 |
| Butterflies Lounge | Carnival Pride | 350 Seats | 6,700 sqft | 2001 |
| Starry Night | Carnival Pride | 140 Seats | 2,600 sqft | 2001 |
| Perfect Game Bar | Carnival Pride | 65 Seats | 1,440 sqft | 2001 |
| Ivory Bar | Carnival Pride | 106 Seats | 1,719 sqft | 2001 |
| Versailles Lounge | Carnival Spirit | 348 Seats | 6,670 sqft | 2001 |
| Club Cool | Carnival Spirit | 135 Seats | 2,657 sqft | 2001 |
| Champions Bar | Carnival Spirit | 67 Seats | 1,436 sqft | 2001 |
| Shanghai Bar | Carnival Spirit | 106 Seats | 1,721 sqft | 2001 |
| Adriatic Lounge | Carnival Victory | 425 Seats | 7,100 sqft | 2000 |
| Black & Red Seas Lounge | Carnival Victory | 85 Seats | 2,150 sqft | 2000 |
| Irish Sea Bar | Carnival Victory | 100 Seats | 1,200 sqft | 2000 |
| Salone delle Feste Corallo | Costa Atlantica | 326 Seats | 6,057 sqft | 1999 |
| Piazza San Marco | Costa Atlantica | 32 Seats | 1,678 sqft | 1999 |
| Bar Fortuna | Costa Atlantica | 22 Seats | 280 sqft | 1999 |
| Piazza Madame Butterfly | Costa Atlantica | 255 Seats | 7,413 sqft | 1999 |
| Balconata Atlantica | Costa Atlantica | 156 Seats | 4,174 sqft | 1999 |

**Architectural Lighting**

| | | | |
|---|---|---|---|
| HP Manhattan VCS Room | New York, NY | 340 sqft | 2005 |
| Bellagio Men's Façade Remodel & Shoe Retail | Las Vegas, NV | 3400 sqft | 2005 |
| US Senate Hearing Room * | Washington, DC | 2200 sqft | 2005 |

**Multimedia Facilities**

| | | | |
|---|---|---|---|
| Sea Side Theatre | Carnival Freedom | n/a | 2007 |
| Movies by the Pool | Costa Concordia | n/a | 2006 |

| | | | |
|---|---|---|---|
| Sea Side Theater | Carnival Liberty | n/a | 2005 |
| Long Beach Cruise Terminal | Long Beach, CA | 30,000 sqft | 2003 |
| Hewlett-Packard Executive Briefing Center * | Cupertino, CA | Kaleidoscope Productions | 2001 |
| MTV Studios Asia | | 1200 sqft | 1995 |
| Singapore Broadcasting Corporation | | Various Large Studios | 1993-94 |

**Entertainment System Commissioning** (Design By Others)

| | | | | |
|---|---|---|---|---|
| Queen's Lounge | Holland America Line's Amsterdam | 558 Seats | n/a | 2000 |
| Show Lounge | Holland America Line's Zaandam | 560 Seats | n/a | 2000 |
| Frans Hal Show Lounge | Holland America Line's Volendam | 557 Seats | n/a | 1999 |
| Wajang Theatre | Holland America Line's Volendam | 217 Seats | n/a | 1999 |
| Crow's Nest Lounge | Holland America Line's Volendam | 250 Seats | n/a | 1999 |
| Explorer's Lounge | Holland America Line's Volendam | 89 Seats | n/a | 1999 |
| Hollywood Dance Club | Carnival Triumph | 211 Seats | 4,200 sqft | 1999 |
| Club Rio | Carnival Triumph | 425 seats | 7,100 sqft | 1999 |
| Venezia | Carnival Triumph | 85 Seats | 2,150 sqft | 1999 |
| The Big Easy Bar | Carnival Triumph | 100 Seats | 1,200 sqft | 1999 |
| Rome Lounge | Carnival Triumph | 1400 Seats | 13,700 sqft | 1999 |

*Feasibility study

*For more information on recent and current projects, visit our website at www.n-e-d.com*

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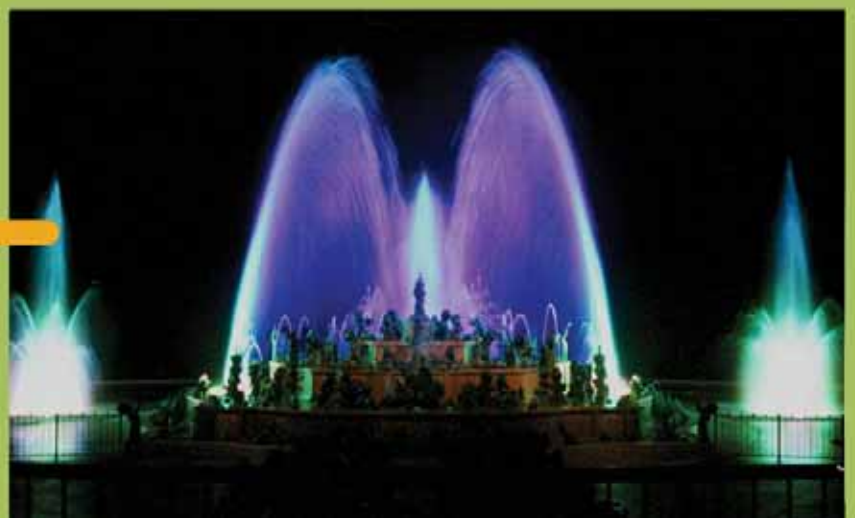
# ARCHITECTURAL & THEMED ENTERTAINMENT DESIGN

Precious Moments Fountain and Water Show / Carthage / MO



Nautilus Entertainment Design provides innovative design solutions for architectural lighting and themed entertainment environments, including lighting, sound reinforcement, rigging, film/video projection, special effects and broadcast systems.



Silver Star Hotel / Philadelphia / MS / Architectural Lighting Design

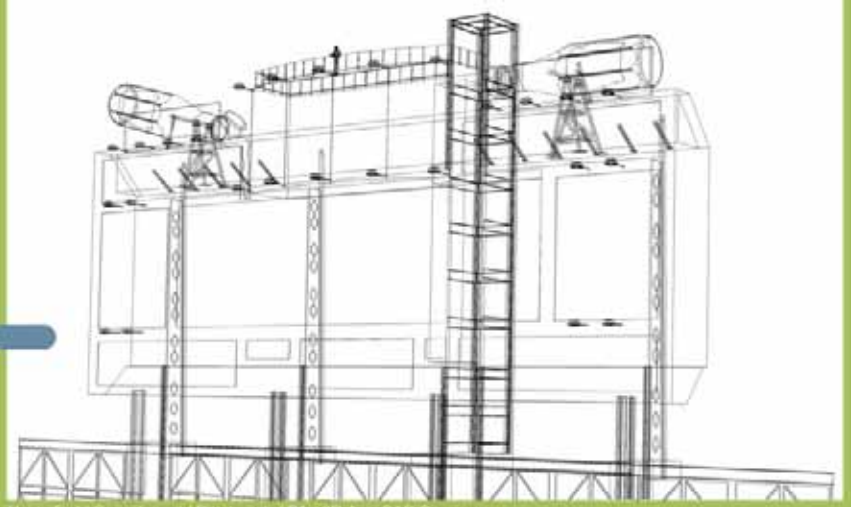


Macau / China Handover Ceremony Center / Architectural Lighting Design

## TYPICAL SERVICES

- Sensitivity to maintaining the architectural integrity of a space while precisely selecting the technologies required to meet the production and design goals for that space.
- Seamless integration of the various specialized entertainment systems.
- Rapid generation of design possibilities very early in the process in a manner that is concrete and easy to communicate, assuring that the design aspirations are being met.
- Complete drawing packages and fully engineered system designs.
- System budget preparation and cost estimation for accurate bid analysis.
- Project Management on behalf of the Owner throughout the entire process.
- On-site inspection of system installations and complete system commissioning.

# ARCHITECTURAL AND THEMED ENTERTAINMENT DESIGN



Heinz Field Scoreboard / Pittsburgh / PA / 3D AutoCAD Drawing


Heinz Field Scoreboard / Pittsburgh / PA / 3-D AutoCAD rendering

Heinz Field Scoreboard / Pittsburgh / PA / Actual Photo

# ARCHITECTURAL LIGHTING

**Sheppard Mullin Law Office in San Diego, CA**

NED provided specialty lighting design service in conjunction with ID Studios interior design for the new law offices of Sheppard Mullin. The features included column surrounds with hand painted translucent acrylic panels. NED worked with custom lighting manufactures to create 12' high by 36" diameter column covers that were back lit with cold cathode fixtures to create the sense of day light entering the room thru stained glass. NED also designed custom chandeliers for the conference rooms as well as wall features similar to the column designs.

**La Scarpa at the Bellagio Hotel and Casino Las Vegas, NV**

NED worked with WorthGroup Architects to provide lighting design services for the La Scarpa retail space in the Bellagio Hotel and Casino. The la Scarpa is a high end boutique shoe store located in the promenade area of the hotel. The wall treatments were glass tiles in blues and greens, and all of the products were laid out along large serpentine sculptures in a gloss tan finish. The challenge in this product was to create the illusion of the calm in the room and light the product, while still staying within the newly adopted energy regulations. A combination of fiber optic, LED and Fluorescent fixtures were used to achieve the effect.

**United States House Ways and Means Committee Room, United States Capitol, Washington, D.C.**

NED is currently serving as the lighting consultant for the renovation to the House Ways and Means Committee Room. The mandate from the Architect of the Capitol was to develop a feasibility study for adding proper television lighting to this area with minimal impact to the historic architecture of the space. The study also investigated supplemental lighting to cover the entire room in the event that this space is ever used as a temporary home for the entire House of Representatives.

**United States Senate Chamber, United States Capitol, Washington, D.C.**

NED is currently serving as the lighting consultant for a re-design of the architectural and television lighting for the U.S. Senate Chamber. The Architect of the Capitol has approved the first phase of the detailed design for this project, which includes the development of specifications and drawings for new cove lighting. The new system will result in a dramatic reduction in power consumption while providing increased illumination with color balance for television.

**United States House of Representatives Chamber, United States Capitol, Washington, D.C.**

NED worked as the lighting consultant with the architectural firm Beyer, Blinder & Belle to develop a feasibility study for a historic restoration of the House of Representatives Chamber. This study incorporated new architectural and television lighting for both daily use and broadcasted events. As part of this study, NED developed conceptual drawings and estimates of lighting fixtures, lighting control and power consumption.

**8426 Sunset Blvd, Los Angeles, CA**

NED provided lighting design services in conjunction with the Executive Architect, David Denton, AIA. This project was conceived to integrate the existing architecture of this public plaza with a new café and newsstand to create an attractive environment for the public. NED created a lighting design concept to enhance the existing architectural features of the location, while at the same time considering the practical and safety needs of the area. A major portion of the project included a huge JumboTron screen to be used for advertising at the top of one of the buildings. NED provided detailed information for the project including fixture selection with equipment data and specification sheets, as well as design drawings consisting of plans, sections and mounting details.

