DRIVING FLEET EFFICIENCIES

Bringing Fleet Suppliers Together to Deliver Sustainability

October 2-3, 2012
Renaissance Schaumburg Convention Center Hotel
Schaumburg, IL
Efficient refrigeration unit to handle requirements for fresh and frozen compartments on the truck.

Selected an ideal chassis capable of hauling the intended load while conserving the ultimate amount of fuel.

Selected a truck body capable of hauling a typical day’s load without adding additional weight.

Worked with partners to ensure the project was successful using truck expertise & analytical tools.

Deli Express’ Sustainable Future

October 2-3, 2012
Renaissance Schaumburg Convention Center Hotel
Schaumburg, IL
E.A. Sween/Deli Express

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Schaumburg, IL
E.A. Sween Company

- Family-owned since 1955 (3rd generation)
- 900 Employees
- Corporate and Production based in Eden Prairie
- 335 trucks in fleet, ranging from 12,000 to 33,000 GVWR
- 75 trailers (cold storage units)
- 110 cars
3 Main Divisions

CDC – Combined Distribution Centers
Chicago, Dallas, Austin, Denver, Salt Lake City, Las Vegas

Wholesale – Produce and Distribute Food
Private label & Deli Express

Deli Express
#1 selling sandwich in convenience stores across U.S.
75 million sandwiches are sold each year
Deliver DE sandwiches, burritos, bakery items, & food service programs covering 26 states
Service over 26,000 stores & food outlets
The Challenge...

- Reduce TCO
- Maintain 2 temp zones in 1 truck
- Improved driver safety
- Conserve natural resources
- Increased driver satisfaction
What Next?

- Established TCO Baseline
- Gathered Input from Deli Express Managers and Drivers
- Assembled External and Internal Teams
- Reviewed Options (What If?)
- Involved Manufacturing Teams and Engineers
- Formulated Plan and Built Pilot Truck
Current Deli Express Trucks

14’ – 19’ Thermo King
- Temp (adjustable)
- MPG: 8.1
- CPM: $0.91

14’ Walk-in
- 19,000-26,000 GVWR
- CPM: $0.91

MPG: 7.6

20’ Walk-in
- 26,000 GVWR
- Temp w/blower
- CPM: $1.10

16’ Reach-in
- 19,000-26,000 GVWR
- Frozen only
- MPG: 9.2
- CPM: $0.88

14’ – 19’ Thermo King
- 19,000-26,000 GVWR
- 1 temp (adjustable)
- MPG: 6.9
- CPM: $0.95

14’ Walk-in
- 19,500 GVWR
- Temp w/blower
- MPG: 7.6
- CPM: $1.10

20’ Walk-in
- 26,000 GVWR
- Temp w/blower
- MPG: 6.9
- CPM: $0.95
Introducing the New ECOMAX Truck

- 13’6” Reach-in
- 12,000 GVWR
- 2 temp – both adjustable

- MPG: 15.0 CPM: $0.72

- MPG: 9.2 CPM: $0.88
- MPG: 7.6 CPM: $1.10
- MPG: 6.9 CPM: $0.95
- MPG: 8.1 CPM: $0.91
ECOMAX Driver Comments

“Love the size.”

“Everything is within reach.”

“Love the fact that I can stay safely on the ground.”

“The truck is great, it is so much easier on my back!”

“Easy to maneuver in tight spaces.”
**ECOMAX Value Proposition**

- Lowers truck cost per mile = $6,000 more profit per route per year
- 90% of routes can fit into the cubic feet of smaller box
- Temperatures are adjustable for 2 separate sections of the box
- Sandwiches are slowly thawed to eating temp in 6-8 hours
- Truck and box are secured with remote door locks
- Decrease CO2 emissions by 40% (-4.2 tons annually)
Insight from a Client/Fleet Manager Perspective

- Identify goals prior to starting journey
- Earn internal support from a user group
- Be sure that facts support theory
- Find advocates that are able to influence outcome
- Find & promote other valuable uses for the new product/changes (worth time, energy & resources)
- Document a pilot test with 2 or more test units
Expand CV business in the global market, by leveraging absolute competitive advantage in DE technologies
## Isuzu Motors Limited Overview

