



Book Industry Study Group



Internet-Based Data Envelopment Analysis System

for System-Based Self-Assessment of Warehouse Operations

User-Guide for the Book Industry Study Group

Web-Enabled Benchmarking of Book Industry Warehouses

Getting Started / Introduction Guide

**Use this guide during your visit to the Online
Benchmarking Lab, and take it with you to use later as
you access the benchmarking tool via the Internet.**

The online benchmarking tool is an ongoing project of the Keck Virtual Factory Lab and The Logistic Institute at Georgia Tech. Our partners in developing this web site include:

The Book Industry Study Group
www.bisg.org

The Progress Group
www.theprogressgroup.com

Logistics Execution Systems Association (LESA)
www.mhia.org/LESA

Order, Selection, Staging and Storage Council (OSSSC)
www.mhia.org/OSSSC

LESA is a product section of the Material Handling Industry of America (MHIA)
OSSSC is a council of the Material Handling Industry of America (MHIA)

Every warehouse and distribution center is different, but for all, the key to success is effectively using resources to deliver required services. Traditionally, effectiveness has been measured using single-factor productivity indices, such as picks per hour, or cost per line. Interpreting the resulting index requires understanding the unique situation of the facility, such as exceptional number of skus, exceptional size of skus, or other factors that can cause the index to be much higher or lower than expected.

The Online Benchmarking Lab presents a new systems-based approach to performance evaluation, an approach that permits simultaneous consideration of a range of resources (inputs) and services provided (outputs). This new approach also enables an anonymous comparison of your facility with every other participating facility, i.e., your facility is "benchmarked" against the "best of the rest."

This document introduces you to the procedures of evaluating your warehouse performance using the iDEAs website. You'll will enter your data, step by step, using an internet browser interface.

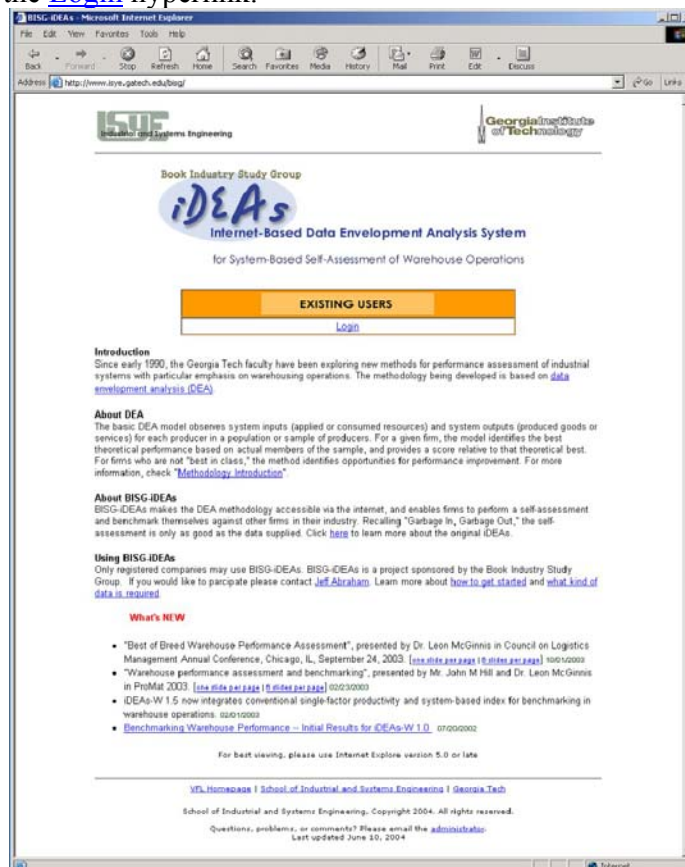
Through using this document we will explain how to:

- Login
- Add a warehouse to your user profile
 - Enter the input and output information
 - Describe your warehouse characteristics
- Generate a performance score for your warehouse
- Examine the sources of inefficiency for various partial productivity measure

Logging In

The iDEAs tool is available via internet access 24 hours a day to users to update, edit or analyze their data. Once you have received an email with your user name and password, you can login and begin using the website.

