



Industry Tours for Students Guide

a FLATE Best Practices Guide

www.fl-ate.org



*Let's get on the
tour bus*

*Connecting Students and Educators
with Their Industry Partners.*

FLATE

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Introduction

Interested in taking a group of students on a field trip to a local advanced manufacturing facility?

The *Industry Tours for Students Guide* will provide the necessary tools and sample materials needed for a successful hi-tech tour. Inside this guide are details that should to be considered, covered or dismissed depending upon school and individual needs.

Since 2004, FLATE has introduced nearly 3,500 students, along with their teachers and parents to the world of modern manufacturing. We at FLATE do not claim to have all the answers, but if what we've learned helps another organization have a successful field trip then we are successful too. The purpose of this guide is to assist in the planning of a Middle & High School tour to a manufacturing facility. However, this material can be applied to field trips to other locations. We hope this guide will be of help to your field trip experience.

What are the benefits of visiting hi-tech manufacturing facilities? It helps build the pipeline of STEM workers, which we need to, do in the US. We need to get more kids interested in STEM careers of all kinds, and better prepare them for these careers, earlier in their education. The tours relate STEM to the real world, and ideally include lessons before and after the tour to maximize the impact of the experience.

FLATE looks forward to hearing your feedback and ideas about the materials in this guide and your experience using them.

Special thanks to our generous hosts; our program would not be a success without them.

A few quotes from our industry partners about FLATE's *Made in Florida* Industry Tours and programs observe:

"The tours have been an essential factor in showcasing the integration of various skill-sets in a manufacturing facility, intricacies of manufacturing processes, and how everything is inter-connected. The MIF [Made in Florida] tours have also served as a vehicle in underlining the importance of science, technology, mathematics, and engineering in securing high-wage, high-skill jobs." - **Valpak**

"Education is the key to being able to work in an exciting industry such as aerospace. Focusing on STEM and continuing college education will give students a competitive edge in securing next generation, high-tech jobs." **Pratt & Whitney Rocketdyne**

"The Made in Florida outreach campaign has been an effective vehicle in enhancing technology education, and giving students an opportunity to develop a passion for technology." - **EEI Manufacturing Services**

Please contact us at: 813-259-6577 or barger@fl-ate.org.

Learn more about FLATE and our *Made in Florida* outreach campaign at:

www.fl-ate.org and www.madeinflorida.org

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The overall goal

FLATE, the Florida Advanced Technological Education Center of Excellence, was established by the National Science Foundation (NSF) in 2004 to help develop a skilled and qualified workforce for Florida's manufacturers; our high-tech industry tour program is part of our outreach effort. The goal of this project is to introduce middle and high school students in grades 7 through 12 to the work of modern manufacturing in facilities using advanced technologies, provide opportunities for direct contact with the people in the plants, stimulate student interest in the wide variety of supporting technical careers, and encourage enrollment in the essential technology programs available throughout the state of Florida.

An important objective for the tours is to raise student awareness and promote a positive image about careers in modern manufacturing in Florida. In a comparison study of student attitude change using a post tour survey, cumulative data (2004-2014) for collected surveys shows a 32% positive change in strongly agree and agree responses toward consideration of a career in high tech manufacturing after the tour (n = 3,340).

Pre-tour

We strongly suggest a pre-tour visit of the site in order to give you an idea of what the students will see. Look at it through their eyes. Check how long it takes you to make the walk through (could you be in and out in 20 minutes?) in addition to any introduction management may want to give. We have been in many high-tech operations which produce some outstanding products, many of which you can't see because of environmental barriers on the floor or due to areas in the plant not open to the public. This is done to either protect proprietary parts in the manufacturing process, the equipment used to make them, or because they are a defense contractor (everyone will need to have Legal US Residency to be allowed in). Through experience, the younger the group, the more activity the better...they are magnetically attracted to automated robotic lights and action.

Additionally, ask the facility tour guide or team to prepare an orientation presentation for your group. Some facilities may have a formal PowerPoint or video which they typically show, but an informal short speech letting students know about the facility and its products, processes, and personnel is also effective. You may wish to offer some guidance for this orientation, especially if your chosen facility personnel are excited about the tour, but inexperienced with school groups.