**Silver Star Hotel & Casino in Philadelphia, MS**

This project involved a variety of spaces including the ballroom and convention center, entertainment lounge, restaurant, atrium and exterior of the Silver Star Hotel and Casino in Philadelphia, Mississippi. NED helped to establish the Silver Star as a creative landmark with unique colors and programmable effects on the exterior of the hotel that could be seen for miles. Drawing on an extensive background in the entertainment industry, NED created an interior architectural lighting design for the live entertainment lounge, as well as the restaurant and waterfall-themed atrium.

**Holland America Rotterdam**

NED designed specialty architectural lighting for the flagship of the Holland America Cruise line, the *M.S. Rotterdam*. This included designs of decorative fiber optic effects with programmable control and the illumination of artwork and displays using both conventional sources and fiber optics.

## THEMED ENTERTAINMENT DESIGN

**Heinz Field Scoreboard, Pittsburgh, PA**

H.J. Heinz Company requested two animated ketchup bottles to sit atop the scoreboard in the new Heinz Field stadium. NED was contracted to design the structures and project manage the construction and installation. NED became involved very early in the design process, developing a number of different options at the request of Heinz. Our 3D drafting and rendering capabilities allowed us to rapidly generate images of the various possibilities and provide views from different locations around the stadium. The NED office in New York provided the project management, while the research, design and drawing packages were created at NED's home office in La Jolla, California. *(See attached article for more information)*

**Fountain of Angels Water & Light Show in Carthage, MO**

The small mid-western town of Carthage, Missouri is home to the 'Fountain of Angels', an open-air music and water production featuring a plaza of large programmable fountains centered around 252 bronze sculptures. The entire plaza comprises an area one hundred seventy feet in diameter and incorporates fourteen different types of water jets including a central fountain that shoots seventy five feet into the air. At the rear of the plaza, there is a giant fan-shaped eighty-foot wide mist screen and a candelabrum comprised of sixty individual jets that create another wall of water. NED created the original lighting design, which consisted of underwater fixtures, exterior fixtures and automated fixtures in protective enclosures, which were synchronized with music and the choreography of the fountains. The main lighting positions included two weatherproofed bunkers, two telescoping forty foot lighting towers and two fixed front of house positions. NED was contacted again to provide additional lighting design services for the most recent show, *The Everlasting Promise*. (*See attached article for more information)*

*For more information on recent and current projects, visit our website at www.n-e-d.com*

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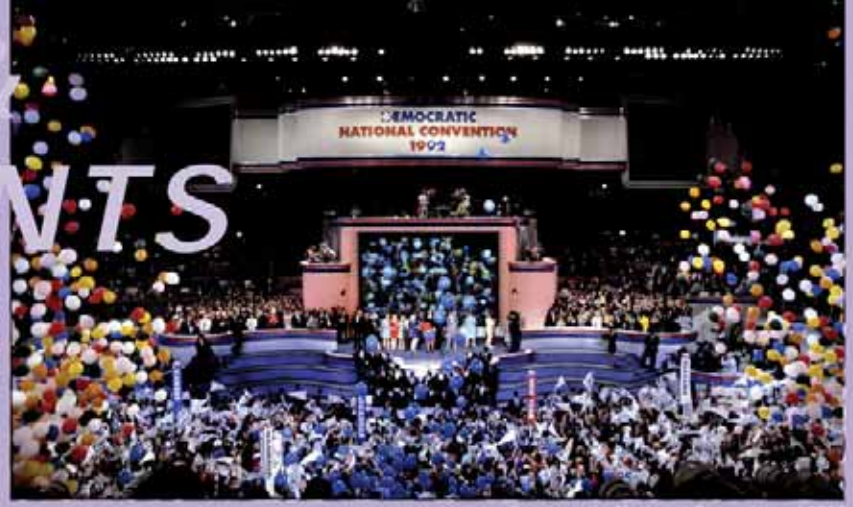
# TELEVISION & SPECIAL EVENTS




Democratic National Convention / 1992

Nautilus Entertainment Design provides lighting design services for live-to-air and taped television shows — as well as live special events — throughout the world. Led by EMMY® award winning designer Jim Tetlow, our team combines years of design and production experience to meet the unique demands of these varied events, as demonstrated by the range of design credits accrued.

100th Anniversary of Stanford University

Republican National Convention / 1996


Nascar Awards Show /1999

Macau / China Handover Ceremony / 1999

2000 Presidential Debates

## TYPICAL SERVICES:

>> Our design team makes use of the latest in rendering technology, giving our staff a method to rapidly generate design possibilities and communicate these abstract concepts in a concrete way.

>> Delivery of detailed plots and equipment schedules. This approach lends itself to the inherently tight schedules and budgets found in television and special events.

>> Experience means we know how to expect the unexpected.

Singapore 25th Anniversary of Independence / 1990

Hong Kong Handover Ceremony / 1997

100th Anniversary of Stanford University

# TELEVISION AND SPECIAL EVENTS

# PROFESSIONAL AFFILIATIONS

American Society of Theatre Consultants, American Society of Lighting Designers, Society of Television Lighting Directors, International Association of Lighting Designers, Illuminating Engineering Society, National Association of Television Arts and Sciences, International Cinematographers Guild- Local 600 IATSE, National Association of Broadcast Employees & Technicians- Local 53

# AWARDS

| | | |
|---|---|---|
| 1990 | EMMY AWARD | Sesame St., PBS |
| 1987 | MONITOR AWARD | "Courting" WED/CMU |
| 1985 | MONITOR AWARD | Muppet Music Video |
| 1982 | EMMY NOMINATION | All My Children, ABC |

# TELEVISION

**POLITICAL EVENTS:**

**2004 Presidential Debates** - Lighting Designer
*Responsible for television lighting for all four debates in different locations*

**2000 Presidential Debates** - Lighting Designer
*Responsible for television lighting for all four debates in different locations*

**1999 Macau Handover Ceremony** - Lighting Designer
*Responsible for television, live stage lighting, and building's architectural lighting for this event*

**1997 Official Hong Kong Handover Ceremony** – Lighting Designer
*Responsible for television and live lighting of both stage and convention hall for this historic event in Hong Kong Harbor*

**1996 Republican National Convention in San Diego, CA** – Senior Lighting Designer
*Responsible for entire convention lighting design including the speaker's rostrum, performance area, delegate, audience, and press areas*

**1993 Presidential Inaugural Balls in Washington D.C.** – Production Lighting Designer
*Responsible for conceptual lighting design and supervision of the lighting for all fifteen inaugural balls and dinners in eleven different locations*

**1992 Democratic National Convention in Madison Square Garden, New York** – Lighting Designer
*Responsible for entire convention lighting design including the speaker's rostrum, performance area, delegate, audience, and press areas*

**1988 Republican National Convention in New Orleans, LA Super Dome** – Lighting Designer
*Responsible for entire convention lighting design including the speaker's rostrum, performance area, delegate, audience, and press areas*

**1984 Republican National Conventions in Dallas, TX** – Lighting Designer
*Responsible for entire convention lighting design including the speaker's rostrum, performance area, delegate, audience, and press areas*

**Singapore Silver Jubilee Spectacular at National Stadium in Singapore** – Lighting Designer

*This show, commemorating the25th Anniversary of Singaporean independence, featured a cast of 15,000 in a stadium mega event*

**AWARDS CEREMONIES:**

| | |
|---|---|
| NASCAR Awards (ESPN) | 1994-1999 |
| Daytime Emmy Awards (NBC, CBS, ABC) | 198, 198, 198, 1990, 1993, 1994 |
| Heisman Trophy Award (ABC, NBC) | 198-198 |

**SPECIAL EVENTS:**

**World University Games Opening Ceremonies in Buffalo, New York**

*Large Stadium show to celebrate the opening of this international sports competition.*

**1992 NBC Broadcast Facilities Summer Olympics in Barcelona** – Lighting Consultant

**100th Anniversary of Stanford University at Stanford Stadium in Palo Alto, CA**

*Large stadium event with three stages and full field production numbers.*

**Singapore Jubilee New Year's Show at National Indoor Stadium in Singapore**

*Large stadium event with live broadcast to all Southeast Asia.*

**50th Anniversary of the Polaroid Corporation at Boston College Stadium**

**CONCERTS & COMEDY SPECIALS:**

Paul Sorvino in Concert (PBS)
Andrew Lloyd Webber's REQUIEM (BBC/PBS)
Harry Chapin Tribute at Carnegie Hall (PBS)
Radio City Music Hall Christmas Spectacular (HBO)
Robert Klein on Broadway (Joe Cates Prod./ HBO)
NBC Super Star Comedy Special (NBC Productions)
The Best of Comic Relief (Moffitt-Lee/ HBO)
Tim Allen – Men are Pigs Tour (Showtime)
Tim Allen – Rewires America (Showtime)
John Mendoza Comedy Special (Showtime)
Luciano Pavarotti Special (NY Locations-Smith Hemion Prod)
I'm Gonna Always Love You, Muppet Music Video (MTV)
Frank Zappa at the Palladium (MTV)
Mink DeVille at the Savoy (MTV)
Ian Hunter in Concert (MTV)
Garrison Keillor 2nd Annual Farewell Special (Disney)
Letterman's Late Night 6th Anniversary Special (NBC)
Live at Dangerfield's (HBO)

**MISCELLANEOUS SPECIALS:**

| | |
|---|---|
| Gullah Heritage | PBS musical and drama special |
| Barbara Walters Special | BarWal Productions |
| Life Magazine's 50th Anniversary Special | ABC |
| Sesame Street at the Metropolitan Museum of Art | PBS |
| Cerebral Palsy Telethon | Pasetta Prod. /CBS |
| Legend of the American Cowboy | Steve Binder Prod. |

**PAGEANTS:**

| | |
|---|---|
| Miss Universe (CBS) | 198-1994 |
| Miss USA (CBS) | 198-1993 |
| Miss Teen USA (CBS) | 198-1993 |
| Miss America Pageant | 198-198, 1990 |

**SERIES:**

| | |
|---|---|
| Live from the House of Blues | TBS |
| The Tonight Show | on location at the MGM, Las Vegas |
| Sesame St. | PBS- selected episodes and re-design |
| Into the Night | ABC - selected episodes |
| ETV (Entertainment Television) | Original lighting design |
| Kate and Allie | CBS- selected episodes |
| The Thorns | ABC - selected episodes |

| | | | |
|---|---|---|---|
| Search for Tomorrow | NBC selected episodes | All My Children | ABC - Switzerland Remotes |
| Comedy Tonight | Metromedia | Live at the Met | PBS - intermission features |

**TELEVISON LIGHTING FOR GOVERNMENT FACILITIES**

**Senate Hearing Room, United States Capitol, Washington, D.C.**

*2004 feasibility study for re-design of the architectural and television lighting. Architect of the Capitol.*

**House Ways and Means Committee Room, United States Capitol, Washington, D.C.**

*2003 feasibility study for adding proper television lighting with minimal impact to the historic architecture of the space. James Posey and Associates, Architects.*