1. To login, type <http://www.isye.gatech.edu/bisg/> in the address bar of your web browser and press enter.
2. Click on the [Login](#) hyperlink.



3. There are two fields on this screen. Enter your username in the field next to Username and enter your password in the field next to Password. Your username and password if lost can be resent to you. If you need your username and password sent, please send an email from the account associated with your username to ajohnson@isye.gatech.edu. If you do not have a username and password, you will need to contact a representative of the book industry study group to join this study. This project is funded by the Book Industry Study Group (BISG) and all participation decisions will be made by BISG.
4. Please read the disclaimer.
5. Once the two fields are correctly filled then press login.

IDEAs-BISG / Login - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Refresh Home Search Favorites Media History Mail Print Edit Discuss

Address <http://roadrunner.isye.gatech.edu/cgi-bin/WebObjects/BISG> Go Links

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IDEAs for BISG Login

All fields are CASE-SENSITIVE

Username

Password

Welcome to the [Book Industry Study Group Internet-based Data Envelopment Analysis for Warehousing \(BISG-IDEAs-W\)](#). This web-site will allow you to describe your warehouse and its performance, and see how its performance compares to the "best of the breed". The comparison uses a database containing information from a broad range of warehouses; your data will become part of this large database.

The information in the database is confidential, and using the data in this analysis does not compromise its confidentiality. Georgia Tech also may use the database to study industry trends, but such use also will maintain confidentiality. On a regular basis, we will analyze the data to identify trends in technology or in warehouse performance; you will receive a free copy of the report prepared for any period in which you have updated your performance data. At no time will your specific data be shared with anyone else without your permission.

We will ask for general information about you and your warehouse. We need contact information so that if necessary, we can clarify data entries, send you copies of reports, and inform you of any updates to the system.

It is our objective to provide you with useful information about your warehouse performance, in particular, to identify potential opportunities for improvement. Of course, this analysis is based on very general information, and there may be special factors that are not considered, but significantly impact performance relative to our database.

This is an ongoing project of the [Book Industry Study Group](#) and [Keck Virtual Factory Lab](#) at [Georgia Tech](#). Our partners in developing this website include [MHIA](#) and [The Progress Group](#). We value your feedback about the website, the tool, or the results it provides.

Login Reset

[Return to IDEAs for BISG Home](#)