Planning the tour

COMMUNICATION

After you have received the approval from your administration to conduct the tour, it is time to verify all the facts: who goes, to where, when, and how. The policy as to what paperwork is required for an off campus adventure varies district by district and school by school. Speaking from experience, give yourself at the very least, 4 weeks to get trip permits signed, notarized in some locations, and returned in time for the trip. This in itself can be a challenging task. In order to make sure that all the bases are covered, someone needs to get a letter going that tells all those involved with the trip about the date and time, various locations, contacts and phone numbers, preferably cell. (See appendix) Email this information to all parties (educators, tour facility contacts, bus company) and have a hard copy with you the morning of the trip.

LOCATION

Where to go will be the most time consuming part of the entire adventure. To convince a facility to consider allowing tours, we've learned to stress the benefits of hosting a tour. Hosting school tours provides the facility with an opportunity for community service and positive public relations. The tour may provide an opportunity for outreach that can help establish a partnership with schools offering aligned technical programs, and showcases the business to students as future potential employees. In our follow up surveys with industry partners, 81% responded that tour was a good use of company time and resources and 19% somewhat agreed. Finding a location whose processes and products match what you would like the students to experience. You will want to confirm that the manufacturing processes are hi-tech, and there is a lot of activity that will be exciting for students to see. Example: Connecting human actions and programming with real robots at work on the factory floor = exciting. Is the experience aligned to the curriculum you are teaching back in the classroom, or an activity you plan to implement? (FLATE has print and online-ready resources for you if needed www.flate.pbwiki.com). Places to get help in this treasure hunt are regional manufacturing organizations, engineering societies, economic development councils and local chambers of commerce. When looking for locations, we limit our sites to within 75 miles of the school so that a round trip, including about 1 ½ hours in the facility (to make it cost effective), usually takes no more than 5 hours. Of course, stopping for lunch will add to the overall time, but that is up to the teacher.

TRANSPORTATION

Now that you've selected the location, how will you get there? Local bus/limousine services available in your area can be found either in the Yellow Pages or on the internet (funding discussed later). Most charge from the time they leave their facility to the time they get back, usually by the hour. Before selecting one of these, you need to check with your school district's department that keeps up with approved vendors. They will know which ones have the appropriate vehicles, insurance coverage, and have complied with the Jessica Lunsford Act requirements. Second, you could try using school district buses or even multi-passenger vans if the group is small enough. One problem that could occur here is the limited time they are available during the day to do this type of service. Finally, there is always private car-pooling. Again, check with the school district to see if this is allowed as the tour would probably be considered a school function. We rely on MapQuest to get directions for those going ahead of the group (usually the coordinator) and sometimes the drivers. Although most know where they have to go and may be equipped with global positioning system (GPS) devices, so play it safe and hand out maps. Also exchange phone numbers with the driver, teachers, and facility representative in case of emergencies or delays.

FUNDING

There are several areas of funding that may be used for various tour expenses. We have received funds from state organizations, donations from several regional manufacturing organizations. (Who have also helped in establishing some of the tours), educational foundations, local companies, and our own NSF grant funding.

EXPENSES

In order to make it easier for the teacher to 'sell' a tour to administration for her students, we have eliminated as many financial barriers as possible. Typical expenses include:

- the bus expense itself, which usually starts in the \$400.00 range for a 5 hour trip for a private charter *(School district buses can be used during certain hours of the day and typically cost less).
- a substitute teacher's expense to the school/district, which might be required
- a teacher's aide expense to the school/district, which may be required by school district field trip protocol

FLATE works with its industry and community partners including business associations, community groups, school districts and others to support these expenses. Depending upon the time of day for the return trip, numerous schools have opted to stop along the way back to school for lunch. FLATE does not cover this optional cost. Additionally a lunch stop adds to the travel time.

During the tour

TIPS FOR COMPANY HOSTS

Company hosts can prepare the students for the tour ahead of time by explaining what they will see and hear at a particular place or section on the shop floor. Students most likely have never been in a manufacturing facility. Here are some tips.

