

# **ERGONOMIC BEST PRACTICES FOR GROCERY DISTRIBUTION CENTERS**

**By  
Advanced Ergonomics Inc.  
5550 LBJ Freeway Suite 350  
Dallas TX 75240  
Phone 972-239-3746 (x204)**

## **INTRODUCTION**

There are a variety of ergonomic issues that are common in grocery distribution centers (DCs). Ergonomic issues can include the handling of heavy weights, significant endurance requirements, awkward postures, exposure to whole-body vibration, and potentially others. Ergonomics is the science of evaluating these physical requirements to determine their acceptability. Where the physical requirements are defined as unacceptable, ergonomic principles can then be employed to reduce these physical demands to a more acceptable level.

The objective of this discussion session is to provide for DCs a process for establishing an ergonomics program at their location(s). This will include both the proposed framework for an ergonomics program, as well as a detailed discussion of ergonomic controls that DCs should consider for their location(s). Specifically, this training session will detail the following:

1. Why should you have an ergonomics team?
  - Who should be on it?
  - What training should they receive?
  - What should be their mandate?
  
2. What can a DC do to reduce ergonomic issues in the work place?
  - Case weight and rack design guidelines
  - Hand holds in case packaging
  - Pallet rotation and case retrieval hooks
  - Use of rack steps
  - Minimizing receiving in aisles
  - Use of glue between cases
  - Cube guidelines
  - Workforce Ergonomics Training
  - Fork truck design and floor maintenance issues
  - Development of a Medical Management program.

Who can benefit from the information to be presented today?

- Existing or potential ergonomic team members
- Safety Directors
- Personnel Directors
- Warehouse Operations Managers.

Advanced Ergonomics Inc. (AEI) has worked closely with DCs for the last several years in a variety of ergonomic endeavors. This includes establishing ergonomics programs at locations, training DC ergonomic teams, developing ergonomic controls for DCs, and implementing Physical Ability Test (PAT) batteries for DCs.

### **ERGONOMIC BEST PRACTICES FOR DCs**

Table 1 presents those components of an ergonomics process that DCs should consider. Some DCs may already have a number of these components in place; others may be beginning the process. For those DCs that already have components in place, **remember** that ergonomics is an ongoing process. Review the status of the program component on a regular basis to assess its ongoing effectiveness.

As this discussion session proceeds, fill in the “STATUS” column to reflect where your DC(s) is regarding this program element.

**Table 1. Ergonomic Process Elements**

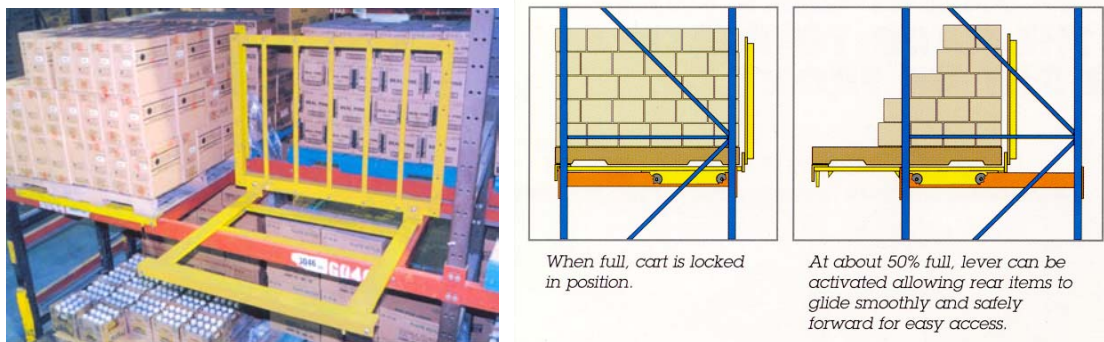
ELEMENT	COMMENT	STATUS
<p>Develop process to analyze accident experience and exposure areas</p>	<p><b>1. PASSIVE SURVEILLANCE</b></p> <p>Your insurance carrier or internal resource should provide regular (about quarterly) trend analysis. Updates/trends should be presented to management and ergonomics team on regular basis. Refer to <b>Attachment A</b> for a detailed discussion of injury data analysis techniques.</p> <p>General Rule. Keep ergonomics on the front burner. Regular reviews of data help accomplish this.</p> <p>If possible, compare injury statistics with grocery warehousing industry, to help identify areas for program focus (for example, FMI has compiled injury statistics for the grocery warehousing industry).</p> <p><b>2. ACTIVE SURVEILLANCE</b></p> <p>The above analyses are referred to as “passive” statistics (you wait for something to happen then record it). There are also “active” surveillance methods that can be used to identify potential problems before they escalate to recordable injuries. Body Part Discomfort Surveys (BPDS) are an example of this. <b>Attachment B</b> shows a BPDS and describes how to use it.</p>	
<p>Establish and Train an Ergonomics Committee</p>	<p><b>Who should be on Committee?</b> The team should consist of both management and hourly employees. All job categories should be represented. All shifts should be represented.</p> <p>Note. If your DC intends to also have the ergonomics program include the office work areas, consider a separate team to conduct this work.</p> <p><b>Training the Team.</b> The team will need to receive training in both ergonomic design principles and ergonomics program management. Consider hiring an ergonomics consultant to provide this training for the team.</p> <p>Remember that team members come and go and things we learn do not stay with us forever. Try to provide training refresher courses on at least an annual basis for the team.</p> <p><b>How often should the team meet?</b> The team should meet on a weekly basis during the initial development of the ergonomic action plan for the DC. Following this, the team should meet at least monthly.</p>	