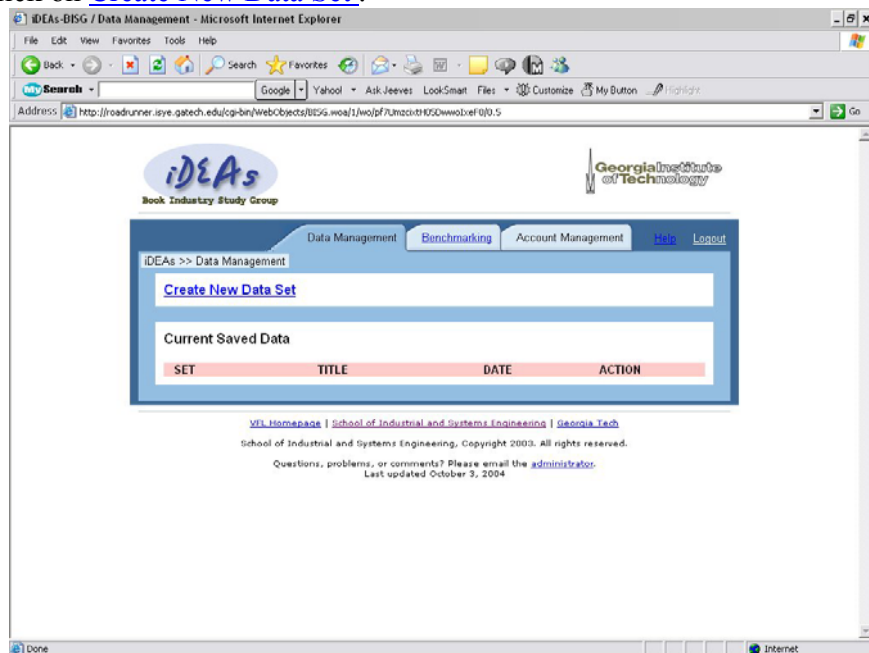
Done Internet

Creating a New Data Set

A single user may have many data sets. A data set is a representation of a warehouse at a particular time. Therefore, if a user has more than one warehouse or would like to track a warehouse's performance over time then various data sets should be created.

Notice the tabs at the top of the page. There are data management, benchmarking, and account management. These are to assist in navigating through the iDEAs website. Currently, we are working within the Data Management tab. Notice the location within the website is given in the top right hand corner of the tab you are working in.

1. Click on [Create New Data Set](#).



In the new page near the top of the tab it will say
“Add New Data Set Assume a 12-month period”
Just below is the word TITLE.

2. In the far right of the TITLE row is a text field. Currently in the text field is written “add title”. Enter the name you would like to use when referring to this warehouse. I.e. MemphisTNOct2003 or LexingtonMarch2004.

The following section is the input section. Here data describing the inputs used in your facility will be entered. In some cases there are two fields in a single row. Only one of these fields needs to be filled to describe your warehouse. The field on the left is always the default field. For example in the row for Direct Labor there is a field for (hr) or for (headcount). In this situation if information is collected on the number of direct labor hours used in your facility, this is the field you should fill in. However, if you do not have data on hours, then headcount can be used as an approximation of the number of direct labor hours used. As you can see if you enter 20 for direct labor head count the website will calculate approximately 40,000 hours.

3. Enter the data requested for in the input section. To see the definition or a further explanation of a word or question, click on the hyperlinked words. The last row of the input section is investment. Notice here there is no field to enter an investment value. Instead, there is a hyperlink [Click here to change](#).
4. Click on the hyperlink [Click here to change](#). This will create a separate window with the heading Investment Calculator.
5. For each type of equipment, enter the quantity of that equipment used in your facility. Note that for conveyors the quantity is measured in feet.

- Many types of equipment are listed, however, this is not an exhaustive list of equipment. If there are some pieces of equipment in your facility that are not listed, pick the most similar piece of equipment and credit the associated count. After entering all equipment used in your facility scroll to the bottom of the window to find the submit button.
6. Click the submit button.

The window will automatically close and a check mark will appear to the right of the word **Change?**. The next section gathers information about the output of your facility.

7. Enter the information associated with the various output measures (for example total orders shipped).
8. Click the Continue button at the bottom of the page.

The next page collects information about the attributes, warehouse equipment and operations, suppliers and skus, and characteristics. Here a combination of text fields, pull down menus and pop-up window calculators are used to help in data entry. Many words in the questions are underlined to indicate these are hyperlinks. To see the definition or a further explanation of a word or question, click on the hyperlinked words. Some of the data requested may be difficult to gather. In the case when data may not be available often it is sufficient to talk with someone involved in the daily management of the warehouse and ask them for their best estimate. Blind guesses should not be used, however, if a person familiar with the operation of the warehouse is able to make a reasonable approximation, often this provides the information necessary for this analysis.

The screenshot shows a web browser window titled "IDEA's BSG / Data Management / Add (attributes/practices) - Microsoft Internet Explorer". The address bar shows a URL from "http://prodrunner.rye.gatech.edu". The main content area is titled "IDEA's >> Data Management >> Add (attributes/practices)" and contains a form for "Add New Data Set".