- Breaking students up into small groups, so they can hear and see
- Offer a short overview of the company: what it makes, and how it makes and markets its products
- Be sure to define industry terms
- Have some sample items and/or parts to show, and ask some questions about them
- Make it relevant to students - if the product is not something they personally use, identify an analogous product or how it's used, what it is a component of etc...
- Allow the students to put on the facility's necessary PPE, such as clean room dress, gloves, safety glasses, hair nets, electrostatic strap, etc.
- Ask questions about the product such as:
 - Could we make this out of another material, why or why not?
 - What effect would a change in size/tolerance have on the product?
- Explore the careers/pathways for this industry. What do workers really do? What kind of education is needed? What STEM subject background prepares a student for these careers? How much money can employees make? (especially important for high school students)
- Have staff address the group after the tour for a question and answer session
- Give-aways from the host or tour coordinator are always popular
- Stress the importance of math and science.

SAFETY / PPE

So far, every location we have visited that requires eye and ear protection on the shop floor has provided the proper SAFETY GLASSES (regardless if students wear glasses or not) and EAR PROTECTION to anyone going through the shop door. Although we have some spares, various plants have different requirements and prefer to supply their approved OSHA items. It will require your vigilance to see that they stay on and in the proper place. Also, due to OSHA requirements, just make it understood that all students will wear the proper enclosed foot wear, which means no high heels, open-toes or open-heels. Long, loose hair should be contained, and many places also require the legs to be covered and no open midriff blouses...keep it covered neck to ankles.

PHONES/CAMERAS/FLASH MEMORY DEVICES

Many locations today will not allow photography equipment within the manufacturing facility for numerous reasons, all of which must be complied with. Today, just about every cell phone has a camera so those would not be allowed either. If it is a defense contractor, in addition to no phones, no recording devices of any type (memory sticks, etc.) are allowed. These are all best left on the bus or at the Security Desk. They will be taken away from students and teachers if discovered. To save embarrassment to you and the school, and to save time entering the facility, check all this out ahead of time, explain it as best as possible to the students, stick to the rules, and confine if necessary. Yes, improperly dressed or uncooperative students have occasionally spent their time on the bus during a tour.

Maximizing impact for the tour

FLATE's Industry Tours are designed to introduce students to the world of modern manufacturing, stimulate their interest in the supporting careers, and encourage enrollment in the essential technology programs available throughout the state of Florida. We have found that preparation is the key to success. Follow-up surveys with our industry partners contain such comments as:

"Prepare the students for the tour with a reason for them to pay attention. Activities like a treasure hunt, a survey, a fact finding project, prepare a proposal, something that would engage them more than just a show and tell."

Pre-tour curriculum resources and preparation

Preparation for a tour can best be done by having the students go through a discussion following the *"What Is Manufacturing"* video (located on www.madeinflorida.org under the video tab). By doing this ahead of time, they will be better equipped to spot manufacturing processes during the tour and focus on what is happening around them. (See appendix) This is a perfect opportunity for the teacher to tie in careers, career pathways, and the importance of Science, Technology, Engineering, and Mathematics subjects (especially the T & E parts of STEM); a career lesson is also appropriate as a post-tour subject. Refer to **"FLATE's classroom teaching materials"** for pre-tour lessons on page 11. One activity which incorporates research skills, writing, and the use of computer technology is an exploration of the website of the host company for product, process, and career information.

The field trips discussed in this guide are designed to engage students. Groups of 4-5 students benefit most when field trips involve hands on activities, a knowledgeable tour guide, and the opportunity to ask questions. The following points are worth considering when conducting a field trip.

During the tour – Student engagement

Chaperons/educators should help keep students organized, together, and on their best behavior. Also encourage students to ask questions. Both educators and company hosts should help keep students interested and engaged. Refer to **"Tips for Company Host"** on page 8 for creating and conducting the tour. This helps the students better understand the requirements of the working environment. Also, use introduction time to emphasize safety in the facility.

Post-tour curriculum resources and follow-up

Administer a Post-tour Survey (see appendix) immediately after the tour, (perhaps on the bus ride back to school). A thank you note to the facility personnel along with a summary of the survey results, if used, is really appreciated as it provides materials for their community service files. In addition to the Post-tour survey, provide a follow up lesson where students reflect and expand on their experience. Refer to **"FLATE's classroom teaching materials"** on page 11. Provide recognition to your host in the form of a Certificate of Appreciation/Plaque. Follow up to see if the tour worked well for your host. Make notes about what you would change for next time. Publicize the tour in the district and/or community with stories and photos.

