Portfolio Project
EDUC 765: Trends and Issues in Instructional Design

By: Amy Koshoshek-Winkler

Submitted June 20, 2019

Contents

Project Proposal – Module 2

EZ BLOCK SIZER SOFTWARE APPLICATION TRAINING

SPONSORING ORGANIZATION

Die Cast Consulting, Inc. is a die cast engineering consulting company. They provide consulting services for die cast design, process engineering and product development.

PROJECT DESCRIPTION

New EZ Block Sizer web-based software application

The EZ Block Sizer software application accurately calculates the evacuation area and size of a device used to evacuate a die casting cavity used in the high pressure die casting process. The software application utilizes a series of casting and machine attributes to perform calculations providing a result that is used in selecting the device size.

Porosity (air entrapment) is inherent in the high pressure die casting process and is detrimental to the required quality levels acceptable in the production of die castings. The die casting process involves the injection of molten metal under high pressure into a die casting cavity. During the injection phase of the process, air is mixed with the molten metal and creates porosity. Thus a means of reducing the porosity in the die casting is necessary. This is accomplished by providing a means of reducing the porosity (air entrapment) during the injection of the metal. An evacuation device is used to accomplish this.

Die casting companies utilize various methods of evacuating die casting cavities. The application is used by the manufacturer of a specific evacuation system in determining the area and subsequent size of the device for their customers (die cast producers). The manufacturer of the device can accurately determine the best size and style of the evacuation device for the die caster with a minimum amount of time.

AIM

Help engineers (users) generate accurate and timely inquires and block sizing (recommendations for customers) when calculating sizes for vent and/or vacuum blocks using the new EZ Block Sizer web-based software application.

TARGET AUDIENCE

Die cast engineers at ABC Company who provide recommendations to their customers and businesses regarding the use of vent and/or vacuum blocks in the manufacture of their specific products. Currently there are two mechanical engineers, a sales manager and an owner in one location and most of them have been with ABC Company for at least 2 years.

DELIVERY OPTIONS

I would choose face-to-face and/or blended training because this is customized software for a very specialized and small group of learners currently in one location. An important part of the face-to-face training would include the ability to interact with the software in a demo/test environment via the internet. I also believe there is benefit in supplying a copy of the PowerPoint presentation and/or job aids such as quick reference guides as additional resources for the learners to access after the training is conducted.

Front-End Analysis: Instructional Need – Module 3

INSTRUCTIONAL NEED

Currently ABC Company relies on contacting an outside consultant to supply important vent and/or vacuum block measurements to potential customers for future die cast products. In the near future, ABC Company will be able to access and use a new EZ Block Sizer web-based software application that allows mechanical engineers (and/or sales employees) to enter specific information into a software application and create an inquiry and block sizing request for proposal (RFP) for vent and/or vacuum blocks for a potential die cast customer. This is a new process and software application that will be utilized by a few employees at ABC Company and they will need to be instructed on the proper terminology and use of the new software application. Learning how to use the new software application effectively will help the engineers create and/or modify an inquiry and RFP for their customers in less time than it does now utilizing an outside consultant.

Front-End Analysis: Learner Characteristics – Module 3

LEARNER ANALYSIS

Through a survey and various emails (questions) I conducted with the SMEs, I was able to define the following learner characteristics. (If this was a project that involved a larger group of learners, SMEs and stakeholders, I would conduct a follow-up conference call/or emails to clarify any of my outstanding questions about the learners that I included in the survey. (See example of survey questions I emailed in the Appendix.)

Primary Audience

- Mechanical Engineers (2)

Secondary Audience

- Sales Manager
- Company President (owner)

General Learner Characteristics

- Age: 41 – 50
- Gender: 100% men
- Education: Post-secondary (associate or college degree)
- Work experience: two years at ABC Company, 5 to 10 years in engineering, less than two years in die casting industry.

Entry Characteristics (prerequisite skill or knowledge)

- The learners are familiar with using a computer and accessing a company intranet, VPN and/or internet.
- The learners are familiar with the die casting industry and terminology used in the die casting process and the software application.

Attitude and Motivation:

- The learners are motivated to learn the new process and software because in the past it was outsourced and took too long to gather the information needed for inquiries and block sizing.
- The learners want to learn how to use the software, as well as understand how it derives the results that it does (understand the underlying equations).

Prior Experience:

- The learners have general knowledge how to log in to a website and enter information into a spreadsheet and/or search engine search field.
- The learners are familiar with the die casting process.