The form includes the following sections and questions:

- Attributes Section:**
 - For what one year period was this data collect? (select one)
 - What type of warehouse is your warehouse? (select one)
 - What customer type does your warehouse service? (select one)
 - What product type does your warehouse carry? (select one)
 - Please select your NAICS (industry) code [Click for your NAICS code - publishing in 01](#) (select one)
 - How many ship-to locations does your warehouse service? (text field)
 - What packaging materials are used in your warehouse? (text field)
 - How many different packaging labels are used in your warehouse? (text field)
 - What fraction of orders shipped require customer-specified shipping packaging and/or labeling? (text field)
 - How many times was the inventory turned last year? (text field)
 - Is your inventory turns estimate based on operational data or financial data? (select one)
 - What characteristic is the basis of order consolidation in your warehouse? (select one)
 - Are there value-adding activities in your warehouse? (select one)
 - If you have value-adding activities, what is the total direct plus indirect labor hours for the reporting period? (text field)
 - Are the employees in your warehouse unionized? (select one)
- Customer Services Provided Section:**
 - Do you perform compliant shipping? (select one)
 - Does your warehouse provide on-the-fly adjustments to your customers? (select one)
 - Does your warehouse provide billing information with goods shipped to your customers? (select one)
 - Does your warehouse provide product information with goods shipped to your customers? (select one)
 - Does your warehouse provide shipping summaries with goods shipped to your customers? (select one)
 - Does your warehouse provide proof of delivery? (select one)
 - Does your warehouse provide advanced shipping notice to your customers? (select one)
 - Does your warehouse provide in-transit tracking to your customers? (select one)
 - Does your warehouse provide labeling services? (select one)
 - Do you prepare orders a head of time and use a pack-and-hold area to store them? (select one)
 - How large is your pack-and-hold area? (text field)
 - How long is the average stay for an item in your pack-and-hold area? (text field)
 - What percentage of orders enter your pack-and-hold area? (text field)
- ORDER DESCRIPTION Section:**
 - What is the average number of titles per order? (text field)
 - What is the average number of items per title? (text field)
 - What percent of all orders are rush orders? (text field)
 - What percent of all lines shipped are rush orders? (text field)
 - What is the overall average response time for your warehouse? (select one)
 - What percentage of orders shipped meet this response time criterion? (text field)
 - What is the average pick seasonality in your warehouse? (text field)

9. Use the various data entry methods (text field, pull down menu, pop-up window calculator) enter the data for the four major sections.
10. When all the data has been entered, click the Save button at the bottom of the page.

This will bring you back to the first page within the Data Management tab. Notice halfway down the page under the heading Current Saved Data the warehouse you just created appears. Next to the date are four actions ([View](#) [Edit](#) [Delete](#) [Analyze](#)) that can be done to your data set.

IDEAs-BISG / Data Management - Microsoft Internet Explorer

Address: <http://roadrunner.isye.gatech.edu/cgi-bin/WebObjects/BISG.woa/1/wo/ZrWPMC2PRHWCKHV5GhQg/6.23>

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Data Management | [Benchmarking](#) | [Account Management](#) | [Help](#) | [Logout](#)

IDEAs >> Data Management

[Create New Data Set](#)

Current Saved Data

SET	TITLE	DATE	ACTION
32	GT-32 full ineff		View Edit Delete Analyze
34	GT-34 broken ineff		View Edit Delete Analyze
36	GT-36 mix ineff		View Edit Delete Analyze
41	That Warehouse		View Edit Delete Analyze

[VFL Homepage](#) | [School of Industrial and Systems Engineering](#) | [Georgia Tech](#)

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 Questions, problems, or comments? Please email the [administrator](#).
 Last updated October 3, 2004