**Senate Chamber, United States Capitol, Washington, D.C.**

*2003 feasibility study for re-design of the architectural and television lighting, including new cove lighting. The new system will result in a dramatic reduction in power consumption while providing increased illumination with color balance for television. Beyer, Blinder, Belle, Architects.*

*2002 oculus lighting upgrade. Architect of the Capitol.*

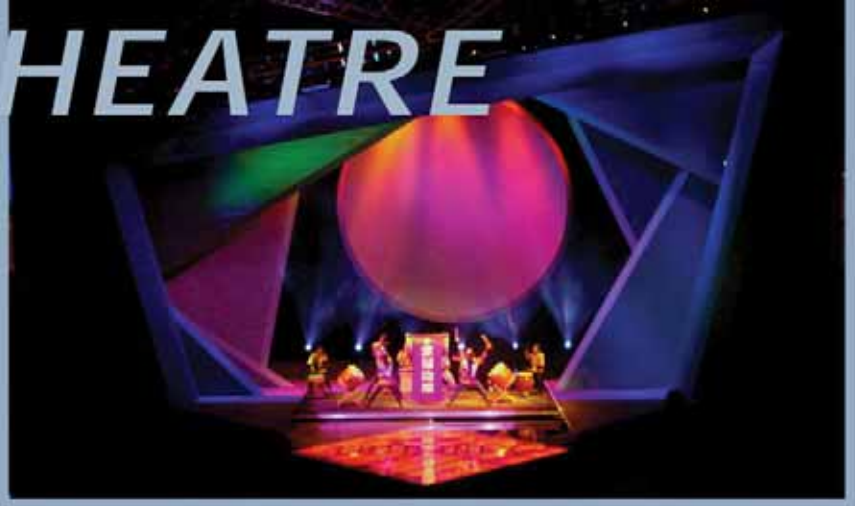
*1998 feasibility study for re-design of the architectural and television lighting. Architect of the Capitol.*

**House of Representatives Chamber, United States Capitol, Washington, D.C.**

*2003 feasibility study for a historic restoration, incorporating new architectural and television lighting for both daily use and broadcasted events. Beyer, Blinder, Belle, Architects.*

*2003 feasibility study for updating architectural and television lighting. Architect of the Capitol.*

# CORPORATE THEATRE & EXHIBITS

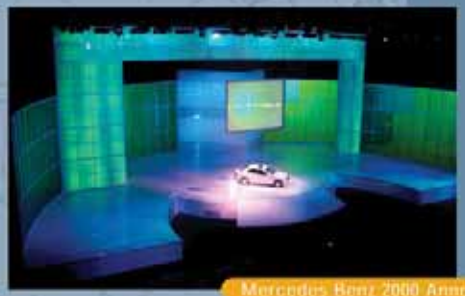


Nautilus Entertainment Design provides lighting design services to the global corporate theatre and exhibit market. Principal designer Jim Tetlow and our award-winning design team interpret our client's production objectives and communicate them to the audience through a precise application of artistry supported by the latest in lighting technology.

Glaxo-Welcome 2000 / Las Vegas / NV



International Truck 2001 Announcement Show / Las Vegas / NV



Mercedes Benz 2000 Announcement Show / Las Vegas / NV

Intel 2002 Developers Forum

## TYPICAL SERVICES

>> Designs for corporate events from sales meetings to new product reveals and exhibits using lighting, projection and effects to build excitement, sustain interest and set tone. A defining characteristic of the NED design team is an ability to deliver visual impact in a timely and cost effective manner.

>> Understanding our client's goals and working within their budget, we design a production that achieves their aspirations and meets their needs.

>> 3D WYSIWYG and other imaging technologies to create, communicate and refine lighting concepts during pre-production.

>> Timely and precise equipment lists and plots, resulting in highly accurate budgeting and labor scheduling.


Infinity 2001 Announcement Show, Museum of Flying / Los Angeles / CA


GM 2000 Press Event / Los Angeles / CA

NATPE Studio USA 2000 / National Association of Television Program Executives


# CORPORATE THEATRE AND EXHIBITS

# CORPORATE THEATRE (selected events)

**2006**

| | |
|---|---|
| GM NAIAS Press Events | Detroit, MI |
| GM Announcement Show | Las Vegas, NV |
| GM SEMA Press Events | Las Vegas, NV |
| GM Product Sneak Preview | Oceanside, CA |
| GM Sneak Preview 3 City Tour | Multi City |
| Intel ISMC | Anaheim, CA |
| Intel IDF Fall | San Francisco, CA |
| Intel IDF Spring | San Francisco, CA |
| HP Tech Conference | Los Angeles, CA |
| HP Facility | Chicago, IL |
| HP Shareowners | Los Angeles, CA |
| HP Hong Kong | Hong Kong |
| HP Shareholder Meeting | San Francisco, CA |
| HP Health Symposium | Orlando, FL |
| HP SAM | New York, NY |
| Toyota Announcement Show | San Antonio, TX |
| Hyundai Detroit Press Events | Detroit, MI |
| Hyundai Press Event | Los Angeles, CA |
| Pepsi Bottlers Show | Las Vegas, CA |
| Audi Tour 2006 | Multi City |
| Walmart Shareholders Meeting | Bentonville, AR |
| Deloitte & Touche | San Diego, CA |

**2005**

| | |
|---|---|
| GM NAIAS Press Events | Detroit, MI |
| Intel ISMC | Anaheim, CA |
| Intel IDF Fall | San Francisco, CA |
| Intel IDF Spring | San Francisco, CA |
| HP Shareowners | Chicago, IL |
| HP Tech Conference | Phoenix, AZ |
| HP Big Bang | New York, NY |
| HP ING Press Analyst Meeting | Half Moon Bay |
| HP NAB Keynote | Las Vegas, NV |
| HP SAM | New York, NY |
| Pepsi Bottlers Show | Las Vegas, NV |
| Daimler Chrysler International | Cannes/Hawaii |
| Daimler Chrysler Announcement Show | Las Vegas, NV |
| Toyota National Dealer Meeting | Chicago, IL |
| RSA Security Conference | San Jose, CA |

**2004-2000**

Daimler-Chrysler Announcement Show, Hewlett-Packard CES Keynote, HP / Compaq Merger Announcement, Hyundai Announcement Show, Infiniti Announcement Show, Intel APAC Tour, Intel Internet Developer's Forum, Intel ISMC, Nissan Announcement Show, Phillips CES Keynote, Sprint CES Keynote, Sprint, Toyota Announcement Show
General Motors Press Event, Glaxo Product Launch, Hewlett-Packard Press Events, Hyundai Announcement Show, Infiniti Announcement Show, Intl Truck Announcement Show, Jeep Liberty Announcement Show, Nissan Announcement Show, Toyota Announcement Show
Chrysler Announcement Show, Chrysler – SEMA Press Event, General Motors Press Event, Glaxo Product Launch, Glaxo Meeting, Hewlett-Packard Meeting, Hewlett-Packard Press Events, Infiniti Announcement Show, Mercedes-Benz Meeting, Mercedes-Benz C-Class Intro, Navistar Meeting, Nissan Announcement Show, PepsiCo International , Toyota Announcement Show

**1997-1999**

Partial Client List
Chrysler, Compaq, Glaxo Smith Kline, Honda, Hyundai, IBM, Infiniti, Jeep, Mercedes-Benz, Nascar, NATPE, Nissan, Porsche, Toyota

# THEATRICAL PRESENTATIONS

| | |
|---|---|
| Carnival Cruise Lines | DESTINY, IMAGINATION, HOLIDAY, FASCINATION, SENSATION, INSPIRATION, CELEBRATION, ECSTASY |
| "Beyond Belief" | Sun City, South Africa (current production) |
| "Enter the Night" | Stardust Hotel, Las Vegas 1991-1999 |
| "Folies Bergere" | Tropicana Hotel, Las Vegas (relighting of selected scenes) |
| "Night Dreams" | Dunes Hotel, Las Vegas |
| "Shoji Tabuchi Show" | Branson, Missouri (Summer & Christmas productions) 1992-2007 |

# EXHIBITS

| | |
|---|---|
| Apple Exhibit | COMDEX |
| AT&T Exhibit | EPCOT Orlando, FL |
| Chrysler (2 locations) | SEMA, Las Vegas |
| GM (3 locations) | SEMA, Las Vegas |
| GM NAIAS 2007 | Detroit, MI |
| Hewlett-Packard | COMDEX Las Vegas, CES Las Vegas |
| IBM | COMDEX |
| Mercedes Benz | Detroit, Chicago & Los Angeles Auto Shows |
| Paramount Television | NATPE, New Orleans, Las Vegas |
| Paramount/Viacom | Los Angeles |
| Phillips Broadcast Products | NAB |
| Porsche | Los Angeles Auto Show |
| Sony Broadcast Products | NAB |
| Spruce Goose Airplane Exhibit | Long Beach, CA |
| Universal Pictures Television | NATPE, New Orleans, Las Vegas |

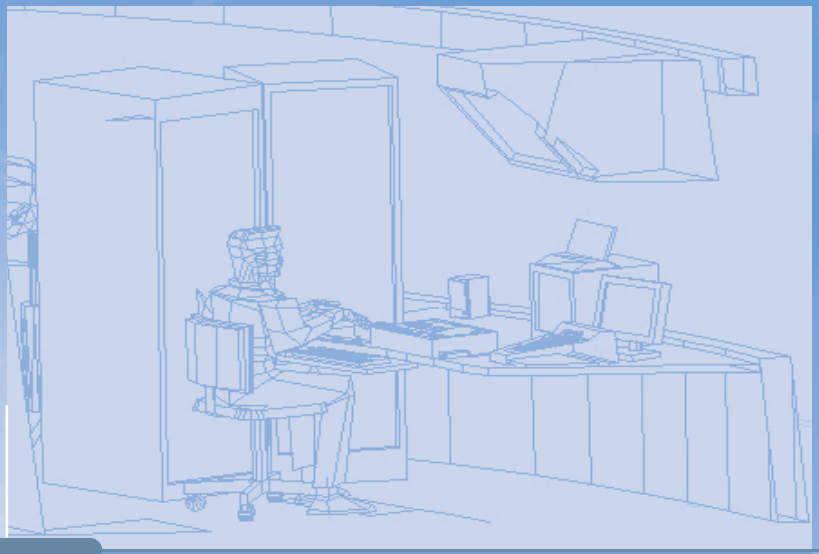
# CORPORATE PRODUCTIONS ON TAPE and FILM

AT&T, Bank of America, Toyota, Gulf Oil, Alcoa, U.S. Steel, Westinghouse, Xerox, Stouffer Foods, and IBM

For information on recent and current projects, visit our website at www.n-e-d.com

Nautilus Entertainment Design, 1010 Pearl St., Suite 3, La Jolla, CA 92037. Phone: 858-456-6395 Fax: 858-456-6396

# ADDITIONAL INFORMATION



Mercedes Benz 2000 Announcement Show / Las Vegas / 2000

ENTERTAINMENT DESIGN
the art and technology of show business
Reprinted from June 2002

# Q&A With Cruise Ship Guru Jim Tetlow

JIM TETLOW

*Lighting designer Jim Tetlow became interested in theatre in high school, where the auditorium was also the local civic theatre and the home of the Great Lakes Shakespeare Festival, in the early 1970s. There he also met several faculty members from the Carnegie Mellon Drama Department who spent their summers at the Festival. Tetlow applied to CMU, was accepted, and graduated in 1977. Today he is the principal of Nautilus Entertainment Design in La Jolla, CA, a company that handles the lighting design for over 40 shows a year, from television to corporate presentations, and designs the entertainment spaces for cruise ships. Ellen Lampert-Gréaux, checks in with Tetlow about his take on new trends in entertainment technology on the high seas.*

**Ellen Lampert-Gréaux:** How did cruise ships enter your life?

**Jim Tetlow:** In 1992, the production team from Carnival Cruise Lines saw *Enter the Night*, a show I did at the Stardust in Las Vegas. They asked me to meet with them on a short cruise from Miami to discuss the possibility of lighting some of their shows. At this point I didn't even know that there were theatres or shows on ships. I met with them, we hit it off, and I proceeded to light several shows for them on both new and retrofitted vessels. In 1994, they asked if I could provide input on a new class of ship, as they had never been satisfied with the equipment originally supplied with a ship. This was the Carnival Destiny, the first 1,000-seat theatre at sea with a three-deck-high auditorium and a four-deck-high flyloft. I started by consulting on just the lighting but in the course of the project picked up aspects of the rigging, stage machinery, and special effects. Following Destiny, CCL asked me to handle all of the entertainment consulting and that is when I built this into a larger business.