CONTEXTUAL ANALYSIS

Orienting Context

- Since this is a new process and software, the learners want to understand the new process, software terminology and calculations used in the software.
- The learners want to learn how to use the new software to provide their customers with accurate and timely block sizing.
- The learners believe that learning to use the new software will promote faster inquiries and block sizing (better customer service experience) and generate potential new business opportunities and increased sales for the company (possibly creating an opportunity for profit sharing and/or bonuses paid to employees).
- The learners are aware that some level of experience is needed to utilize the software and that it may take some time to fully understand the process.
- The learners have some concern about their ability to understand the calculations that are the heart of the application.

Instructional Context

- Schedule the training for three or four (two-hour) sessions at ABC's company office. Ideally scheduling these from 9:00 to 11:00 a.m. (CT) on a Monday, Wednesday and Friday, thus allowing the learner to absorb the content with a day in between.

- Access to good lighting with the ability to dim lights if necessary.

- Conduct the training in a small conference room or office with a door to control the noise.

- Access to control the temperature in the small conference room or office.

- Seating should allow for two tables and at least four to six moveable chairs.

- No hotel or housing accommodation is necessary.

- Access to a computer and projector to display the PowerPoint presentation and EZ Block Sizer software is needed. In addition, there is a need for the appropriate cable connection to the projector and access to the internet and/or VPN to access the software.

- Learners are employees of ABC Company and already have their mode of transportation to the company facility.

Technology Inventory

- The learners will have access to computers and the EZ Block Sizer software via the internet and/or VPN during the training and after the training is complete.

- The learners will also have access to a phone to conduct any additional conversations with the SMEs.

Transfer Context

- The learners will have access to computers and the EZ Block Sizer software via the internet and/or VPN. The learners will be able to use the software as often as they want after the training is complete.

- The leaners will have opportunities to use the software in the training sessions and after the training is complete.

- The learners will have access to the PowerPoint presentation and job aids after the training is complete.
- The learners will have ongoing access to the consultant who developed the patented process.

Instructional Impact Based Upon Learner Characteristics

APPLICATION OF LEARNING THEORIES

Taking into consideration this training is for adult learners, I would apply the following adult learning theories of Andragogy (Malcolm Knowles) and Constructivism (Jerome Bruner) to this project.

According to the Andragogy theory (Knowles), adults want to know why things are being taught a specific way. This need ties in nicely with constructing the content of this training in a logical and sequential order based on how the learners interact with the software (Constructivism, Bruner). There is a sequential order to how learners need to interact with the software because of how the information used in the software is connected. The adult learners bring a lot of previous experience to the learning experience, which is why it is important to allow the learners to discover things for themselves while working with the software and filling in the gaps relevant to their experience. A significant component of learning how to accurately use this software involves the analytical skills of an experienced mechanical engineer and thus lends itself to a lot of task-oriented and learning activities that engage the mechanical engineers (i.e. entering correct and/or incorrect values and then comparing and calculating different value scenarios). Guidance will be available to the learners when mistakes are made.

APPLICATION OF MOTIVATIONAL THEORIES

Taking into consideration that this training is for adult learners, I would apply the following motivational theories and/or approaches to this group of learners. These ideas and approaches tie into Andragogy and John Keller's ARCS motivation theory. (Keller). I also believe the Expectancy Motivational Theory (Straker) ties in nicely to this project because the learners believe there is value of the perceived outcome and that they will be able to complete certain tasks and achieve a desirable outcome (successfully understand how to use the software).

- Explain how the information in the training is going to help them solve problems they regularly encounter. Have a learner share a most recent example and/or create a bad example (Attention / Orientation to Learn).
- Explain the valid reason behind learning the new information and show them the benefit of learning and using the software correctly – a correct example vs. an incorrect example (Relevance / Motivation to Learn).
- Explain the benefits of learning to use the software correctly will benefit them, the company and possible increased sales, and if applicable, company profit sharing if tied to performance reviews (Relevance).
- Encourage learners to share previous experiences of when they used similar software applications and/or industry related experiences (Confidence / Prior Adult Learner Experience).
- Encourage learners to interact with others to create a social aspect and collaboration with other learners. Have the learners encounter an error creating an inquiry and block sizing (RFP) and determine what went wrong (Confidence, Satisfaction / Readiness to Learn).
- Encourage experiences with minimal instruction by introducing the instructions/training with various scenarios to problem solve (Satisfaction / Self-Concept).