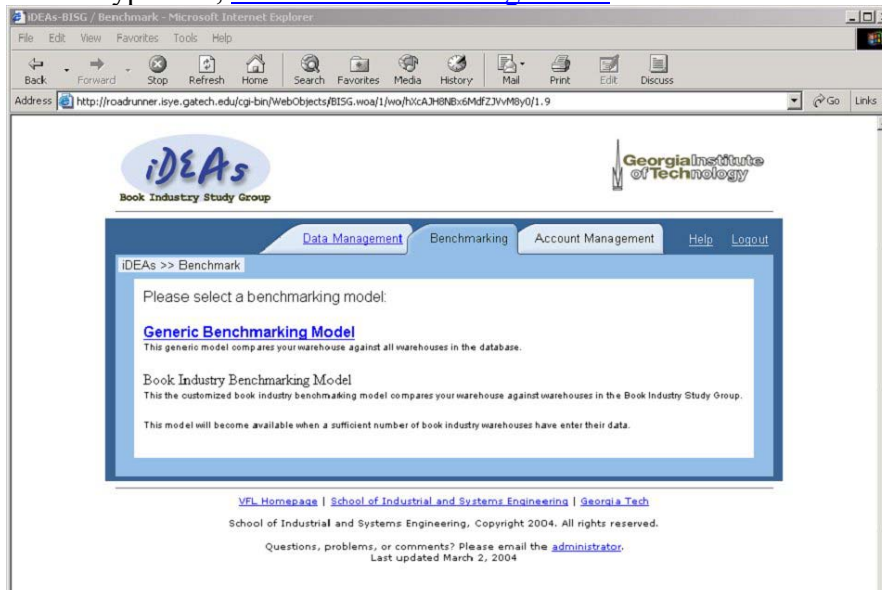
Benchmarking

After the data has been entered the next step is to compare your performance to the performance of other warehouses. This is done in the Benchmarking tab.

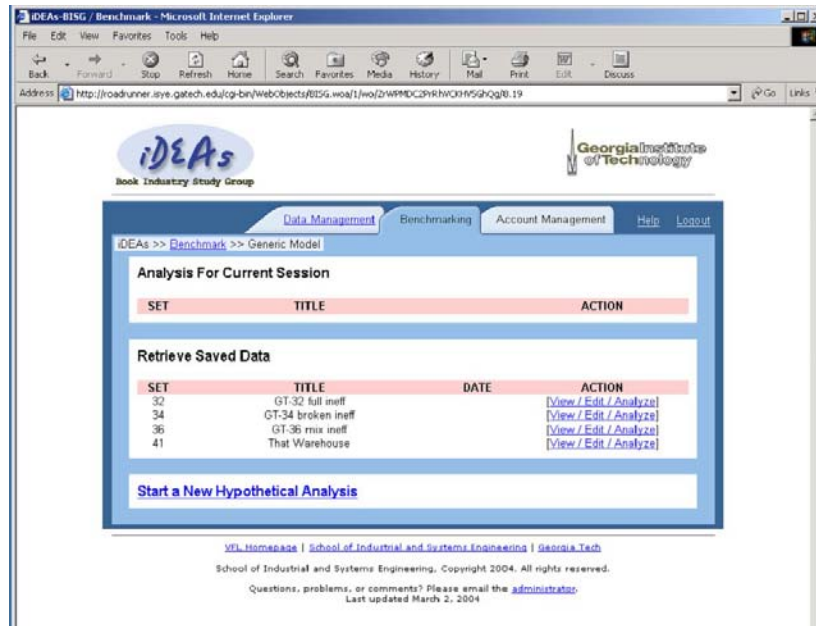
1. Click on the tab labeled [Benchmarking](#).

There are two options. The first is to use the iDEAs model and the second is to use the Book Industry Study Group (BISG) model. When the website first becomes available only the iDEAs model will be available.