**ELG:** What are your most recent cruise ship projects?

**Tetlow:** The short answer is 'all new construction for CCL, Costa, Holland America, and Cunard.' The longer answer is that we have 12 ships scheduled to be delivered by 2005 from five different shipyards in Italy, Finland, and France, with options for several more. At any one time we are either in design, construction, or commissioning of approximately six ships. Beyond functioning as the theatre consultant for the major entertainment venues, we also design the lighting, audio, video, and special-effects systems for all public areas and crew recreation areas onboard the ships. There are typically 20 to 24 such areas, including bars and lounges, discos, restaurants, and spas, in addition to the theatres. We also track the project in what could be best described as project management on behalf of the owner, in that we follow progress and perform periodic inspections. We also work to ensure that there are no conflicts with other systems being installed and to avoid budget overages. When the systems are ready for testing, we have a team inspect and commission all of the systems with a protocol that we have developed. Any defects or comments are recorded in a 'punch list' database and we work with the shipyard and their contractors to clear this list prior to the ship's delivery.

**ELG:** Is there a specific project or part of a project that is especially interesting or unusual in terms of technology or design at sea?

**Tetlow:** For several years the challenge was to install as much technology as possible into the theatres in support of the entertainment productions. I think that we have reached the saturation point and I would be hard pressed to name any land-based facilities other than some of the Cirque du Soleil theatres that contain as much technology.

Now, I think the interesting work is in unique spaces such as the Queen Mary 2 Auditorium. This is a steep two-deck-high multipurpose space intended for live music performances, speeches and conferences, 35mm film, video, and television production. It also contains a planetarium with a dome that lowers from the ceiling to envelop the center 100 seats. We have designed a sound system that supports live performances in addition to cinema surround sound, 35mm, and four video projectors, and a lighting system that can support live contemporary performances, classical music, and corporate-type presentations.

**ELG:** How do ships integrate entertainment spaces successfully and what are the biggest challenges in doing so?

**Tetlow:** One of the obvious limitations is available space and almost any public area has to have multiple uses. This means that the theatre has to support not only the live variety production with 14 dancers, but also daily bingo games, a big-band dance set before dinner, shore excursion briefings during the day, and a late-night comic. Because all of these functions will take place in one place, there must be adequate storage and sufficient technical systems. Unfortunately, there is precious little storage space onboard a ship, especially the backstage wings, which are limited by the width of the hull and emergency egress issues. A specific answer would have to be on a case-by-case basis, but suffice to say that the backstage layout and booth layouts are very tight and the solutions have been arrived at through experience.

Another known limitation is the crew intended to operate the equipment. For the theatre, Carnival has one lighting tech, one sound tech, and a stage manger who operates the rigging system. Stagehands to move scenery and the followspot operators are not entertainment personnel and have normal shipboard assignments such as deckhands, stewards, and waiters. This is one of the reasons that a high level of automation is used and that the booth layout is critical. We have been designing our booth layouts in 3D recently and the information is priceless. Not only can you see any conflicts in spacing but also you can see the stage and all of the equipment from the operator's point of view.

**ELG:** What is the future of entertainment design and technology at sea? Any trends we should keep our eye on?

**Tetlow:** Incrementally, the future will include more networked systems. We are modifying the lighting DMX distribution on most of our new ships to be distributed over ethernet, allowing much more flexibility. I expect to see the same with the audio and video systems as well.

On a larger scale, I think that the future will be in more unique spaces such as the QM2 auditorium and in expanded video production facilities. I would not be surprised to see in the near future a ship with a 3D Imax theatre, or a video equivalent. A multipurpose area could be designed with arena seating that could work for a variety of functions. If you look at the onboard requirements as a challenge or opportunity instead of a restriction, I think that there are a lot of unique spaces that could be created. ED

# Hewlett Packard Exhibit
# International Telecommunications Union Conference
# Hong Kong 2006

Nautilus Entertainment Design Lights Hewlett-Packard

Looks are deceiving; this project looks like a permanent architectural installation, but it's actually the Hewlett-Packard stand at ITU Hong Kong in December 2006. With approximately 9150 square feet of space, the ground floor housed an exhibit of HP products and technology, while upstairs had extensive conference rooms and a hospitality cafe. The design team opted for an approach that would make visitors feel they were in an actual architectural environment, not on a trade show floor. The conference rooms were generous; there were seven with seating capacity of 10 and three with capacity for six. The hospitality area seated over 40 people for refreshments. The space supported a fully functional kitchen, 17 reception desks, a VIP reception desk with coat check space and a fully integrated air conditioning system.

The Hewlett-Packard exhibit at ITU represents an increasingly common trend toward design and execution at a truly global scale. Produced by the London office of Kaleidoscope Productions, under the direction of Mike Paxson, the stand was designed by H Studio, also in London. The lighting was co-designed by Nautilus Entertainment Design of LaJolla, CA and Andrew Gardner of the U.K. The primary illumination for the stand was a combination of both custom and standard architectural fixtures, with suppliers located throughout Hong Kong and China.

The exterior of the structure consisted of large glass panels screened with small frosted dots, lit with 60 HMI PARs to create a varying opaque/translucent effect. The ground floor exhibit environment was designed with a glossy black floor and ceiling, making the HP products and graphics the dominant visual elements. This area was illuminated primarily with halogen track lighting for flexibility, with general lighting by recessed halogen downlights.

The upper floor hallways and hospitality café were lit with 25 custom cylindrical pendant fixtures that combined linear T5 fluorescent lamps, circular fluorescents for uplighting the ceiling and a single halogen downlight. Additional accent lighting was provided by custom wall-mounted dual head halogen fixtures.

The conference rooms were lit with T5 recessed cove lighting, track-lighting wall accents and recessed halogen downlights over the conference tables.

Overall, the equipment totals included 636 linear meters of T5 fluorescents, 28 compact fluorescents, 184 recessed halogen fixtures 35 surface-mount spotlights, and 150m of track, with 231 halogen trackheads. Supporting this were 96 dimmed and 99 non-dim circuits, with 22 battery backup emergency circuits. The architectural lighting was supplied and installed by Hong Kong Lighting Limited under the direction of Andrew Li. The rental lighting package of HMI PARs and associated rigging was provided by Easy-Lite of Hong Kong, represented by Reedy Sung.

The Nautilus Entertainment Design team included principal Jim Tetlow, lighting designer Kurt Doemelt, and associate designers Will Cooper-Daub and Soo Hong. Tetlow commented on the project: "We have worked with Kaleidoscope on many projects over the past decade. This project was unique due to the integrated use of architectural and exhibit lighting. The environment designed by H Studio required architectural lighting solutions, while the budget and schedule were for a temporary exhibit. We were fortunate to work with some excellent designers and contractors who shared our enthusiasm in creating a unique presence for Hewlett-Packard."




# HP Hong Kong
# December 2006

NAUTILUS
ENTERTAINMENT DESIGN INC.

# CRUISE TERMINAL AT LONG BEACH

*Article by NED April 2003*

Nautilus Entertainment Design's successful history of designing and commissioning entertainment systems for Carnival Corporation's new cruise ships led Carnival to involve NED in the development of their first privately owned seaport. Located in Long Beach, California next to the historic Queen Mary and situated within the world's largest geodesic dome, formerly the home of the Spruce Goose, Carnival enlisted NED originally to design the local audio and video systems as well as a small Closed Circuit Television (CCTV) system to cover the needs of the Port Security force hired to monitor the facility. NED's role was later expanded to include coordinating and designing the various security, emergency duress, visual call, and intrusion detection systems for the U.S. Immigration and Naturalization Services and U.S. Customs Services, now consolidated within the newly formed Department of Homeland Security.

The inherent acoustical properties of working within a dome presented several design challenges for NED's lead audio designer, Alan Edwards. "Our primary goal was to maximize intelligibility of the paging system, throughout the facility" says Edwards, "As well as provide a system that would sound good playing background music". A dome creates many audible reflections. "We had to work towards a system which controlled the dispersion of the audio to a narrow vertical coverage, limiting how much reflection occurred off the dome." A combination of full-range column-array loudspeakers and digital signal processing provided the necessary components to achieve this goal. To accomplish the task of paging, a telephone interface with a digital message recorder was employed. This combination allows for flexibility of paging from any telephone location within the facility while the digital message recorders eliminate the possibility of feedback. Additionally, the digital message system reduces the confusion that occurs when a person hears themselves at the same time as they are making the announcement and also allows for stacking of messages to eliminate page collisions.

The video information system requested by Carnival was to consist of a series of forty-two inch plasma screens positioned in strategic locations around the facility. Carnival's internal Video Services department handled the video content while NED handled the technical design of the system and coordination of the installation and commissioning. The sleek, low-profile plasmas were favored by the architects as an attractive artistic addition to the facilities overall look. Passengers are given critical information such as boarding requirements and ticketing instructions through video displayed on the plasma's in conjunction with an audio track distributed to the speaker system.

Post-911 security concerns caused NED's role in the CCTV system design to expand from merely designing the building security system, to include all requirements and coordination to meet the strict government regulations of the U.S. Immigration and Naturalization Services and the U.S. Customs Services. In the aftermath of September 11th, the government has continually been updating its security requirements for all facilities including seaports and airports. Extensive new regulations have been published which have proven to be not only mandatory for future projects, but have become retroactive for projects that were already under construction. The Cruise Terminal at Long Beach proved to be one such project. NED's role was expanded to include the design and coordination of the government's CCTV systems, emergency Duress systems, inter-agency visual alert and call systems, as well as intrusion detection systems. NED worked closely with Carnival and local, regional, and federal representatives of the INS and Customs to develop a system which can be shared between the local security personnel and the government agencies.