**Table 1. Ergonomic Process Elements (Cont.)**

ELEMENT	COMMENT	STATUS
<p>Conduct ergonomics and work place safety surveys. Provide for ongoing employee input.</p>	<p><b>Ergonomic Assessments.</b> A primary role of the ergonomics team will be to conduct ergonomic assessments to identify issues and develop solutions for ergonomic problems. <b>Attachment C</b> provides a checklist developed for DCs. Feel free to modify it based on the specifics of your DC.</p> <p><b>Safety/Ergonomics Suggestion Form.</b> It is critical that everyone feel involved in the ergonomics process at the DC. To help accomplish this, provide workers with an ergonomics suggestion form and box so they can communicate their concerns and ideas.</p> <p><b>Keep and post committee minutes and accomplishments.</b> This keeps the program at a high-awareness level within the DC.</p>	
<p>Identify product and locations requiring lifting tasks exceeding ergonomic guidelines.</p>	<p><b>Case Weight Guidelines.</b> The issue of how much weight is too much weight is a complex one that can require fairly intensive ergonomic analysis. As a benchmark, NIOSH (1991) has established an “upper limit” of 51 lb for manual handling under “ideal” lifting conditions. As such:</p> <ul style="list-style-type: none"> <li>• For existing product, a comprehensive list of all case weights 50 lb or more needs to be established, and this list should serve as the “hit list” for weight reductions.</li> <li>• For new product, establish a company policy prohibiting the introduction of new product with case weights greater than 50 lb.</li> <li>• Target Areas. <ul style="list-style-type: none"> <li>• Meat/Deli and Produce areas often have case weights in excess of 50 lb.</li> <li>• Many products represent a collection of smaller items. Repackaging should be considered.</li> </ul> </li> </ul> <p>Rack / Weight Guidelines. Consider the following:</p> <ul style="list-style-type: none"> <li>• Install structural load beams to raise heavy product (&gt;50 lb) to minimum 15” above floor</li> <li>• 3-Tier Picks. Weight should be the primary criteria for slotting versus frequency of handling. Any cases weighing greater than 20 lb should be placed in the middle slot.</li> </ul>	