<table>
<thead>
<tr>
<th>Establishment</th>
<th>April 9, 1937</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head Office</td>
<td>6-26-1 Minami-Oi, Shinagawa-ku, Tokyo 140-8722 Japan</td>
</tr>
<tr>
<td>Capital</td>
<td>Capital 40.6 billion yen</td>
</tr>
<tr>
<td>President</td>
<td>Susumu Hosoi</td>
</tr>
</tbody>
</table>
| 2011 Sales    | Sales Revenue – 1400.1 billion yen ($17.8 Billion)  
Operating Income – 97.4 billion yen ($1.2 Billion) |
| Employees     | Consolidated 24,257  
Non-consolidated 8,127 |
| Major Products| Heavy- medium- and light-duty trucks, buses, passenger vehicle engines, industrial-use diesel engines. |
Isuzu #1 Sales Markets

- **U.S.A.**: Cab-over trucks (Class 3-4) (73%)
- **Columbia**: PUP (42%), L/D trucks (56%), L/D buses (55%)
- **Egypt**: PUP (79%), L/D trucks (89%), L/D buses (55%)
- **Panama**: L&MD trucks (31%)
- **Ecuador**: PUP (55%), L/D trucks (45%)
- **El Salvador**: L/D trucks (37%)
- **Costa Rica**: L/D trucks (29%)
- **Barbados**: CV all (39%)
- **Honduras**: M/D trucks (44%)
- **Kenya**: L/D trucks (32%)
- **Chile**: L/D trucks (23%)
- **U.S.A.**: L/D trucks (69%), M/D trucks (36%), H/D buses (60%)
- **Hong Kong**: L/D trucks (69%), M/D trucks (36%), H/D buses (60%)
- **Philippines PUP (35%), L&M/D trucks (69%)
- **Vietnam (47%)**: L/D trucks
- **Bangladesh**: L/D buses (83%)
- **Thailand**: PUP (38%), CV all (37%)
- **Malaysia**: CV 5t-over trucks (28%)
- **Papua New Guinea**: L/D trucks (36%), M/D, H/D trucks (47%)
- **Australia**: CV all (22%)
- **Japan**: 2-3ton Cab-over trucks all (38%)

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Opportunity

- Since 2005, Isuzu in the US has marketed the 4HK diesel with great success and throughout the class 3 – 5 product line, 12,000 GVWR to 19,500 GVWR
- Economy of scale with entire product line in class 3 – 5 with same power train made economic sense
- Cost of diesel in January 2005 was $1.95
- Price fluctuations for fuel since 2005 have ranged from $1.95 to $5.00 per gallon

Big Opportunity & Perfect Timing for 4J Engine
ISUZU 4J-Engine History

1984  Start of J-Series Engine Production
✓ Direct Injection
✓ Large Displacement
✓ Installation of World Smallest DI Diesel Engine 4JA1 &4JB1 on N-series.

2004  Start of New J-Series Engine Production
✓ Common Rail Injection
✓ DOHC 4-valve
✓ Aluminum Cylinder Head

2010  US Deployment of New J-Series Eng for N-Series tTruck (10 EPA Certification)

2011  US Deployment of New J-Series Eng for WIV application (10 EPA)

<table>
<thead>
<tr>
<th>VEHICLE</th>
<th>GVW (ton)</th>
<th>ENGINE</th>
<th>EMISSION REGULATION</th>
<th>OUTPUT (Kw)</th>
<th>MAX TORQUE (Nm)</th>
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<tbody>
<tr>
<td>N*</td>
<td>3.5-8</td>
<td>4JJ1 (3L)</td>
<td>Japan NLT</td>
<td>110</td>
<td>375</td>
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<td></td>
<td></td>
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<td>2.8-3</td>
<td>4JK1 (2.5L)</td>
<td>Euro-4</td>
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<td>280</td>
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<td></td>
<td></td>
<td></td>
<td>Euro-3</td>
<td>85</td>
<td>280</td>
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</table>
4JJ1-TC Engine

Great Fuel Economy
- Suitable Displacement
- Good Combustion
- Good Heat Management
- Low Friction

Low Emission
- NOx Reduction using SCR
- High Pressure Fuel System
- High charging VGT
- Enhanced Cooled EGR

High Performance
- High charging VGT
- High Pressure Fuel System
- High Performance Al Cyl Head