Because the Long Beach terminal is considered a private facility, Carnival was not initially given any financial support by the government. Therefore, they mandated NED to develop the required systems to meet or exceed all government requirements while keeping the overall budget at the forefront. The resulting system consisting of a combination 33 fixed and pan-tilt-zoom cameras, digital matrix, and digital recorder, has come together to meet all of the various parties' needs. "Because of the way the systems developed, starting from a relatively simple 16 camera system for security needs, then at a relatively late date, expanding to include all of the government's needs," explains Michael Lindauer who designed the CCTV systems, "We were limited by cabling already installed before the new regulations were released. By creating 3 separate systems, one for Customs' private areas, one for INS'

private areas, and one general system for all public spaces which can be shared by INS, Customs, and Port Security, we were able to keep the costs in line while providing all of the necessary functions."

The terminal project culminated with the Carnival Ecstasy docking for the first time on April 15th to begin the facilities operation. Currently, Carnival plans to make this the home port for two ships, the Carnival Ecstasy and Carnival Elation, both of which operate 3, 4, and 7 day cruises to the Mexican Riviera.

**Design Team:**

| | |
|---|---|
| Michael Lindauer | Project Manager/Design Consultant |
| Alan Edwards | Sound Designer/Design Consultant |
| Carrie Sefcik | AutoCAD Specialist |

*Panoramic View of the Baggage Handling Area*

*Main Ticketing Architecture*

*Main Ticketing Area in Operation*

*CARNIVAL ECSTASY Arriving for Opening Day*

# CRUISE TERMINAL AT LONG BEACH

NAUTILUS
ENTERTAINMENT DESIGN INC.

# HEINZ FIELD SCOREBOARD

*Article by Anne Valentino, NED October 2001*

Nautilus Entertainment Design (NED) has met many interesting challenges over the years, but the one recently presented by Heinz was red hot! In June 2001, the H.J. Heinz Company and the Pittsburgh Steelers announced a 20-year partnership to name their new stadium "Heinz Field." This 65,000-seat venue replaces Three Rivers Stadium and is the new home of the Pittsburgh Steelers and University of Pittsburgh Panthers. The agreement gives Heinz an exclusive platform to promote its brand and products to millions of football fans around the world, according to William R. Johnson, Heinz Chairman, President, and CEO.

To establish their identity in the new stadium, Heinz wanted to use a unique, identifiable icon – specifically their classic ketchup bottle - which is recognized worldwide. Eager to make a definitive statement, Heinz marketers developed the concept of forcing the competition to play "ketch-up football". A variety of different arrangements, sizes and materials were considered during the design process, including an LED display in the shape of a 3D ketchup bottle.

The final decision was to create two semi-3D photo-realistic structures - 35' long, 9' high and 6' deep – in the shape of Heinz ketchup bottles. These devices, which weigh several tons each, sit atop the Sony Jumbotron scoreboards inside the stadium. When the Steelers or Panthers get within the "Heinz Red Zone," otherwise known as the area between the 20-yard line and the goal line, the bottles will tilt downward, the caps will flip up and ketchup will flow downward toward the scoreboard, starting an animation sequence on the Jumbotrons. This is to urge the home team to "pour on" the points. They may also be used when a touchdown is made.

NED was contracted to design the structures and manage the project from the construction through the installation of the signs. The company became involved very early in the design process, developing a number of different options at the request of Heinz. Their 3D drafting and rendering capabilities allowed them to rapidly generate images of the various possibilities and provide views from different locations around the stadium, which was highly valuable because the time frame to design, construct, install and program these devices was very short.

One of the requirements established by Heinz was that the bottles should appear completely realistic, yet animated at certain times during the football games.

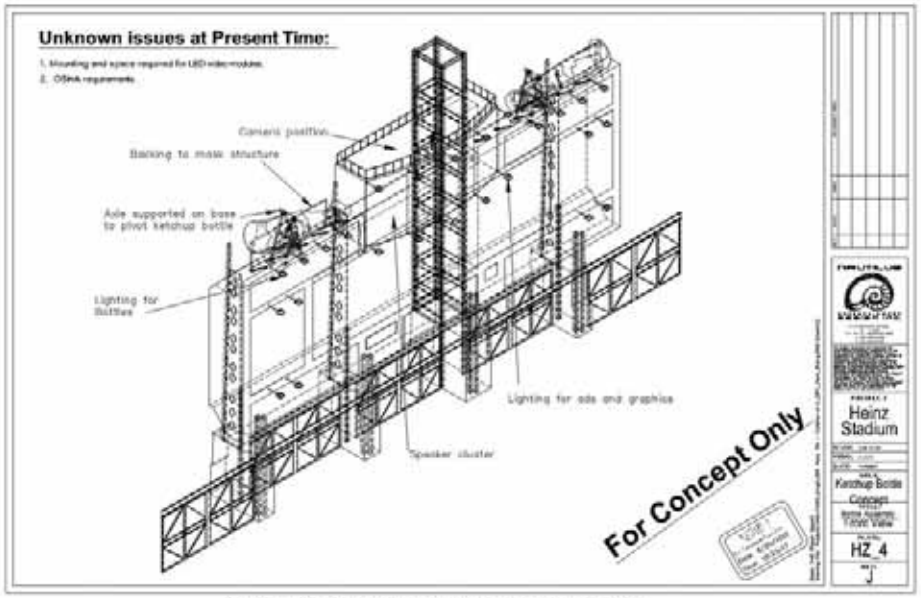
To accomplish this, the bottles are fabricated of red tinted fiberglass resin and internally illuminated with red neon. There are cutouts for the white labels, which are actually light boxes. When tilted, the mouths of the bottles are aligned with LED panels mounted on the face of the scoreboard leading to the Jumbotron displays. The LED panels are programmed to simulate the ketchup pouring out of the bottle and down to the Jumbotron, which then displays additional animation of the entire Jumbotron filling with Heinz ketchup. Young Electric Sign Company of Las Vegas (YESCO), a company well known for many of the Las Vegas casino signs, constructed the signs for the field. While the field has been in use since August, the new icons were seen by the public for the first time on the Monday night football game on October 29th, broadcast by ABC.

The NED office in New York provided the project management, while the research, design and drawing packages were created at NED's home office, located in La Jolla, California. The NED project manager was Bill Havens, who shared the onsite installation supervision with Denis McCubbin. The NED staff provided 3D renderings by Carrie Sefcik.

Michael Doherty, general manager of communications at Heinz Frozen Food Company, who was the company's coordinator for the new stadium commented: "Nautilus was selected to design and manage this project based on their track record and their unique abilities to integrate all of the various technologies that were required on a very tight schedule. Their 3D design capabilities allowed everyone involved to visualize the final product at the very beginning of the design, putting everyone on the same page on a project that could not afford any delays."

**Design Team:**

| | | | |
|---|---|---|---|
| William H. Havens | Project Manager | Denis McCubbin | Installation Supervisor |
| Michael Lindauer | Design Consultant | Carrie Sefcik | AutoCAD Specialist |




*An AutoCAD 3D drawing for the project.*


*A 3D Rendering showing the East view.*


*The finished installation. The bottle caps flip open and LED "ketchup" drips down to begin an animation on the Jumbotron screen.*


*This photo, taken during installation, illustrates the massive size of the 35' foot bottles.*

# HEINZ FIELD
# OCTOBER 2001

NAUTILUS
ENTERTAINMENT DESIGN INC.

# PRECIOUS MOMENTS FOUNTAIN OF ANGELS

*Article by Anne Valentino, NED October 2001*

When Samuel Butcher, the creator of the American figurines and greeting cards featuring Precious Moments, and his sons Jonathan and Don decided to develop an attraction in their home base, they turned to a creative team that included the lighting designs of Nautilus Entertainment Design (NED) for their inspiration.

The small mid-western town of Carthage, Missouri is home to a unique amphitheater that draws tens of thousands of visitors annually. The 'Fountain of Angels' is an open-air music and water production featuring a plaza of large programmable fountains centered around 252 bronze sculptures—some weighing as much as 1,000 pounds each. The action centers on a fountain containing a water jet that shoots 75 feet into the air, surrounded by a cathedral arch and two foam jets that are smaller versions of the main water jet. The water is held in a one hundred thousand gallon underground reservoir; during the peak of the performance sixteen thousand gallons of water are pumped through the fountain per minute. Thirteen pumps with a total of five hundred fifty horsepower force the water through five hundred sixty valves, connected by over two miles of tubing to two hundred sixty water nozzles.

Surrounding the central sculptural display are two Water Castles and two Dancing Water fountains, which are animated with moving water jets. There are four additional foam jets in this area. Finally, at the rear of the plaza, there is a giant fan-shaped eighty-foot wide mist screen, and a candelabrum comprised of sixty individual jets creating another wall of water. The entire plaza encompasses an area 175 feet in diameter.

Jim Tetlow of Nautilus Entertainment Design (NED) created the original lighting design, which consisted of underwater fixtures, exterior fixtures and automated fixtures in protective enclosures. The main lighting positions included two weatherproofed bunkers, which were built into the grade at ground level on either side of the plaza and housed Cyberlight CX units. The bunkers were equipped with temperature controls to keep the fixtures cool and a clear glass window facing the fountains. Two telescoping 40 foot high lighting towers were located in the side bunkers and two front of house positions were used for 1Kw Par 64 Exterior fixtures, using pink, lavender and blue dichroic filters. A weatherproof booth placed for rear-projecting 70-mm film onto the mist screen provided an additional location for backlighting purposes, containing three Cyberlight CX fixtures. Waterproof 1Kw Par 64 and 500w Par 56 units, as well as 75w submersible MR16s, were utilized around and within the fountains themselves. The Par 64s were located at the base of the water effects and functioned as up-lights. These were modified to accept dichroic color filters. The smaller 75w fixtures were used without color to illuminate the statues within the fountain.

In late 2000, NED was contacted a second time to design a new show - The Everlasting Promise. The lighting plot and setting remained essentially the same, except the site was now enclosed, allowing the event to run year round. A new 20-minute musical score was created by Bob Krogstad and recorded by the London Philharmonic Orchestra.

The production begins with a chorus of gospel singers who start the Biblical journey of the world's creation through the birth, death and resurrection of Christ. The singers are only present for the beginning of the production' after their departure, the music, water and lighting tell the story.

In May of 2001, NED associate lighting designer Mia Bane returned to create the lighting for the new production. She worked closely with Michael Connery and his staff at Show Fountains of Houston, Texas, who designed and installed the water effects. Fountain designer Carol Connery and programmer Bob Harvey created the movement of the water in real time to the musical score during exhaustive programming sessions. While they were working, Bane began the task of lighting each of the five songs in the production with about 11 hours of programming time each day.