The primary audience for this project is 100% Caucasian males with no known disabilities. If the learner audience for this training was more globally diverse, I would suggest accommodating longer scheduled training sessions and/or the use of webinars (due to multiple geographical locations). Through a survey and/or conference call, I would try to find out what type of scenarios or problems a more diverse learner could or would encounter using the software. Since understanding the terminology and the calculations used behind the software and process is complex, I would suggest more emphasis on learning the terminology and how it may differ in other cultures and/or countries. Similar to the North America Die Casting Association (NADCA), I would search out additional resources (via the internet) on die cast terminology used in other countries and supply access to those resources if necessary. I would supply the training materials (PPT) and/or recorded sessions (with closed captions for those with hearing disabilities) for future training needs.

Goal and Task Analysis – Module 5

Step 1 - Write down the goal(s)

Original goal(s):

Original AIM/Goal: Help engineers (users/learners) generate accurate and timely inquiries (recommendations for customers) when calculating sizes for vent and/or vacuum blocks using the new web-based EZ Block Sizer software.

Step 2 - Write down everything a learner would have to know, say, or do for you to agree that the learner has achieved the goal.

- Have access to the internet
- Obtain a user name and password from the EZ Block Sizer administrator via email.
- Open a web browser
- Enter the secured EZ Block Sizer application URL to navigate to the EZ Block Sizer software Log in page.
- Obtain a customer information sheet
- Navigate to the various pages in the EZ Block Sizer software application.
- Navigate to the inquiry page in the EZ Block Sizer software application.
- Create a new inquiry. (Enter specific information into Create Inquiry page/pop-up)
- Save a new inquiry
- Enter the customer's die cast information in the Block Sizing page.
- Verify the input values are within 15% of ABC Company's calculated casting information parameters (allowed variances).
- Verify the information received from the customer is appropriate for the block size output.

11

- If necessary, contact the customer via phone or email to confirm or update the information they supplied.

- Search for an existing inquiry in the EZ Block Sizer software.

- Make updates to an existing customer inquiry and block sizing.

- Email the Block Sizing Results inquiry and block sizing output section I to customer (within 5 days after the completed customer form was received).

Step 3 - Sort the items listed in step 2.

Prerequisite

- Have access to the internet

- Obtain a user name and password from the EZ Block Sizer administrator via email.

- Obtain a customer information sheet.

Access Software

- Open a web browser

- Enter the secured EZ Block Sizer software application URL to navigate to the EZ Block Sizer software Log in page.

Navigate the Software

- Navigate to the various pages in the EZ Block Sizer software.

- Navigate to the inquiry page in the EZ Block Sizer software.

- Create a new inquiry. (Enter specific information into Create Inquiry page/screen)

- Save a new inquiry.

- Search for an existing inquiry in the EZ Block Sizer software.

Enter and Verify Information

- Enter the customer's die cast information on the Block Sizing page.

- Verify the information received from the customer is appropriate for the hot or cold chamber block size output.

- Verify the input values are within 15% of ABC Company's calculated casting information parameters.
- If necessary, contact the customer via phone or email to confirm or update the information they supplied.
- Make updates to an existing customer inquiry and block sizing.

Send Accurate Vent and Vacuum Block Sizing to Customer
- Email the Block Sizing Results inquiry block sizing output section to customer (within 5 days after the completed customer form was received).

Step 4 - Write a complete sentence to describe each of the items on your final list.

Prerequisites:
- Obtain a user name and password from the EZ Block Sizer software application administrator via email.
- Have access to the internet via a computer.
- Obtain a customer information form from the customer. (The customer information form is sent to ABC Company via email).

Access EZ Block Sizer Software Application
- Using a computer, open a web browser and enter the secured EZ Block Sizer application URL to navigate to the EZ Block Sizer software application Log in page.
- On the EZ Block Sizer Log in page, enter a user name and password obtained from the EZ Block Sizer software application administrator.

Navigate EZ Block Sizer Software Application
- Navigate to the various pages in the EZ Block Sizer software application. Pages include: Home, Inquiries, Block Sizing (Used for entering customer input, viewing and output), Machines Database.

Enter and Verify Customer Information

- From the customer information form create a new inquiry. (Enter specific information into Create Inquiry page/screen.)

- Save a new inquiry by clicking Save on the Inquiries page (pop-up).

- Search for an existing inquiry in the EZ Block Sizer software application.

- After creating the new inquiry, enter the customer's die cast information in the fields on the Block Sizing page.