Light Weight / Compact
- Suitable Displacement
- Al Cyl Head
- Al Inlet Manifold
- Al Crank Case

High Reliability
- Induction hardening of Cyl Block
- Double layer Water Jacket
- Robustness of Oil Leakage

Low Noise
- Combustion Noise Reduction
- Scissors Gear of Timing Train
- Suitable Oil Clearance
- Floating Noise Cover

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GREEN FLEET
Conference & Expo 2012
Isuzu 4JJ1-TC – NPR ECO-MAX

- Sets New Performance & Efficiency Standard
- Great High Performance Engine
  - Green – 2010 EPA/CARB Compliant
  - New engine for US
  - True medium duty engine
  - Smaller displacement
  - Light weight
  - Cost advantage over 4H
  - More efficient and higher MPG
- Special Branding for new model
Engine Specifications 4JJ1-TC

- Horsepower (gross): 150HP @ 2,800rpm
- Torque (gross): 277lb-ft @ 1,600 - 2,800 rpm
- Injection: Bosch Common Rail Direct Injection
- Displacement: 183CID / 3.0 L
- Cylinder Bore x Stroke: 3.76in (95.4mm) x 4.13in (104.9mm)
- Cylinders: 4-cylinder, in-rail DOHC
- Operating Cycles: 4-cycle, turbocharged and intercooled
- B10 life: 310,000 Miles
- Oil change interval: 10,000 miles or higher
- Features:
  - Engine shut down (coolant temp and oil pressure)
  - Programmable idle shut down
- Target fuel economy improvement: Up to 25% (with rib tire)
- Target fuel economy with full load: 15+ MPG
Program Design Success

- **Common Goal** – Lower Total Cost of Ownership
- Key Stakeholders Dependent on Common Goal
- Key Stakeholders Dependent on Each Other
ISUZU NPR ECO-MAX

Fuel Economy & TCO
- Needed to demonstrate a significant impact on TCO achieve program goals.
- Significantly increased fuel economy over current offering.
- Sustainable solution when compared to cost of hybrid technology.

Refrigeration
- Supported program direction with engine-driven refrigeration.

Payload
- Supported the consolidation from a 16’ walk-in body to a 13.6” reach-in body design.
ISUZU NPR ECO-MAX

**Alternator**
- Upgraded to Leece-Neville 240 amp alternator and custom bracket designed by Bracketry Systems to achieve dual-temp refrigeration.

**Idling**
- A remote start system was developed by Malone Systems as a safety precaution.
- Ongoing development continues to meet the program design goals.

**Pricing**
- Vehicle price needed to be as reasonable as not to negate the benefits of price advantages.
Looking In the Rear View Mirror

Is the Company committed to reducing operating expenses, emissions output, increasing fuel economy?

Are you willing to be flexible in your approach to achieve your program goals...payload, routing, etc?

Are you willing to accept new alternative technologies?

Is your company financially committed to the program and making improvements?

Can your company implement a testing and evaluation process?

As with any change....will your employees embrace the change for the good of the company?
Johnson Truck Bodies

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Who is Johnson Refrigerated Truck Bodies?

- Leader in fiberglass composite insulated truck body construction
- Largest dedicated reefer manufacturer in the US; strong synergies with parent company, Great Dane Trailers
- Johnson’s composite construction provides industry leading thermal performance and lightweight products
- Industry leader in development of All-Electric Refrigeration technology
- Focused on increasing customer value through design innovation and reducing overall life-cycle costs
Fleet Challenges

Reduce Fleet Equipment Costs
- Affordable customization

Reduce Fleet Operational Costs
- Fuel usage, maintenance

Compliance with Government Regulations
- Hazard Analysis Critical Control Points (HACCP)
- FDA requirements - The Johnson ArcticTherm interior liner meets FDA’s food contact requirements
Define and Qualify Solutions

OEM Collaboration

Developed and introduced design concepts to key stakeholders. Design was qualified and pilot GuardianLT was built.

Body Design and Development Requirements

Work closely with Deli Express to develop solution. Review cold chain management practices and operations

Review

Ride-along to acquire insight on operational ease of use, temperature recovery data collection, thermal efficiency validation, and route data
Evolution of Truck Body Design

Common thread: **THERMAL EFFICIENCY**
26% annual refrigeration operation savings!