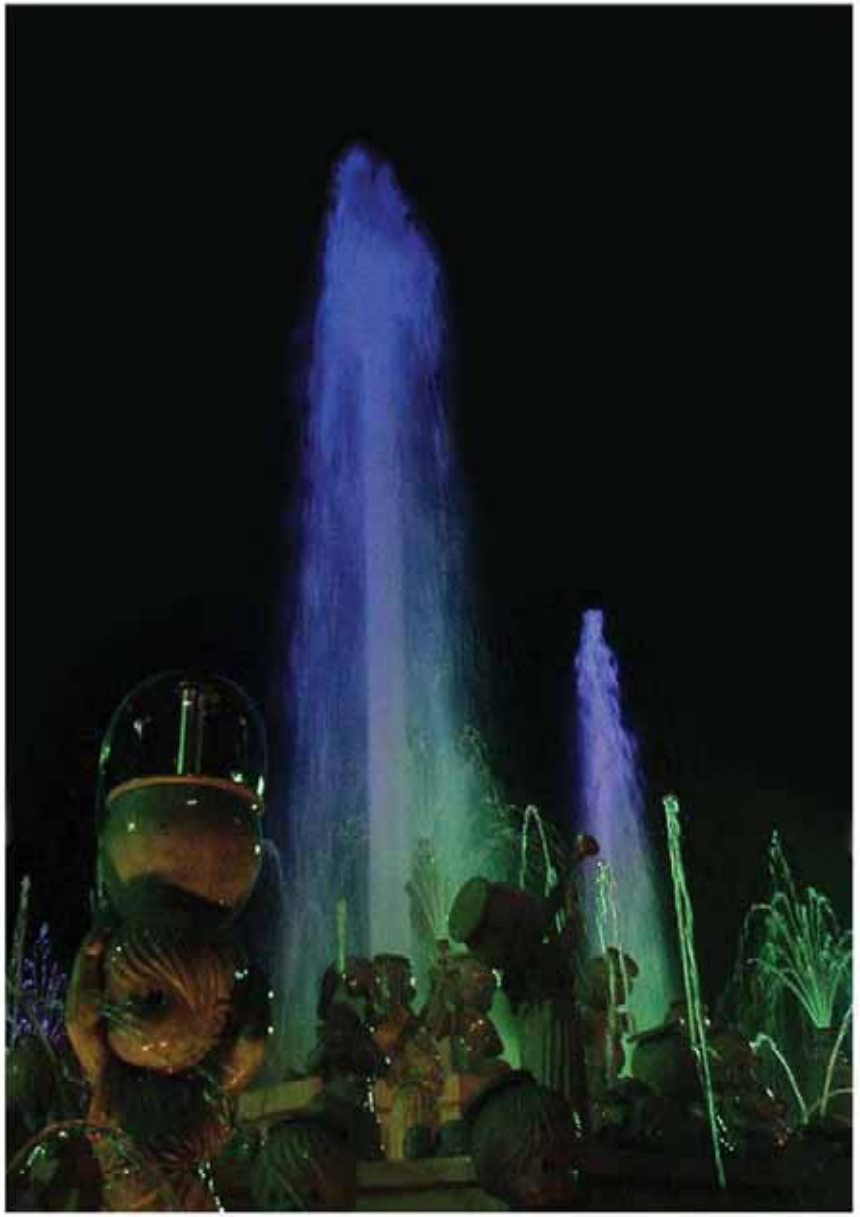
Walter Gundy acted as production manager and line producer for the new production. David Chance programmed the lighting during an early programming session and Brian Howard for the final programming, using an Expression 2X control console and digitizer tablet. NED's Denis McCubbin acted as production electrician, while Fourth Phase managed the installation itself.

**Design Team:**

| | |
|---|---|
| W. James Tetlow | Lighting Designer |
| Mia T. Bane | Associate Lighting Designer |

*A variety of saturated color schemes helped to set the mood for each song. The story of the birth, death and resurrection of Christ required a range from deep sorrow to joy and celebration.*

*The fountain plaza is 170 feet in diameter with seven different types of fountain displays. Here, the central geyser is framed by the cathedral arches. There are two "dancing" peacocks on either side of the main fountain, as well as three water castles and four small geysers.*



*The Precious Moments figurines, seen here in the popular Fountain of Angels show, are well known and loved around the world.*

# PRECIOUS MOMENTS FOUNTAIN OF ANGELS

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# TECHNOLOGY SETS THE STAGE

With popular shows like Cirque Du Solei's "O" and Broadway spectacles like "Aida" and "Lion King," audiences have come to expect increasingly advanced technology in entertainment facilities on land. Likewise, the cruise industry has adapted to meet those expectations on ships. The complexity of technology connected with the entertainment and broadcast systems aboard cruise ships has exploded in the past several years. Most of the main show lounge productions employ high-energy singers and dancers tightly choreographed with high-tech lighting, heart-pounding audio systems, futuristic lasers, moving stages and exploding pyrotechnics. The stage houses are equipped with everything from motorized orchestra lifts, to modular stage lifts, to enormous turntables, to fly lofts packed with automated scenery rigging. Today's cruising audience has grown to expect and even demand such riveting entertainment which, in turn, causes the cruise lines' entertainment personnel to require ever more advanced entertainment systems.

What the passengers do not necessarily expect - but what is becoming more prevalent in ship interior design - is the overflow of this level of entertainment technology into smaller, secondary public spaces. For many years, this technology was something to be hidden behind a wall or in a ceiling as to not interfere with the décor. Now, in many cases, the technology is the décor. As the technology on board expands, so does the need for system designers with experience in both the ship building process and the specialty of entertainments system design. Expanded coordination between these designers and the interior architects is crucial to the success of the overall room designs. Gone are the days when the theatre system designs were lumped into the electrical design of the ship. With the advancement in technology, ship owners are choosing to utilize the extensive knowledge of theatre and entertainment consultants who are familiar with the technology and can create custom systems to meet their specific needs rather than relying on the shipyard contractors to provide a more generic system. Those projects where specialty consultants are involved in the interior planning early in the room design process result in the most visually successful projects.

The "typical" main showroom or main theatre on a new cruise ship is a modern marvel. The stage houses have grown from single-deck, converted lounges to huge, dedicated spaces tailored specifically for the purpose of housing extravagant production numbers. Most include full-height fly lofts, which allow for movement and storage of large scenery and props. Typically, these stage towers are more than double the proscenium opening height and are filled with scenic linesets that would be characteristic of any land-based theatre. The linesets provide a mounting bar - called a batten - to lower or raise scenic pieces into and out of view of the audience. Land-based fly systems rely solely on gravity, but the movement of the ship requires special stabilization of the overhead scenery pieces during ship navigation. Modern stages on ships are typically outfitted with an integrated guiding system to capture both the lineset battens and anything hung on those battens, preventing them from swinging freely. Since their introduction on the first ships with fly lofts in late 1995 (Celebrity Century) and early 1996 (Carnival Destiny), these guidance systems have evolved from simple tensioned wire-rope stabilizers to custom track-and-guide shoe systems integrated into both the ship's structural design and the owner-supplied scenery pieces. The guide systems have become integral to achieving a successful and safe rigging system design.

Mechanized orchestra pits and stage mechanics are also common components of the modern maritime theatre. The pits are typically sized for 8-12 musicians and double as production elements for actors' entrances and exits. Other stage mechanics installed on recent ships include large stage turntables, integrated stage lifts which can extend up to 1m above the stage floor, mechanical step units, and stage tracks for guiding scenic pieces. The addition of stage mechanics such as these have given show designers a tool to reduce the number of large scenic pieces required for each show. The stage lifts themselves can be reconfigured into many different shapes and sizes, becoming part of the scenic platforming.

The impact of entertainment technology on interior architecture is not limited to large stage mechanics. Lighting systems have expanded to include increasingly sophisticated, and therefore larger robotic lighting fixtures. Mounting positions for the instruments must be designed into lighting coves positioned over the audience. The position of these coves is crucial to the effectiveness of the lighting system and must be coordinated closely between the architect and the theatre consultant. Access to the coves is integrated into the ceiling design via a system of catwalks, since the complicated moving fixtures require regular maintenance.

Audio systems place even more demands on the interior design than lighting systems. Today's audio systems utilize large main speaker clusters located near the stage edge with a system of reinforcement speakers to cover areas under balconies, where the main cluster cannot reach. Surround

sound speakers are positioned on all outboard and rear walls for sound-effects and movie playback, and a series of sub bass speakers are placed around the room for uniform distribution of low frequencies.

The mounting of all of these speakers must be carefully coordinated between the interior architects and the audio designer to ensure the speakers can be placed in the necessary locations without sacrificing the integrity of the architectural design. Invariably at this stage the architects, who want all speakers to be recessed out of sight, ask, "Why do you need so many speakers? It does not have to be that loud!" It is a question all entertainment consultants both expect and dread to hear because the explanation is difficult to grasp. Audio designers actually prefer to add more speakers in order to keep the volume DOWN. More speakers in the reinforcement system produce better coverage, thereby allowing the overall level of the sound reinforcement to be kept low. Fewer speakers mean less coverage, undoubtedly leaving some seating outside of the audio coverage area. This forces the audio operators to run the overall system louder to cover the "dead spots" and reduce the passenger complaints.

The key to the design is finding the middle ground between the desire to have even coverage and the opposing desire to keep the ceiling as clean of equipment as possible. It is often possible to recess up to 95% of the speakers within the ceiling, if coordination begins early in the interior design process. This is not merely the coordination of the ceiling shape and materials, but also the HVAC ducting, sprinkler piping, houselighting, PA components, access catwalks and installation methods. In some cases, because there is not enough room above the ceiling to house the speakers, the only choice is to surface-mount the speakers and paint them to match the ceiling décor. In any event, it is the goal of both the architect and the theatre consultant to minimize the impact of the audio equipment on the visual design, while supporting the true purpose of the venue – live productions.

The smaller the venue, the bigger the challenge. An audience member might expect to see speakers and lighting instruments in a theatre - after all, the entertainment is the main focus of the room. However, the same passenger may question speakers in a secondary lounge or bar. Why are they needed in a bar? On ships, space is a valuable commodity and there are very few single-use rooms. Almost all public spaces are used as a combination bar, dance club, art gallery, demonstration area, game show stage and even possibly as a corporate meeting room. As such, all of the related audio and video equipment associated with those uses must be integrated into the spaces – preferably out of sight of the patrons. Because of the size of today's ships (in excess of 100,000 tons and over 300m (1000ft) in length), the days of using only portable equipment are over. Audio/visual crews do not have the time or means to carry pieces of equipment from room-to-room all day, everyday to meet the growing demands of the activities. More and more, this equipment must become a permanent part of the room. In these venues, it is the responsibility of the interior architect and theatre consultant to coordinate the position of various pieces of production equipment to ensure the multiple technical requirements for the room can be met in an unobtrusive manner. Projection screens should be recessed in the ceiling when not used and equipment racks should be hidden in furniture or equipment lockers within the rooms. In the best cases, even connection panels can be mounted behind architecturally matching door panels. This is all in an effort to reduce the visual interruption of equipment in the venue.