Industry Prepare
Tours encourage
engage
STEM-u-late
ask questions



FLATE's classroom teaching materials

Utilizing a comprehensive curriculum both before and after the tour is the key to students making the most of the field trip experience. Supplementary materials support instructor goals and provide tangible products for students related to manufacturing and careers. FLATE provides a series of online lesson plans, handouts, and virtual tours to use prior to the tour to start students thinking about manufacturing, and after the tour to keep the interest and enthusiasm going.

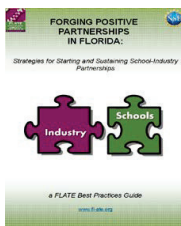
- Samples of pre/post tour lesson plans may be found in the appendix; complete pre/post tour curriculum is available on FLATE's resource for educators at www.flate.pbwiki.com
- Career pathways interviews, virtual tours, videos, online curriculum resources and links are available for K-20 educators at www.madeinflorida.org developed around local industries on the www.flate.pbwiki.com site. These are complete lesson plans designed by engineers and educators to make the most of the experience.
- The *Made in Florida* video about manufacturing in the State of Florida is available on the web at www.madeinflorida.org. It's chapter format lends it to classroom use, "Postcard" handouts (see appendix) and additional information are available by sending a request to outreach@fl-ate.org. There are many student handouts available for teachers to print or download from the above websites, and range from coloring books to curriculum challenges and STEM puzzles.
- Career/college information sessions are great ways to revisit the tour experience and resources are available on the *Made in Florida* website.
- Contact FLATE to learn more about the possibility of arranging a classroom presentation on manufacturing or a "Made in Florida" Industry Day at your school. (Either virtually or in person.)



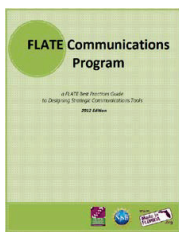
FLATE's wiki
...full of great **FREE RESOURCES** for you!

FLATE Best Practice Guides

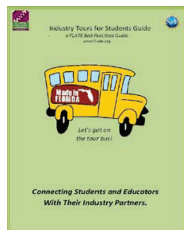
All FLATE Best Practice Guides are available online, or for download at:
<http://www.fl-ate.org/best-practices/>



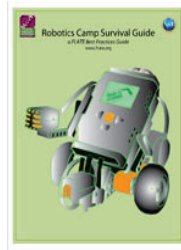
Forging Positive Partnerships in Florida



Communications Best Practices Guide



Industry Tours for Students Guide



The Robotics Camp Survival Guide

Appendix

Industry Tours Planning Checklist

Planning (Allow at least 4 weeks prior to the trip)

- ☐ Find your location
- ☐ Visit the site to see if this will be an appropriate, exciting site to visit for you and your students
- ☐ Decide how much time you are going to use for your tour
- ☐ Determine transportation costs involved
- ☐ Determine how you will fund your event
- ☐ Finalize the date and time for your event and make note of any facility requirements
- ☐ Contact the transportation company you have selected to make arrangements
- ☐ Compose a list of pertinent contact telephone number and email addresses

Pre-Tour

- ☐ Distribute and collect field trip release forms from students
- ☐ Compose a letter that provides all of your facts and distribute to all parties (hosts, teachers)
- ☐ Develop pre-tour lesson plan with pre-tour curriculum and activities
- ☐ Contact and confirm your parent-helpers or teacher aids if appropriate
- ☐ Contact and confirm number of students, pick-up time, and place with your transportation provider
- ☐ Finalize tour numbers a week before and send to host.

Tour Day

- ☐ Ensure all students are appropriately dressed and are not carrying inappropriate devices
- ☐ No food or drinks carried on the bus
- ☐ Bring a list of students names (required by many facilities)
- ☐ Bring a hard copy of the contact letter you prepared with your list of contacts
- ☐ Bring student handouts (if applicable), student post tour surveys and don't forget pencils and pens!

Post-Tour

- ☐ Administer post-tour survey to students
- ☐ Provide a follow-up lesson where students may reflect on their experience
- ☐ Provide a press release with photos and/or story about your tour to your school's web site
- ☐ Send a thank you note and certificate of appreciation to appropriate facility personnel
- ☐ Follow up to see if the tour worked well for your host
- ☐ Make notes about what you would change for next time
- ☐ Publicize your tour

February 11, 2013

All Adventure Buses
Phone: (940) 555.1212
Fax: (940) 555.1122

Good Afternoon Everyone:

Here is information concerning the trip between South Port Senior High School and Domino Player Industries to take place on April 7, 2011. The group will be no more than 35 passengers.