**Table 1. Ergonomic Process Elements (Cont.)**

ELEMENT	COMMENT	STATUS
Provide hand holds or holes in case pkg	<p>Minimally, effective hand holes / cut-outs in cases can increase lifting capacity by 10% (based on NIOSH 1991 lifting equation), although this figure probably underestimates the value of good coupling during manual handling. Work with suppliers to incorporate handles into case design. Two guidelines are offered to direct efforts:</p> <ul style="list-style-type: none"> <li>• Cases weighing 40 lb or more should be targeted for provision of some type of coupling.</li> <li>• Cases weighing greater than 20 lb and having a cases size greater than 30x24x18 inches (LxWxD) should be targeted for provision of some type of coupling.</li> </ul>	
Pallet Rotation / Improved Access to Product in Racks	<p>Extreme reaches into racks to retrieve product may be the most physically stressful task required in DCs. Methods to address this should be considered a high priority.</p> <p><b>Pallet Rotation.</b> Opportunities to rotate pallets, particularly glass products that do not allow use of case hooks, should be emphasized as part of on-going ergonomics training. Look for opportunities to formalize the pallet rotation process beyond simply training.</p> <p><b>Rack Design.</b> Rollout or pullout racks represent an engineering solution to this ergonomic problem. An example of such a solution is the “Glide ‘n Pick” pallet cart (Frazier Industrial Company, phone 908-876-3001, see Figure 1) that allows the depleted pallet to be pulled out for improved access.</p>	
Provide case retrieval hooks	<p>The use of case retrieval hooks represents an alternative to pallet rotation/pull-out racks. Use of hooks should be encouraged through training. Hooks should be available on the pallet jack.</p>	



**Figure 1. Glide ‘n Pick Pallet Cart (Frazier Industrial Company)**

**Table 1. Ergonomic Process Elements (Cont.)**

ELEMENT	COMMENT	STATUS
Rack steps	For 2 and 3-tier racks, the installation of a rack step can allow the worker to elevate him/herself such that extreme vertical reaches are reduced.	
Minimize Receiving in Aisles	Received pallets in aisles increase carry distances and restrict access to product in slots. Minimize receiving in aisles. For example, consider having one shift pick and the other shift receive and slot.	
Minimize or eliminate use of glue between cases.	Unexpected loading on the body can increase injury risk. Glue between cases increases the force required to move the case, as well as potentially introducing unexpected loading on the body. Although the use of glue is a standard industry practice, DCs should try to minimize/eliminate the use of glue wherever possible.	
Cube Guidelines	Cube guidelines should take ergonomic issues into consideration. Specifically, avoid orders ending with the handling of heavy loads (results in heavy handling above shoulder level where the body is weakest).	
Full Pallet Picks	Full pallet picks represent the “ergonomic Ideal” in that manual handling of individual cases is eliminated. Full pallet picks should be maximized at the DC.	
Provide Ergonomics Training for the Workforce	<p>All workers should receive training in ergonomics, with an emphasis on what they can do to reduce stresses in the job. The ergonomics committee can develop the program based on the ergonomic issues they have identified in the DC. Minimally, the training should cover the following:</p> <ol style="list-style-type: none"> <li>1. Use of good body mechanics: <ul style="list-style-type: none"> <li>• Bring the load close before lifting</li> <li>• Test the load before lifting</li> <li>• Keep the back straight when lifting.</li> <li>• Avoid twisting</li> <li>• Avoid reaching across the pallet you are building</li> <li>• Don’t build the pallet too high</li> </ul> </li> <li>2. The importance of stretching <ul style="list-style-type: none"> <li>• When to stretch? How to stretch?</li> </ul> </li> </ol>	

**Table 1. Ergonomic Process Elements (Cont.)**

ELEMENT	COMMENT	STATUS
Exposure to Vibration / Forktruck Design	<p><b>Floor Conditions.</b> Uneven, rough floors increase vibration transmission to the body that has been associated with increased back injury risk. Docks and frozen food are some areas that are typically cited in terms of bad floor conditions.</p> <p><b>Forktruck / Pallet Jack Design. Attachment D</b> provides guidelines for forktruck and pallet jack design that can reduce vibration transmission to the body.</p> <p><b>Stretching</b> is a very good way to reduce the static muscle contractions that occur when the body is exposed to vibration.</p>	
Develop medical management program.	<p>Select Medical providers and provide onsite exposure to your work place to facilitate understanding of job demands.</p> <p>Identify Restricted-duty positions and utilize as appropriate.</p>	

## ATTACHMENT A.

**Injury Data Analysis Techniques.** Injury data are analyzed to accomplish two things:

1. Where is the highest incidence of injuries?
2. What types of injuries are occurring?

An *incidence rate* (IR) is defined as the number of injuries that have occurred per 200,000 worker-hours (equivalent of 100 full-time workers for one year). Calculation of IR by job title and/or department tells you where your greatest concerns are in terms of injuries occurring to the work force.

(NOTE 1. We calculate rates as opposed to using raw injury counts to allow us to meaningfully compare injuries based on adjusted number of hours worked.)