With the advancements in video, lighting and general entertainment technology and the explosion of high-tech gadgets in recent years, there has been a marked change in thought regarding the integration of technology into interior designs. In many cases, rather than hiding the technology, the interior architects have chosen to feature it as a part of the décor.

The most common application for this has been in discothèques and dance clubs. Starting with Carnival Destiny, architect Joe Farcus' vision of the disco included walls covered in video monitors of various sizes. To make this vision a reality, the architect had to coordinate with the shipyard's video, HVAC, electrical, and outfitting designers and suppliers, with the Carnival Operations team who use the equipment, and with the entertainment consultant who oversaw the video system's integration with the other entertainment systems in the venue. The coordination paid off and the concept has been successfully carried through to all of the Destiny class vessels including Carnival Triumph, Carnival Victory, Carnival Conquest and most recently Carnival Glory.

In another example of the trend towards featuring technology in interior architecture, the Vista Class of Holland America ships has undertaken the use of new LED (light-emitting-diode) lighting technology as a true décor element. LED products provide a low power, long-life option for both general and effect lighting. To achieve greater flexibility in the nightclub room décor on HAL's new class of ships, architect Frans Dingemans of VFD Interiors set

out to find a way to integrate LED technology into the walls to allow variable ambience in the room by changing the color tone of the walls. Additionally, he sought a way to allow the playback and movement of rudimentary shapes around the venue's exterior walls. Theatre consulting company Nautilus Entertainment Design (NED) was assigned the task of researching and implementing the technology to achieve this goal. After extensive investigation, an LED "dot" product was chosen as the best compromise of price and performance for this particular purpose. The dot was comprised of a red, green, and blue LED constructed in a single point of light. The three-colors could be individually controlled to allow for the mixing of virtually any color. NED and VFD coordinated with the shipyard to integrate over 2000 dots into the architectural walls. Care was taken to design a mounting system that provided easy maintenance and replacement, to ensure the system will remain operational for years to come.

Color mixing LEDs were also chosen as the light source behind Joe Farcus' kinetic decorative ceiling design for the Carnival Glory. Maintaining his theme of "Color," Mr. Farcus sought a way to create a kaleidoscopic effect on the ceilings of certain areas of the public venues including the main atrium and promenade areas. The undertaking required extensive research and coordination by the consultant with the shipyard and their entertainment contractor regarding the construction and programming of the ceiling effect. This led to the successful implementation of the kaleidoscopic ceiling providing an endless combination of vibrant color changing patterns.

It is typical in land based projects for the interior architects to collaborate with theatre consultants and system designers, who in turn coordinate with the shows' production team to determine exactly what technology will be required. The design teams then work together to integrate those pieces into the interior design, along with any additional technical systems that will make the venues flexible for future productions.

However, as anyone connected with cruise ship construction can attest, the established building process does not always support this type of communication - and in many ways - directly competes with this type of design path. Currently naval architects and engineers are forced to define the general spatial allowances of the ships long before anyone from entertainment is brought into the picture. The size, shape and location of the rooms, including the fly-lofts and orchestra pits are set well in advance, in order to evaluate the ship's stability and safety systems, meet applicable safety codes, and establish the total number of revenue-generating cabins. Ideally, the entertainment consultants can begin working with the architects immediately after this stage, establishing basic entertainment requirements of the rooms, while the architects develop their early conceptual interior designs. This collaboration is crucial for a successful installation. However, this step typically occurs well before any show concepts have been developed, and is restricted by the basic room design that has already been completed by the naval architects. In the end, the live productions are generally tailored for whatever technology has been designed into the room, rather than the technology being designed to meet the shows' requirements.

While this process has its flaws, it is a vast improvement over previous methods. The very use of theatre consultants is new to the cruise industry. Prior to the technological explosion in the entertainment industry, the cruise lines would order a ship with "a theatre" leaving the shipyard to define as best they could what was required to meet the Owner's show requirements. However, with the advancement of both the show systems and the shows themselves - and an increasingly demanding and sophisticated audience, it became apparent that this process was no longer sufficient. The entertainment facility consultants who design for modern ships must not only understand the entertainment systems, but it is crucial that they fully understand the shipbuilding process – with its inherent restrictions due to the nature of the maritime environment, the needs of the architect to maintain interior design integrity, and the needs of the production teams that will ultimately use the venue. What is successful on land-based projects will not necessarily be suitable for maritime based theatres. The integration of the specialized entertainment consultant into the design process has resulted in more flexible spaces that can adapt quickly to the changing requirements and ever changing technology aboard modern cruise ships.

-Michael Lindauer, "Performing Magic on Stage," *Cruise Ship Interiors International* (2004, 108)

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*HOLLAND AMERICAN LINE'S ZUIDERDAM - The main lounge serves as the primary venue for musical theatre and variety show perfomances. It is equipped with the lastest lighting, audio, video, rigging, and special effects technology.*

*HOLLAND AMERICAN LINE'S ZUIDERDAM - Low power, long-life LEDs cover the walls in the Northern Lights disco. Individual LEDs can be mixed to any color and used to create patterns.*

*CUNARD LINE'S QUEEN MARY 2 - The multi-purpose Illuminations auditorium has a stage area equipped for cabaret shows or presentations, but the highlight of the room is the world's first planetarium-at-sea, which lowers down over the audience when needed.*

*CARNIVAL VICTORY - Video arrays completely surround the bars and dance areas in the Arctic dsco.*

# TECHNOLOGY SETS THE STAGE

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# Designing Theatrical Rigging Systems When Down Isn't Down

*Article by Michael Lindauer, "Designing Theatrical Rigging Systems for Cruise Ships: When Down Isn't Down," Entertainment Design (June 2002, 26)*

Gravity is one of those things that you take for granted – but there are places on earth where gravity doesn't always work as expected. One such place is the water – we all know that unexpected things happen in the water that seem to defy gravity, but most of us are unaware that these unexpected behaviors can also happen on the water. Normally, this can result in a fair amount of amusement, but there are situations where the ramifications can be dangerous. Such situations occur when moving heavy pieces of scenery or moving live performers at sea. As the entertainment options aboard cruise ships have grown more sophisticated over the past few years, so have the requirements for the stage machinery and rigging systems.

While the design approach to these rigging and stage systems is certainly based on the same principles as land based applications, there are a number of considerations unique to designing for a maritime environment. The majority of these considerations are based around one simple, unalterable fact: The theatre and stage are not stationary – they move. The design team at Nautilus Entertainment Design (NED), responsible for designing the entertainment facilities aboard a majority of the cruise industry vessels currently in development, has become intimate with these issues over the past several years and developed a variety of methods to adapt to the special demands of rigging at sea.

Rigging systems – even the motorized systems that are used exclusively on board ships - make use of the natural acceleration caused by gravity. Due to the pitch, yaw and roll of a ship, maritime rigging installations have to take into account other accelerations caused by this ship movement that can be two or even three times that attributed to gravity. Additionally, land based rigging systems can always use gravity to their advantage. At sea, you can't take gravity for granted. In heavy seas, negative gravity situations can cause things to want to fall up; down isn't always down. Conversely, those same seas can cause things to fall down at a significantly increased rate, which can pound the theatre equipment as if the entire theatre were dropped to the ground from five feet in the air.

This means that the size of the motors and possibly other components must be increased due to this greater force of unpredictable seas. Perversely, while oversized, the components must be as light as possible. Size and space are limited on board ships and weight is an ongoing concern with naval architects. For example, maritime battens are usually made of aluminum, rather than steel. This means the batten weight does not detract substantially from the winch weight capacity, allowing more scenic lifting capability – or reducing winch size if greater capacity is not needed.

Another design consideration is vibration. Most on-board ship theatres are located toward the front of the ship, over the bow maneuvering thrusters. Thrusters are propellers built into the ship's hull, which are used to push the ship sideways during docking procedures. These can be activated as many as three times a day and have the force to cause the entire theatre to tremble. This means that threaded fasteners, a mainstay of land-based rigging, are avoided whenever possible. Painstaking steps are taken with the remaining threaded fasteners to ensure they cannot be worked loose due to the ship's vibrations. Each nut and bolt is inspected during the installation and commissioning procedure and various safety measures – ranging from drilling and pinning, to applying Lok-Tight™ or scoring the threads to prevent the nut from being removed at all - are used to fix the connections.

Because of the gravity situation, low ceiling height and space limitations, most maritime overhead rigging systems are multidrum lineshaft systems with variable speed drive. The flyloft width aboard ships is limited by the space between the two fore/aft hallways on the upper cabin decks. This width is usually slightly greater than the width of the proscenium, generally in the 11m range, with a stage proscenium opening of 9m to 10m. With a multidrum lineshaft, all of the rigging can be contained in the upper ceiling of the flyloft and each lineset controlled by one drive and lifted by one motor. Using a winch system rather than a multidrum lineshaft system would require one winch and motor per lift line – typically 5 to 7 per line set – and then routing all of the lift lines to winch drums. Routing all of the cables around the guide system and other obstructions would be difficult enough, but it would also add more friction

and complexity to the system. Additionally, counterweight systems are ruled out due to the inherent danger of having loose weights carried around in a moving theatre.

Typically, all overhead rigging systems on ships are designed with variable speed motor drives, which allow for smooth accelerations and decelerations. This reduces the shock load during the starting and stopping of the piece attached to the batten. If the sets were fixed speed, it would be very difficult to have smooth transitions or repeated accuracy.

Over the relatively short time that complex rigging systems have been installed on ships, various systems have been developed to stabilize the system components from the movement of the ship. All rigging components must use captured guide systems to maintain alignment - of not only the battens, but also the scenery attached to them. If only the battens are guided, the scenery will swing as a pendulum from the batten. As such, movement throughout full travel must be controlled. As an added concern, not only does the stage move, but the entire theatre and flyloft flexes, expands, contracts and twists as the ship moves through the sea. This means that the guides have to be designed to be tight enough to hold the batten and scenery frame, without being so tight as to increase the friction in warmer areas when the materials expand.

The first systems installed that guided not only the battens, but also the scenery frames were introduced on the Costa Cruise Lines' Atlantica class in 2000. The guide systems are straight forward and similar to land-based counterweight arbor guides. Typically, there is either a T-Guide or channel guide integrated into the ship's steel structure. A mating shoe or roller guide is then designed into the ends of the battens. There are a number of additional issues:

The guide shoe system must be adjustable since the guides are not always installed plum.

The guides and shoes must work with a minimum of friction when the battens are not plumb to the stage floor, as is typical when the ship is moving.

The guide shoes must be durable for a long life span.

The guide shoes must be self-lubricating

The guide channels must be designed to allow for easy and smooth threading of battens and scenery into the guide channels.

Designing orchestra lifts and other stage machinery when space is limited – and there is no ground to dig into – also requires a new approach. There is no space for typical stage machinery lifting systems, usually screw-jack with caissons. Self-collapsing drive chain systems are often the solution. Everything must be low profile and fit within 400mm to 600mm of space in storage, yet extend up to 1.5m above the stage level. The lifts must also be able to drive at up to 300mm (1ft) per second. Additionally, due to the possible negative gravity situation, stage machinery drive systems must be stable in both compression and tension situations. To meet these new constraints, machinery manufacturers have had to alter their land-based designs – which only have to accommodate standard gravity conditions – to be able to handle the constantly changing accelerations, pitch, yaw and vibrations experienced in a maritime theatre. Not only do the stage mechanics need to take into account the movement and gravity, but also the rolling scenery requires tracks built in to the floor as guides and to function as anchors in some cases.