2. Click on the hyperlink, [Generic Benchmarking Model](#).



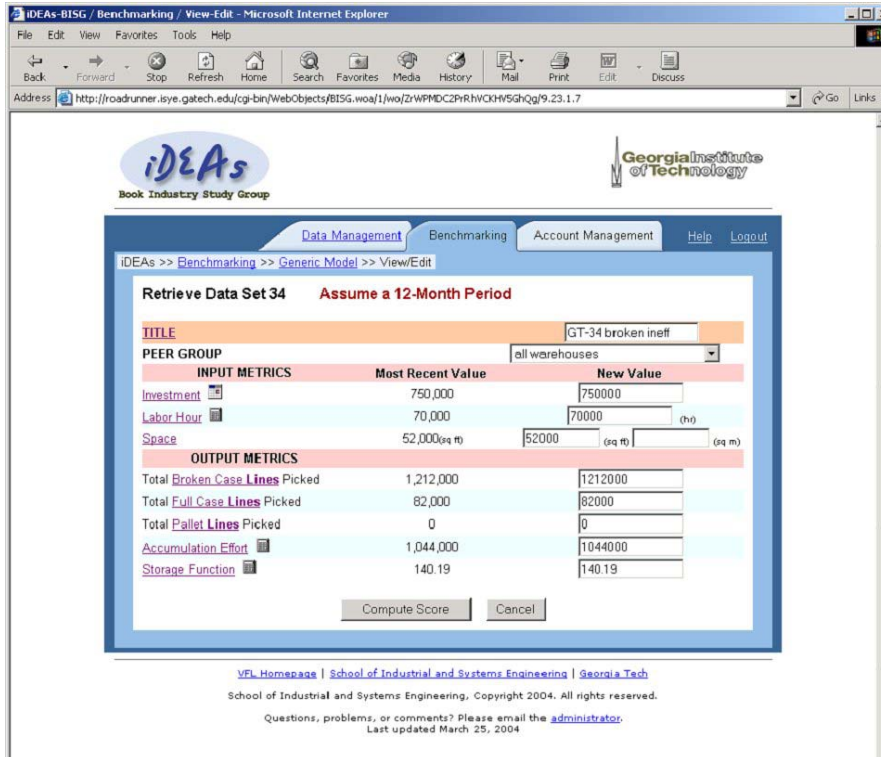
Here you will see two sections: “Analysis For Current Session” and “Retrieve Saved Data”. The warehouse created in the previous section should appear under “Retrieve Saved Data”.



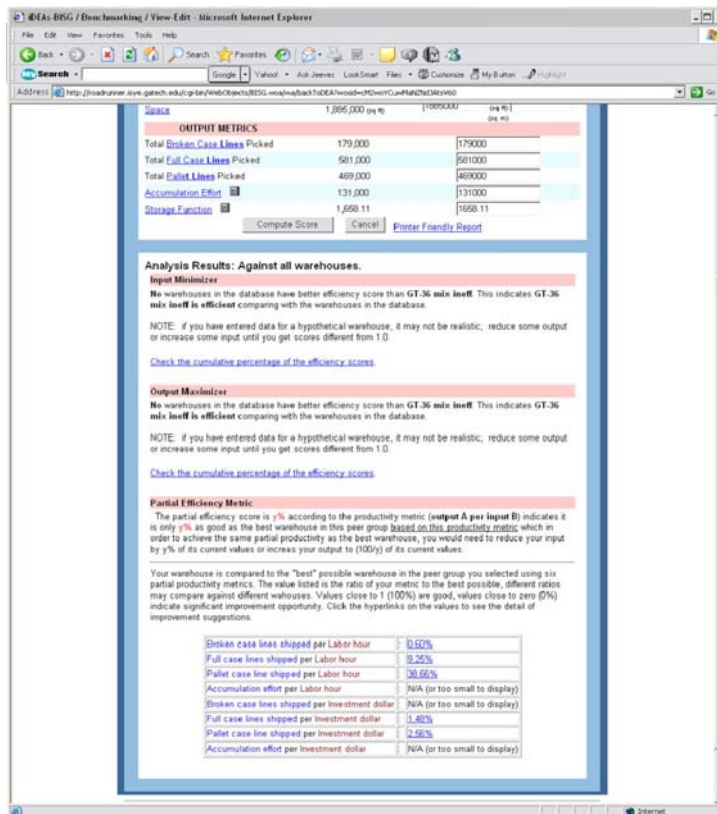
3. Click on [[View / Edit / Analyze](#)] under ACTION for the warehouse you would like to benchmark.