- Using a calculator, verify the input values are within 15% of ABC Company's calculated casting information parameters. (The calculated casting information parameters values are read-only in the casting information section of the EZ Block Sizer software application.)

- Review and verify the information received from the customer is appropriate for the block size output. (If necessary, contact the customer via phone or email to confirm or update the information they supplied.)

- If applicable, make updates to an existing customer inquiry and block sizing values.

Send Accurate Vent and Vacuum Block Sizing to Customer

- Email the Block Sizing Results inquiry and block sizing output section in the lower right-hand table of the Block Sizing page to the customer (within 5 days after the completed customer form was received).

INSTRUCTIONAL GOAL

Using the web-based EZ Block Sizer software application and a customer information form, the mechanical engineer will be able to search, enter, analyze, produce and send accurate and timely customer inquiries and block sizing information (within five days of receiving a customer information form) for vent and vacuum blocks used in die cast manufacturing.

I selected the procedural task analysis because learning how to use the EZ Block Sizer software successfully involves logical and sequential steps.

TASK ANALYSIS

Follow the steps below to access and use the EZ Block Sizer software application.

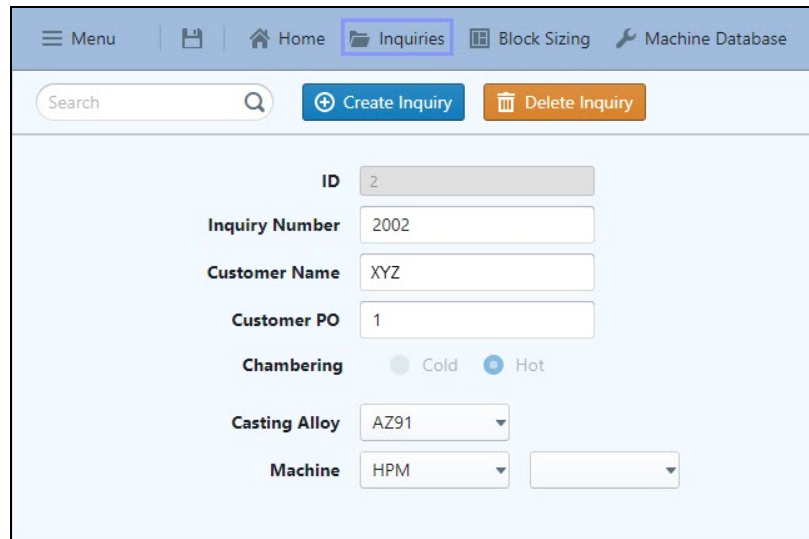### **Log in**

To log in to EZ Block Sizer software application:

1. On your computer, open a web browser.
2. Enter the EZ Block Sizer URL [URL address here] into the browser address field.
3. Press **Enter** on your keyboard. The EZ Block Sizer Log in page displays allowing you to enter your log in credentials.
4. On the EZ Block Sizer Log in page, select **Log in**. The Security Verification Log in page displays allowing you to enter your user name and password.
5. Enter your User Name and Password. (These credentials where supplied to you by the EZ Block Sizer software application administrator.)
6. Press **Enter** on your keyboard. The EZ Block Sizer Home page displays allowing you to navigate to the various pages of the EZ Block Sizer software application.

Note: To log out of the EZ Block Sizer software application, select **Log out**.

(For proprietary reasons, the security log in page is not available for this document.)

Inquiries Page

Search for Inquiries

To search for an existing inquiry:

1. Log in to the EZ Block Sizer software application. (See Log in steps.)
2. On the menu bar, select **Inquiries**. The Inquiries page displays allowing you to choose an inquiry option. Options include: Search, Create Inquiry and Delete Inquiry.
3. In the Search field (located in the upper left-hand corner next to the magnifying glass icon), enter the existing Inquiry Number and/or Customer Name and press **Enter** on your keyboard.
4. If more than one inquiry exists for the search criteria entered, the Select an inquiry… list pop-up displays allowing you to select the inquiry you want to view and edit. Select the blue circle icon located to the left of the Inquiry Number you want to view. The information detail for the inquiry is then displayed on the Inquiry page.
5. If applicable, update the inquiry information and then select **Save**.
6. To view and/or edit details of the block sizing, select **Block Sizing**. The Block Sizing details page displays allowing you to make any necessary edits.