- **2011**
  New GuardianLT lightweight reach-in design with key stakeholder components

- **2000**
  Standard HD with walk-in feature with AE100 cold plate refrigeration and mechanical

- **1990**
  Standard HD Reach-in with AE100 cold plate refrigeration

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GREENFLEET
Conference & Expo 2012
Pilot Features

- Automotive door locking system with keyless entry option – *patent pending*
- LED ext. courtesy lighting
- Substructure/superstructure
- Body lock-out option
- Low ground-to-inside floor height
- Compartment dividers and custom shelving
- 4-chamber door seals
- SST bolt-on bumper

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Insights

- Strong insight into customer needs and expectations
- Collaborative review of past practices (pros/cons)
- Customer’s cold chain management practices
- Customer stakeholder commitment and availability to provide feedback and set milestones
Who We Are

- Transport Refrigeration and HVAC company begun in 1938
- Key product segments include:
  - Truck, Trailer, and Rail refrigeration
  - Auxiliary Power Units
  - Bus and Shuttle HVAC
- Focused on delivering high performance energy efficient systems to global markets
E.A. Sween/Deli Express Goals

- Efficiency
- Flexibility
- Weight
- Cargo Requirements
- Performance

Identify clear objectives for the system
Refrigeration Selection

Route Profile
- Miles Driven
- Time at Stops
- Door Openings

Temperatures
- Product
- Ambient Range

Body Design
- Insulation/thermal efficiency
- Cargo Packaging and Loading
- Door Configuration
- Number of Compartments
Do the Math!

- Determine cooling or heating capacity required
- Identify the technology necessary to deliver the performance goals
- Calculate the necessary airflow for even temperature distribution
- Refrigeration dealers can handle these calculations plus provide suggestions on solutions that work

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Sample Calculation Results

**Heat Flow (btu/hr)**

- **S-2 (-13 °F)**: 10,000 btu/hr
- **Total Load**: 10,000 btu/hr

**Road/Electric Standby**

- **S-2 (-13 °F)**: 8,701 btu/hr
- **Heat Gain**: 5,192 btu/hr
- **Service Load**: 1,747 btu/hr
- **Respiration**: 0 btu/hr
- **Reserve**: 1,388 btu/hr

**Total Load**: 8,327 btu/hr

**Airflow**

- **Required**: 574 CFM
- **S-2**: 777 CFM

**Cargo**

- Temperature Range: -13 °F to 0 °F

**Ambient**

- Temperature: 120 °F

**ATP Requirement**: 9,087 btu/hr
V-520 RT Spectrum

- Direct drive refrigeration compressor (mounted directly to the truck engine)
- Aerodynamic roof mount condenser
- Electric standby for stationary operation
- Two temperature zones
- Flexibility: Heat or Cool as required
- Low system weight
## Common Fleet Challenges

<table>
<thead>
<tr>
<th>Building entire fleet for most demanding route and environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Efficiency goals may suggest different solutions for Northern vs Southern Climates</td>
</tr>
<tr>
<td>• Real savings may be realized with readily available conventional technology</td>
</tr>
<tr>
<td>• Seeking perfection sometimes prevents progress</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Underestimating the impact of fundamental operational controls</th>
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<tbody>
<tr>
<td>• Driver behavior around unloading and managing door openings,</td>
</tr>
<tr>
<td>• Loading product on the truck at the right temperature</td>
</tr>
<tr>
<td>• Mixing temperature controlled with dry goods</td>
</tr>
<tr>
<td>• PM program for bodies and units to maximize uptime and efficiency</td>
</tr>
</tbody>
</table>
Insights

• Approaching a large supplier to get engaged:
  – Find a local champion, likely a dealer sales representative
  – Start early, needed features might be able to be added to product plans
  – Use your network, other fleets may have similar needs that can help increase the visibility of your project
About ARI

• Fleet management company headquartered in New Jersey

• 923,000 vehicles in U.S., Canada, Mexico, Puerto Rico and U.K

• Focus on commercial vehicles with complex upfit
Project Results

~50% Improvement in fuel economy

700 Fewer pounds of carbon dioxide emitted monthly

4.2 Fewer tons of carbon dioxide emitted annually
Insights

• Develop a solid working relationship with all suppliers involved in a client project
• Come equipped with the proper tools
Set a clear vision, prepare for multiple futures!