Modern cruise ships have grown to include several different types of stage machinery systems. Most can be found to have large orchestra lift platforms which retract one full deck below the stage for use with musicians as well as choreographed entrances and escapes. Varying types of performance lifts have also been integrated into these ships' stages. Some have large turntables with large mechanical stair case units, which rise out of the stage. Others have multiple self-supported, independent stage lifts capable of rising 1.5 meters above the stage at 300mm/s. All moving lifts are designed with touch-sensitive safeedges at all possible pinch points. When the safeedges sense an object in a potential pinch point, the control system shuts down all mechanics in the rigging system. This requires a visual check and reset before continuing operation of the rigging system. The safeedges are also important components of motorized bandwagons where performers are on and around the wagons as they are moving. If an object or a performer were to obstruct the movement of the wagon, the safety edge would detect the obstacle and stop the movement until the obstruction was removed.

Because so little scenery storage space is available, NED is constantly working with the owners to provide new ways of using integrated stage machinery within the shows in order to reduce the amount of hard scenery required on stage. One example of this is a full stage flying videowall for the new Queen Mary 2, which can be programmed for both static and moving images.

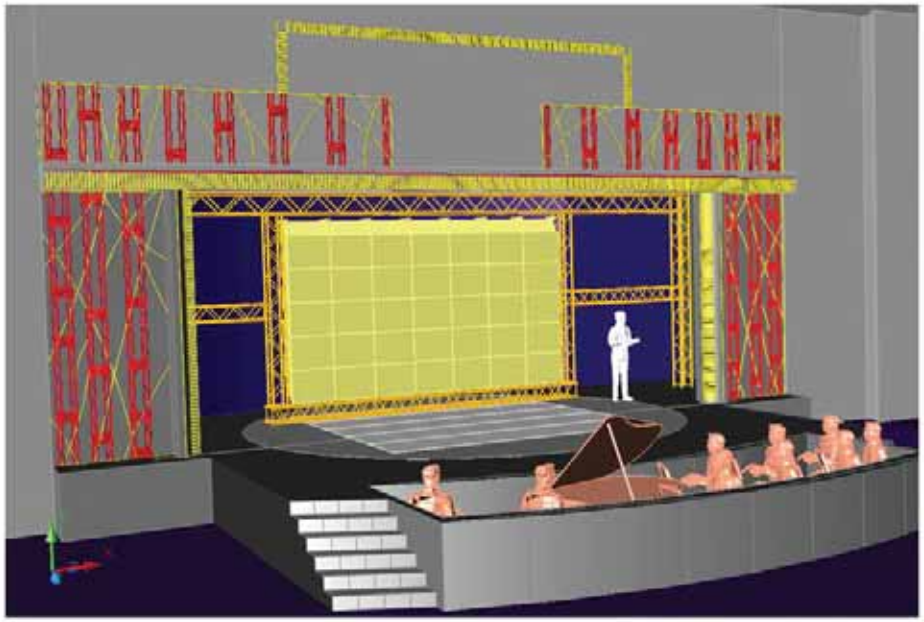
The technical crews are smaller on ships than land-based facilities. A smaller crew means that each technician must wear many different hats. Also, some of the people who act as stage crew may actually only be on loan to the theatre for that evening's performance. Typically, they may have other jobs – as waiters, welders, or stewards– and are used by the technical staff as extra hands to assist running the stage area during large performances. Typically, the only dedicated personnel are a lighting tech, a sound tech and a stage manager who operates the main rigging control system for the large production shows.

The controls systems currently being used on ships have been developed by the manufacturers in conjunction with NED and the owners' requirements in order to provide safe, reliable control of even the most complex moves. Due to the limited personnel, production shows at sea are typically run from SMPTE timecode, so everything is synchronized to a show control system. For safety however, NED does not design systems where SMPTE can actually move any of the rigging pieces. Rather than having the show control system actually execute a lineset or lift move, the SMPTE just loads the rigging cues to the desired playback fader – telling the computer what is supposed to come next - while a stagehand executes the cue after visually verifying that the space is clear and there are no dangers to performers or scenic pieces.

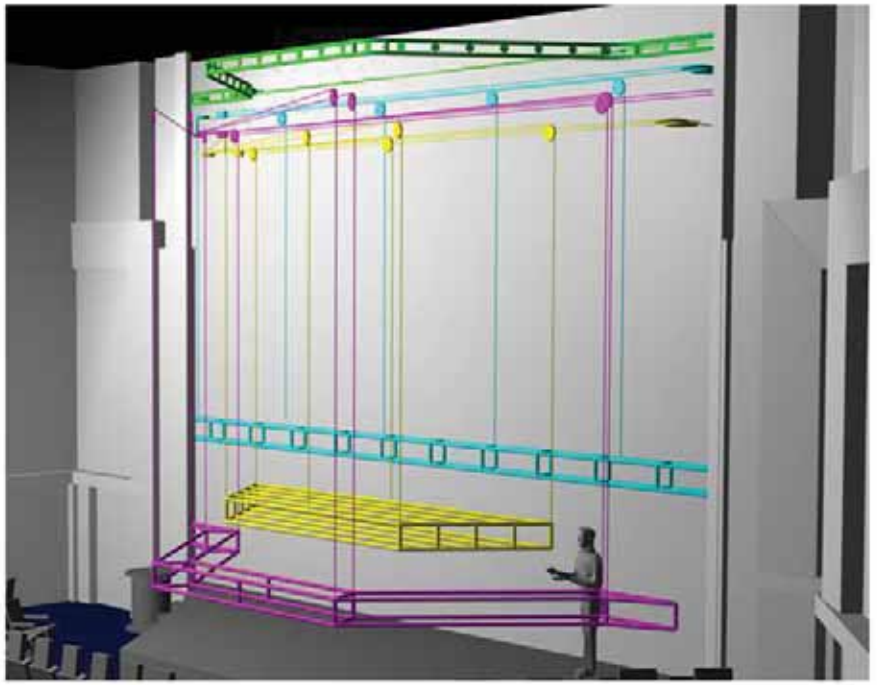
During the development of each ship, the control systems are customized to each space's unique requirements. A system of limit switch interlocks are designed into the control computer to help the computer know where all rigging components are before it allows any piece to be moved. This is something that typically would be done by a live person on a land-based show. Due to the limited experience of the personnel, the computer adds another level of safety – and inevitable complexity.

Regarding safety, the regulatory concerns aboard ships are still evolving. While the entertainment facility design does not fall specifically under anyone's jurisdiction, several different associations require input and approval of the stage machinery designs. The ship's underwriters (usually Lloyd's of London or Italy's RINA) must sign off on the design of anything that moves people or is related to life safety. The United States Coast Guard also has some regulatory responsibilities relating to safety systems and passenger emergency procedures because the ships are registered for US waters.

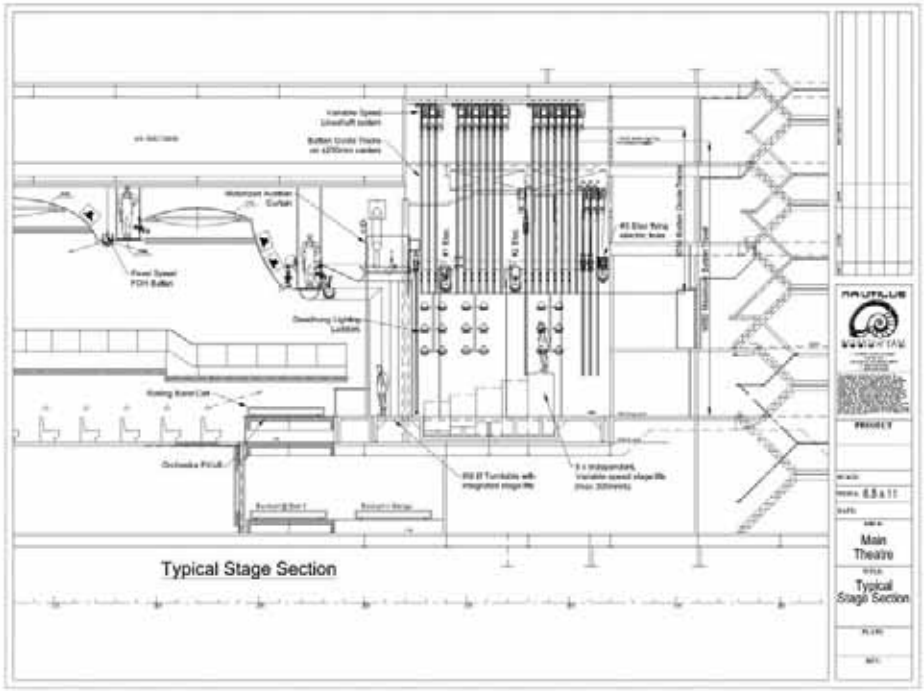
We have seen an explosion in the technology of maritime entertainment facilities over the past decade and the complexity of the issues related to rigging at sea may be a surprise to the uninitiated. The experience NED has gained from designing many of these systems (14 ships in 7 years) and working with the cruise line's entertainment departments has allowed them to evolve their approach, with installations that meet the stringent production demands – while always keeping safety first.



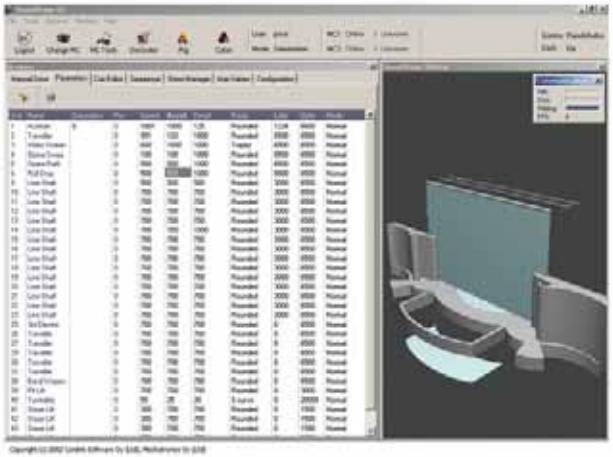
*QUEEN MARY 2 - The Flying Video Wall was designed to be used as a changeable backdrop and was created to compensate for the limited stage depth in this Main Lounge. The rigging guided truss travels 150 mm/second (4 inches/second).*



*QUEEN MARY 2 - Movable Lighting trusses concept in the Auditorium which can be easily lowered for servicing.*




*CARNIVAL PRIDE - This drawing indicates a typical rigging layout with rigid batten guides in the Main Lounge.*



*This "screen capture" is fromMechatronics Oy's virtual staging softwareprogram, which allows users to prewrite cues and rough out programming offline.*

Rigging on the High Seas

# WHEN DOWN ISN'T DOWN

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