Enter New Customer Inquiry Information:

Using the customer information form, enter the following information on the Inquiries page (pop-up):

1. Log in to the EZ Block Sizer software application. (See Log in steps.)
2. On the menu bar, select **Inquiries**. The Inquiries page displays allowing you to choose an inquiry option. Options include: Search, Create Inquiry and Delete Inquiry.
3. Select **Create New Inquiry**. The Create Inquiry pop-up displays allowing you to enter information for the new inquiry.
4. Enter (or select where applicable) the following information:
   a. **Inquiry Number**: Enter the five digit number used to identify the inquiry.
   b. **Customer Name**: Enter the customer name.
   c. **Customer PO**: Enter customer purchase number (optional).
   d. **Chambering**: Select Cold or Hot chamber.
      Note: The input selected here will determine the input fields and values generated on the Block Sizing page associated with this inquiry.
   e. **Casting Alloy**: Select the alloy to be cast (these are pre-set values).
      i. Aluminum – 380, 390, ZA-12, ZA-27 cold chamber only
      ii. Zinc – Zamak 3, Zamak 5, ZA8 hot chamber only
      iii. Magnesium – AZ91, AM50 cold and hot chamber
   f. **Machine**: Select the machine from list by Manufacturer Name and Model ID.
      Note: To reference information associated with die cast machines, select **Machines Database** on the menu bar.
5. Select **Save**.

   Important: A Block Sizing page is generated (including any ABC Company pre-set parameter values) for this inquiry based on the values you entered and selected on this Inquiry page. See the appropriate Block Sizing page steps for either Cold or Hot chamber to continue entering information for this customer inquiry and block sizing.

6. To continue entering information for the new inquiry, select **Block Sizing** on the menu bar. The Block Sizing page displays allowing you to enter additional information. (See Block Sizing page steps.)

Customer Cold Chamber Casting Information Input on the Block Sizing Page

NOTE: These steps are specifically for **Cold Chamber** inquiries and block sizing. Some of the input and output values listed on this page will differ from a Hot Chamber inquiry and block sizing. Values entered on this page automatically calculate/recalculate as more information is entered.

(Fictitious data used for this document)

Using the customer information form, enter the following customer information on the Block Sizing page.

1. **No of Cavities**: Enter the correct number of cavities. (Review to assure the number of cavity/s is the same part of a family die.)
2. **Part Weight**: Enter the Part Weight. (Confirm that the weight is reasonable based on the "thru gate weight and shot weight" and also assure part weight is either each part or total or all parts being cast.)
3. **Thru Gate Weight**: Enter the part weight plus overflows. (Confirm that the weight is reasonable based on the part weight and shot weight.)
4. **Shot Weight**: Enter the shot weight. (The thru gate weight plus biscuit and runners. Confirm that the weight is reasonable based on part weight/s and thru gate weight.)
5. **Machine Tonnage**: Enter the machines locking tonnage value.
6. **Hydraulic Pressure**: Enter the die casting machine hydraulic system pressure.
7. **Accumulator Pressure**: Enter the fast shot accumulator pressure used to generate the fast shot speed (metal inject speed) normally 10% less than hydraulic pressure.
8. **Cylinder Diameter**: Enter the die casting machine injection cylinder diameter.
9. **Max Dry Shot Speed**: Enter the maximum speed the die casting machine can develop without metal to inject (measured by the die caster with the speed control valve fully open).
10. **Fast Shot Speed**: Enter the injection speed used to fill the cavity/s. (Confirm the speed is reasonable and is achievable using the die casting machine selected.)

11. **Total Gate Area**: Enter the total gate areas of all parts. (Confirm this number is reasonable based on part weight/s.)
12. **Cavity Fill Time**: Enter the time required to fill the cavity/s completely using the fast shot speed.
13. **Metal Density**: Enter the density of the alloy being die cast.
14. **% of Dry Shot**: Enter the percent of the dry shot (max dry shot speed normally 50%).
15. **Shot Sleeve Diameter**: Enter the diameter of the shot sleeve.
16. **Shot Sleeve Length**: Enter the length of the shot sleeve.

ABC Company Cold Chamber Casting Information Input on the Block Sizing Page

NOTE: These steps are specifically for **Cold Chamber** inquiries and block sizing. The input and output values listed on this page will differ from a Hot Chamber inquiries and block sizing. Where appropriate, enter the correct values for ABC Company. Some values are automatically calculated and generated based in the initial inquiry and machine. Values entered on this page automatically calculate/recalculate as more information is entered.