(NOTE 2. In general, Selectors tend to have the highest IR, followed by Drivers.)

*Pattern analysis* provides useful information regarding the nature of the injuries that are occurring within a job title / department. Usually, pattern analysis includes categorizing injuries based on **type** and **cause**, as indicated below:

Typical categories for type of injury	Typical categories for cause of injury
<ul style="list-style-type: none"><li>• Back musculo-skeletal disorders</li><li>• Upper extremity musculo-skeletal disorders</li><li>• Other musculo-skeletal complaints</li><li>• Contact injuries</li><li>• Other injuries.</li></ul>	<ul style="list-style-type: none"><li>• Lifting</li><li>• Other material handling activity (push, pull, bending, etc.)</li><li>• Slip/Fall</li><li>• Other</li></ul>

(NOTE 3. In general, back musculo-skeletal disorders are the most common type of injury and lifting is the most frequently cited cause.)

## ATTACHMENT B.

**Body Part Discomfort Survey.** Body Part Discomfort Surveys (BPDS) like the one described here are referred to as “active” surveillance tools, because they require you to actively survey the worker population to determine what problems/discomforts they are having, if any. Use of a BPDS has both benefits and potential drawbacks, as indicated below:

<b>Benefits of BPDS</b>	<b>Potential Drawbacks of BPDS</b>
<ul style="list-style-type: none"> <li>• Discomfort can be a precursor to injuries. The BPDS allows you to address an ergonomic issue before an injury occurs.</li> <li>• Some ergonomic issues do not routinely show up in injury statistics. For example, foot/leg discomfort from standing for extended periods may not get reflected in injury statistics.</li> </ul>	<ul style="list-style-type: none"> <li>• Administering a BPDS may result in a subsequent increased reporting of injuries by workers. This is not necessarily a bad thing because you are catching the problems earlier and this may result in less costly medical intervention.</li> <li>• If you administer a BPDS, remember that the workers will be expecting you to do something to address the discomfort. Make certain that you are prepared for this next step before administering the BPDS.</li> </ul>

**Instructions.** The Body Part Discomfort Survey (BPDS) should be filled out by the worker at approximately the end of the work shift. The survey is filled out by having the worker score the various body parts in terms of discomfort as follows:

Each box, representing different parts of the body, receives two scores. The left hand side of the box is used to record **How Frequently** discomfort is experienced. The right hand side of the box is used to record the **Discomfort Level**.

Frequency is recorded using the following scale:

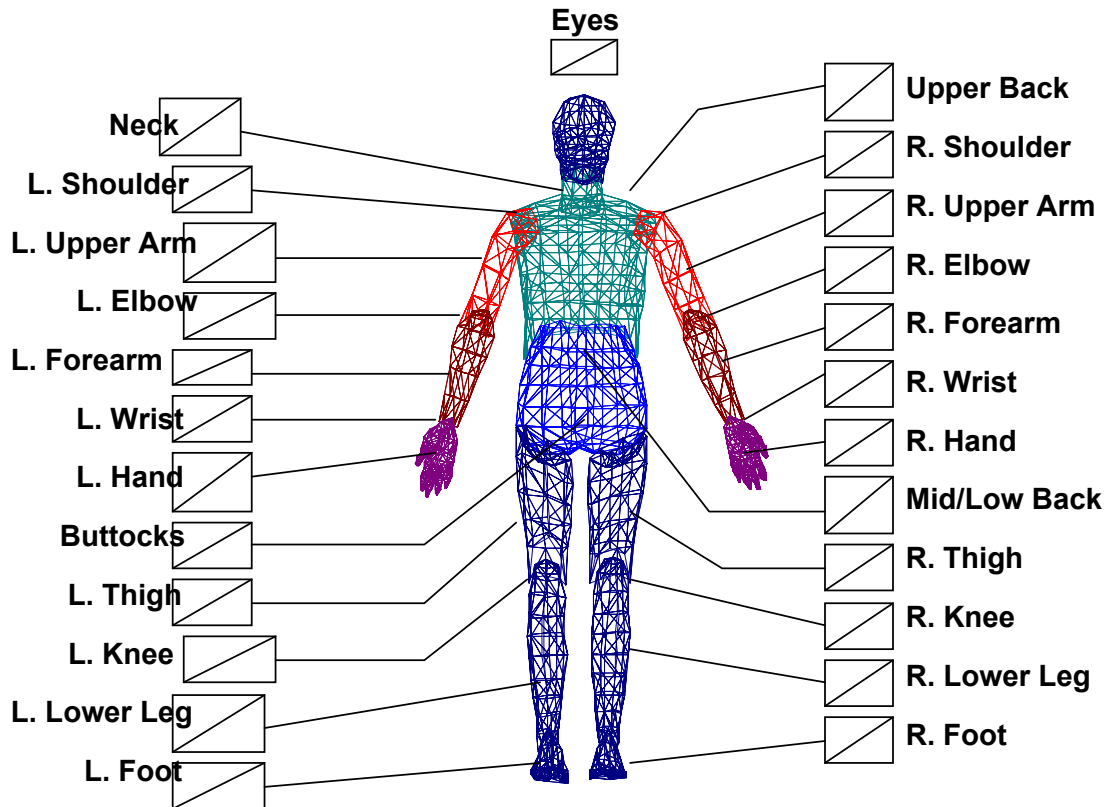
- |                                  |                                     |
|----------------------------------|-------------------------------------|
| 0 = Never                        | 2 = Frequently (few times per week) |
| 1 = Rarely (few times per month) | 3 = Constantly (nearly every day).  |