April 7, 2011

South Port SHS to Domino

South Port SHS
6000 Priceless Blvd.
South Port, FL

Domino Ind.
1000 High-tech Circle
Winter Haven, FL

School Contact:
Doug Mann
Teacher Facility
941.555.1212 c

Company Representative:
Millie Grove
Manager
941.911.1919 c

Board students/teacher(s) at the school in order to leave by 9:15am, arriving at the Domino facility by approximately 10:00am. *I will meet the bus at the facility.*

Re-board students/teacher(s) at plant site by 11:30am, returning to school by 12:15 pm (They may stop for lunch along the way).

If there are any questions about the tour or changes to the schedule, please call me first (Use the cell phone number for a quick response) and I will contact all those involved.

Name

Outreach Manager/FLATE
Florida Advanced Technological Education Center
outreach@fl-ate.org
Office 813.259.6577
FAX 813.259.6576



Pre & Post Tour Lesson Plans

Made in Florida Tours

to Enhance Student's Experience

NATURE OF CHALLENGE:	GRADE LEVELS
Students will learn about the company they will be visiting	6-8
TARGETED SUBJECT AREA/S	MANUFACTURING LEVEL
Career planning, technology integration	Innovate, Design, Fabricate, Test, Market and Distribute
LEARNING OBJECTIVES – The Students Will....	TIME FRAME
Identify possible career interests Become aware of career options and skills needed Learn how to behave in a professional environment	Suggested three class periods to discuss, plan, and report on the company tour experience and one day to tour the company.

The complete lesson plan is located at www.madeinflorida.org

Part A - Pre-Activity Questions and Activities:

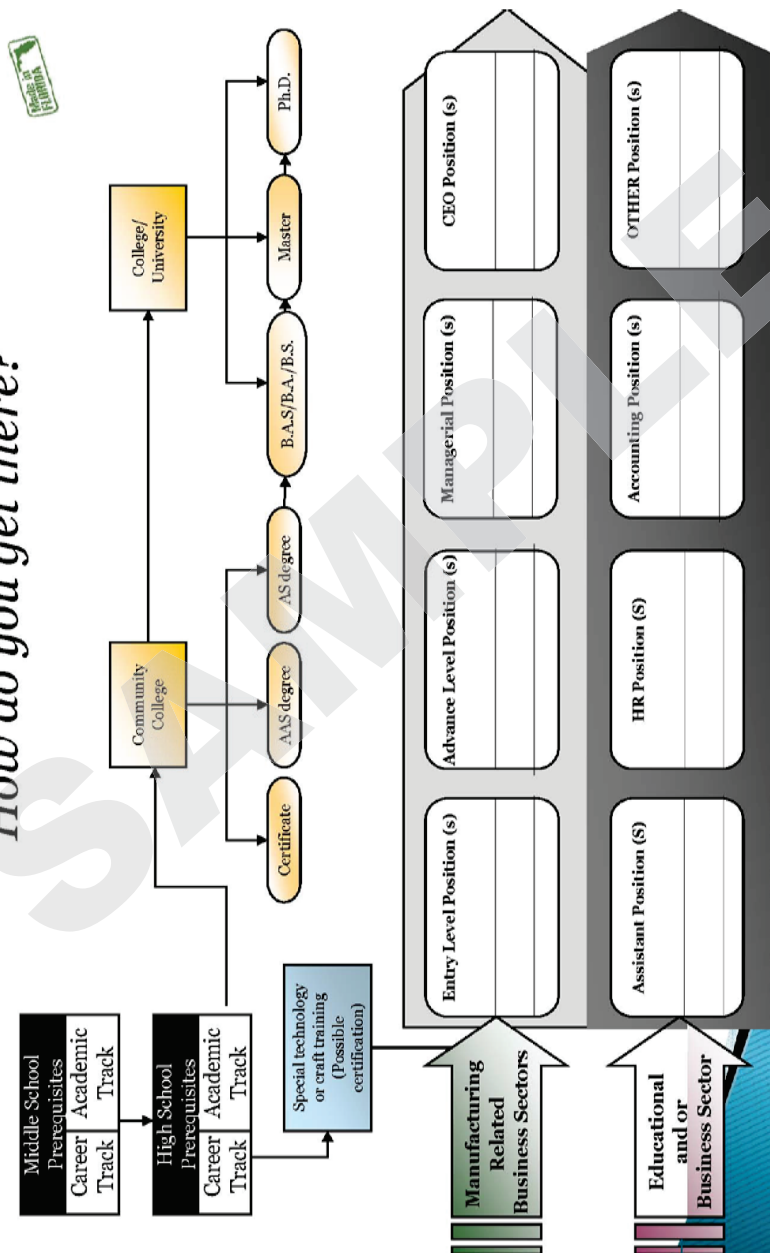
1. What is the name of the company you will be visiting?
2. What products or parts do they make? If they make parts, what is the finished product?
3. Research job opportunities within the company and find out about educational and skill requirements for the job.
4. Write 2 or 3 questions you would like to know about the company you are going to visit.