The next page lists the inputs and outputs that directly impact your Data Envelopment Analysis (DEA) score. Notice that there are two columns Most Recent Values and New Values. When you first visit this page the values in the two columns should be the same. The second column will facilitate “what-if” analysis.

Notice in the row below “[TITLE](#)” there is a row called “PEER GROUP”. In the peer group row there is a pull-down menu which will allow you to select the group of warehouses you would like to be compared to. The default value is “all warehouses”. This peer group will always give you the most pessimistic efficiency measure. As smaller peer groups are selected your DEA score will never get smaller. The all warehouses peer group compares your warehouse to all 178 warehouses in the database. If a smaller peer group is selected you will only be compared to those warehouses in the database fitting the criteria specified for a given peer group. The first four choices are “broken case picking predominant”, “full case picking predominant”, “pallet picking predominant”, and “mixed type picking”. Each warehouse in our database is categorized as having a predominant picking method if 80% of all the lines pick are of that picking type. So for example if a warehouse picks 1,000,000 line and 878,200 line are pallets then this warehouse would be called “pallet picking predominant”. All warehouses that are not predominantly one type of picking are categorized as “mixed type picking”. The last three categories are based on industry. This will not be used as part of the BISG project.



4. Select the peer group you would like to be compared to.
5. Click, the Compute Score button to have the website compute your efficiency score relative to the warehouses in our database.



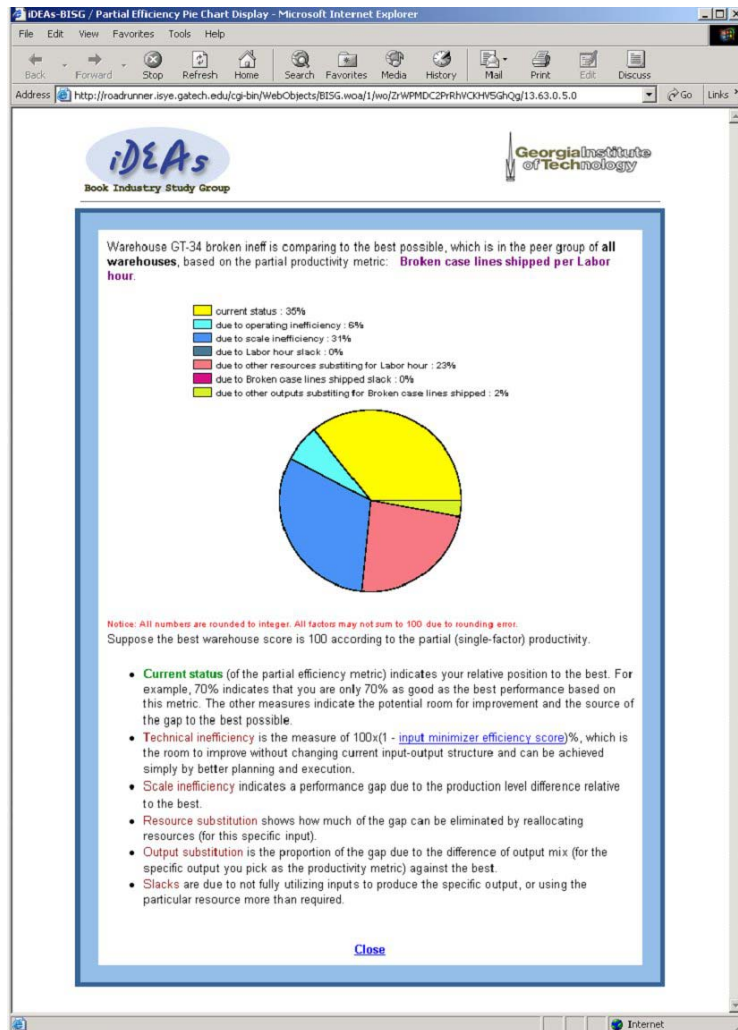
After clicking compute score the webpage will refresh. To see the results, scroll down. The results section has the heading “Analysis of Results: Against [peer group].” where peer group is replaced by the peer group you selected. The first section underneath will be “Input Minimizer”. Here your warehouse is being compared to other warehouses holding the output constant and searching for a warehouse or combination of warehouses in the database that can produce this level of output using less of all the inputs. If such a warehouse or combination can be found then your score is given as a percentage by which all inputs can be reduced and still be able to produce the same level of output. So for example if your score is 0.80 or 80% for the input minimizer this indicates that there is a warehouse or combination of warehouses in our database that can produce the same amount of output using at least 20% less labor, at least 20% less space, and at least 20% less investment than your warehouse is currently using. If your score is 1.0 or 100% this means compared to our database your warehouse is input efficient.