Discomfort Level is recorded using the following scale:

- |                         |                          |
|-------------------------|--------------------------|
| 0 = No Discomfort       | 6                        |
| 1                       | 7                        |
| 2 = Fairly Comfortable  | 8 = Fairly Uncomfortable |
| 3                       | 9                        |
| 4                       | 10 = Extreme Discomfort. |
| 5 = Moderate Discomfort |                          |

An Ergonomic Assessment is recommended for individuals or groups (latter based on average across the group sampled) when:

1. Discomfort Level exceeds 5 for any body part (regardless of frequency)
2. Discomfort level exceeds 3 for any body part and frequency is 2 or 3.



**Directions.** At the end of the work day, fill out this diagram for the listed parts of your body. Each body part (box) will receive two scores. In the left hand side of the box, fill in how frequently you feel discomfort for the body part using the following scale:

0 = Never, 1 = Rarely (a few times per month), 2 = Frequently (a few times per week), 3 = Constantly (nearly every day).

In the right hand side of the box, fill in the discomfort level using the following scale:

0 = No discomfort, 2 = Fairly comfortable, 5 = Moderate discomfort, 7 = Very uncomfortable, 10 = Extreme discomfort.

For discomfort level, if you are somewhere in between the listed values, use what you feel is the most appropriate score (for example, put in a 3 or 4 if you are somewhere in between Fairly Comfortable and Moderate Discomfort).

Thank you for your help!

**NAME (Optional):** \_\_\_\_\_

## ATTACHMENT C.

**DC ERGONOMICS CHECKLIST.** The checklist below can be used as a tool to evaluate your DC in terms of ergonomic issues detailed in this training session. The checklist is intended to be used as a comprehensive survey of the facility and the workers, although it may also be used (e.g.) as an accident investigation tool.

<b>Part 1. Engineering Controls</b>		
<b>Case Weight / Rack Design Issues</b>	Identify and List all cases weighing greater than 50 lb. Establish a target date for reducing these case weights.	
	Identify and List all cases weighing greater than 40 lb that are stored at floor level. Establish a target date for raising these cases at least 15" above floor level.	
	Identify and List all cases weighing at least 35 lb that are NOT stored in lower pick slots. Establish a target date for re-slotting these cases.	
	Identify and List any cases in 3-tier slots weighing greater than 20 lb and NOT stored in the middle slot. Establish a target date for re-slotting these cases.	
<b>Minimize Extreme Reaches</b>	Establish procedure and target date for implementing a pallet rotation program.	
	Evaluate feasibility of installing pullout racks for heaviest cases handled.	
	Provide selectors with case retrieval hooks to pull case forward.  Provide training in benefits of use of case retrieval hooks.	