Part B- Engineer's Report: Post Tour Activity

1. List the name of the company you visited and describe three jobs you saw employees perform in the company tour. What are the jobs you think are the most interesting?
2. How do these jobs use science, technology, engineering and/or math (STEM)?
3. Plan out the education and career pathway you would need to take from this point, in order to be capable of working in one of the jobs you described in question number 1. (Use the provided "Career Pathway" blank worksheet).
4. What is the company doing for sustainability and to help protect the environment?
5. Predict new products this company might have or variations to existing products.
6. Do you see yourself in this career field? Why or why not?

Path your Career

How do you get there?





Post-Visit Survey – FLATE Advanced Manufacturing Tour

Thank you for joining our tour today!



Surveys are anonymous. You do not have to write your name on this survey. We would like to know the following:

Male ☐ Female ☐ Grade in School: _____

Ethnicity: Asian ☐ Black ☐ Hispanic ☐ White ☐ Other _____

Instructions: Please circle YES or NO for each statement. Read the statements carefully. 1) Is a short answer question.

1) What did you like most about this tour? (Please write at least two sentences and use the back of this page if needed.)	
YES / NO	2) I was considering a career in advanced manufacturing before this tour.
YES / NO	3) My teachers have talked about advanced manufacturing with my class.
YES / NO	4) Today I learned about technologies used in advanced manufacturing.
YES / NO	5) This tour gave me new information about careers in advanced manufacturing.
YES / NO	6) The tour helped me understand how STEM subjects learned in school (science, technology, engineering and math) are used to work in advanced manufacturing industries.
YES / NO	7) I would recommend that other students have the opportunity of this tour.
YES / NO	8) After taking this tour, I am considering a career in advanced manufacturing.

Please use the back of this page for any additional comments you wish to share.

“Made In Florida” website postcard



How to Print this Guide

If you would like to print your guide in a “booklet” format (from the original .pdf file), please use the following steps, you will need a printer that can print double sided documents:

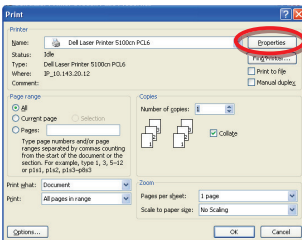
Step 1 – Select *Properties* (please make sure you are using a printer that prints double sided documents).

Step 2 – select Booklet/Poster/Mixed

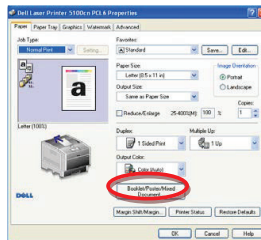
Step 3 – select Booklet Creation and then click OK

Step 4—select Margin Shift/Margins, Print Position Tab, Center, then click OK

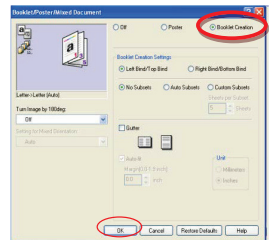
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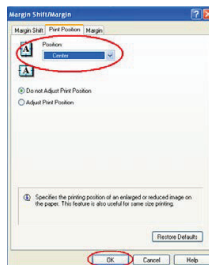
Step 2 – select *Booklet/Poster*



Step 3 – select *Booklet Creation*



Step 4 – select *Margin Shift/Margins*



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