The next section is “Output Maximizer”. Here your warehouse is being compared to other warehouses holding the input constant and searching for a warehouse or combination of warehouses in the database that uses this level of input and produces more output. If such a warehouse or combination can be found then your score is given as a percentage by which all outputs can be multiplied and still be able to produce the same level of output. So for example if your score is 1.10 or 110% for the output maximizer this indicates that there is a warehouse or combination of warehouses in our database that uses the same amount of input and produces at least 10% more broken case lines, at least 10% more full case lines, at least 10% more pallet lines, at least 10% more accumulation, and 10% more buffering capacity a than your warehouse is currently producing. If your score is 1.0 or 100% this means compared to our database your warehouse is output efficient.

The last section is “Partial Efficiency Metric”. This shows some of the common partial efficiency metrics such as lines shipped per labor hour or pallet case line shipped per investment dollar. Your warehouse is scored as a percentage of the best warehouse in your selected peer group for each of these metrics. For example if your warehouse ships 25 broken case lines per labor hour and the best warehouse in the selected peer group ships 40 broken case lines per labor hour your percentage will be 62.5%. Each percentage is listed next to the partial efficiency measure.

6. Clicking on the percentage and a new window will open.

In the new window a pie chart with a legend is shown. This pie chart explains the sources of the difference between your partial productivity measure and warehouse in your peer group with the best partial productivity measure. These sources are technical inefficiency, scale inefficiency, resource substitution, output substitution, and slack. Each of these are further explained on the pie chart page.



7. When finished with the pie chart page, press [Close](#) at the bottom of the page.

This will close the pie chart window and now we can return to the Analysis of Results. Pie Chart windows can be opened for any of the partial efficiency measures for which a score was generated.

Now scrolling back to the top of the page we can now see the “INPUT METRICS” and “OUTPUT METRICS”. For each of these there is a text field under the column “New Value”. Here what-if analysis can be done. After observing your input minimizer score and output maximizer score, you may want to consider how these scores would improve if fewer inputs were used or more outputs were generated.

8. Enter the new value you would like to consider in the new value column.
9. If you are using a peer group other than all warehouses you will need to reselect your peer group
10. Press Compute Score

The results for this new set of inputs and outputs will be calculated and displayed in the same window. After reviewing these results you can again try what-if analysis with

different values. If you would like to analyze a different warehouse you may select the hyperlink [Generic Model](#) just below the [Data Management](#) tab.

In this screen two sets of warehouses are shown: “Analysis For Current Session” and “Retrieve Saved Data”. In the “Analysis For Current Session” each one of the what-if analysis is listed in the order they were performed. If you would like to retrieve one of them just click on [[View / Edit / Analyze](#)] in the Action column.

When you are done using the BISG-iDEAs website please click the Logout hyperlink to the right of the tabs at the top of each page.

This concludes the User Guide’s introduction to how to use the BISG-iDEAs website. Any questions or comments can be directed to ideas@isye.gatech.edu . Thank you for your time and participation.