<b>Minimize Extreme Reaches (cont.)</b>	Identify and List any situations where double pallets are stacked in 2 <sup>nd</sup> and 3 <sup>rd</sup> tier slots. Establish a target date for eliminating double pallets in these slots.	
	Identify and List areas / slots where the installation of rack steps could be beneficial. Establish a target date for the installation of rack steps.	
<b>Case Design</b>	Identify and List all cases weighing 40 lb or more that do not have handholds. Establish a target date for installing better coupling in these cases.	
	Identify and List all cases weighing 20 lb or more and have a case size greater than 30x24x18 inches (LxWxD) that do not have handholds. Establish a target date for installing better coupling in these cases.	
	Identify and list those cases that are most awkward to handle (independent of weight) due to packaging. For example, large bags might be an example. Identify a proposed repackaging for the product, and establish a target date for the repackaging.	
<b>Use of Glue</b>	Identify and list those products where excessive glue is an issue. Contact the supplier regarding using less glue or eliminating the use of glue.	
<b>Exposure to Vibration</b>	Identify and list all those areas in the DC where uneven, rough floors exist. Establish a timeframe to repair or otherwise maintain these floor areas.	
	Identify fork truck / pallet jack design issues that increase vibration transmission (refer to Attachment D). Establish a timeframe to correct these design issues.	

<b>Part 2. Administrative Controls</b>		
<b>Receiving in Aisles</b>	Define and establish a procedure for minimizing receiving in aisles.	
<b>Full Pallet Picks</b>	Identify and list all opportunities for full pallet picks. Establish a time frame for converting these opportunities over to full pallet picks.	
<b>Cube Guidelines</b>	Identify and list all orders that result in handling heavy loads at the end of the order. Identify an alternative cube and establish a timeframe for implementing the revised cube.	
<b>Medical Management</b>	<p>Review the existing medical management program at your DC.</p> <ol style="list-style-type: none"> <li>1. Develop awareness of importance of early reporting of discomfort / physical complaint.</li> <li>2. Develop procedure to increase awareness of physical demands for medical providers.</li> <li>3. Identify and develop procedure for appropriate use of restricted-duty positions.</li> </ol>	

### Part 3. Training Issues

<b>Do workers routinely do the following?</b>	<ol style="list-style-type: none"><li>1. Test the case weight before lifting?</li><li>2. Bring load close to body before lifting?</li><li>3. Lift smoothly (avoid jerking motions)?</li><li>4. Avoid lifting 2 or more cases at once?</li><li>5. Use their legs to lift when bending is required?</li><li>6. Avoid twisting?</li><li>7. Avoid reaching across pallet to place cases?</li><li>8. Avoid placing heavy cases at the top of the pick load?</li><li>9. Park as close as possible to the slot to minimize carry distances?</li><li>10. Participate in stretching and warm-up exercises?</li></ol>	
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## ATTACHMENT D.

### Forktruck / Pallet Jack Ergonomic Design Considerations

DESIGN FEATURE	ERGONOMIC GUIDELINES
Vibration Characteristics	<ul style="list-style-type: none"> <li>• Provide an independent suspension system for the seat. Air suspension systems tend to work better than mechanical vibration systems in attenuating vibration. Enclose all moving parts of the suspension system that might be prone to clogging.</li> <li>• Provide an independent cab suspension system (rubber insulators between cab and truck).</li> <li>• In general, pneumatic tires transmit less vibration than solid rubber tires.</li> <li>• For stand-up pallet jacks, provide cushioned standing surface for the driver. Replace the cushion as it wears out (loses compressibility).</li> <li>• Ongoing maintenance of the truck and floor are critical.</li> </ul>
Seat Design	<ul style="list-style-type: none"> <li>• Horizontal and vertical adjustability of the seat pan and backrest should be considered.</li> <li>• Provide lumbar pads / seat cushions if the existing seat is not supportive.</li> </ul>
Driver Visibility	<ul style="list-style-type: none"> <li>• Mast design should maximize visibility</li> <li>• Swing-mast designs can reduce visual obstructions that may lead to awkward postures</li> <li>• Provide truck with the smallest possible turn radius</li> <li>• Controls should be conveniently located and logically mapped to reduce need to visually reference controls.</li> </ul>
Power Source	Battery-powered trucks recommended (don't have to handle fuel tanks). Regardless of power source, appropriate mechanical assists should be available to minimize manual handling.
Driver Training	Drivers should understand: <ul style="list-style-type: none"> <li>• What are the adjustment features in the vehicle</li> <li>• How to properly adjust the vehicle to enhance comfort.</li> </ul>