1. Log in to the EZ Block software application. (See Log in steps.)
2. Search for the appropriate inquiry. (See Search for Existing Inquiry steps.)
3. Select **Block Sizing**.
4. **No of Cavities**: Enter the same number of cavities as customer.
5. **Part Weight**: Enter the same part weight as customer.
6. **Thru Gate Weight**: This is part weight plus all metal weight that will flow through the cavity or cavities during cavity fill (calculated using part weight/s plus 10%).
7. **Shot Weight**: This is the thru gate weight plus biscuit, gate/s and runners (calculated approximately 20%).
8. **Machine Tonnage**: The locking tonnage of the die casting machine used to die cast the part/s (**generated** from machine selected).
9. **Hydraulic Pressure**: The system pressure developed by the die casting machine (generated from machine selected).
10. **Accumulator Pressure**: The fast shot accumulator pressure used to inject the metal into the die casting cavity/s (generated from machine selected).
11. **Cylinder Diameter**: The diameter of the die casting machine injection cylinder (shot cylinder) (generated from machine selected).
12. **Max Dry Shot Speed**: The maximum speed the die casting machine can develop to inject metal into the die casting cavity/s (generated from machine selected).
13. **Fast Shot Speed**: The actual speed used in the injection of metal into the die casting cavity/s (calculated).
14. **Total Gate Area**: Enter the total or combined area of the inlet gates to fill the die casting cavity/s.
15. **Cavity Fill Time**: The time required to fill the die casting cavity/s with molten metal (calculated).
16. **Metal Density**: Enter the density of the die casting alloy used to produce the die casting/s.
17. **% Dry Shot**: Enter a percentage of the max dry shot speed used to actually produce the die casting/s (input adjusted to develop fast shot speed).
18. **Shot Sleeve Diameter**: Enter the diameter of the cold chamber or shot sleeve which is used to hold the molten metal prior to injection.
19. **Shot Sleeve Length**: Enter the usable length of the shot sleeve measured from the parting line to the face of the shot tip when tip is in the shot sleeve.

Cold Chamber Results Table:

Cold chamber results calculated:

- **Shot Volume**: The shot volume less biscuit.
- **Sleeve Volume**: The diameter of sleeve X sleeve length.
- **Total Volume**: The shot volume + sleeve volume.
- **Max P**: The maximum pressure developed by die casting machine.
- **Max Q**: The maximum flow rate developed by die casting machine.
- **Flow Rate Q**: The flow rate of molten metal into the cavity/s.
- **Gate Velocity**: The inlet gate metal velocity.
- **Shot Weight***: The shot weight less biscuit.

Block Sizing Results for Cold Chamber

The selection of the area and subsequent block number should be determined by the number of cavities, die casting part configuration/s and die casting die configuration.

NOTE: Use the largest calculated area from either ABC Company or Customer.

- ABC Company: Vacuum is based on calculation results area.
- ABC Company: Vent is based on calculation results area.

- Customer: Vacuum is based on calculation results area.
- Customer: Vent is based on calculation results area.

Customer Hot Chamber Casting Information Input on the Block Sizing Page

NOTE: These steps are specifically for **Hot Chamber** inquiries and block sizing. The input and output values listed on this page will differ from a Cold Chamber inquiry and block sizing. Values entered on this page automatically calculate/recalculate as more information is entered.

(Fictitious data used for this document)

Using the customer information form, enter the following customer information on the Block Sizing page.

Hot Chamber Customer Input

1. **No of Cavities**: Enter the correct number of cavities. (Review to assure the number of cavity/s is the same part of a family die.)
2. **Part Weight**: Enter the Part Weight. (Confirm that the weight is reasonable based on the "through gate weight and shot weight" and also assure part weight is either each part or total or all parts being cast.)
3. **Thru Gate Weight**: Enter the part weight plus overflows. (Confirm that the weight is reasonable based on the part weight and shot weight.)
4. **Shot Weight**: Enter the shot weight. (The thru gate weight plus biscuit and runners. Confirm that the weight is reasonable based on part weight/s and thru gate weight.)
5. **Machine Tonnage**: Enter the machines locking tonnage value.
6. **Hydraulic Pressure**: Enter the die casting machine hydraulic system pressure.
7. **Accumulator Pressure**: Enter the fast shot accumulator pressure used to generate the fast shot speed (metal inject speed) normally 10% less than hydraulic pressure.
8. **Cylinder Diameter**: Enter the die casting machine injection cylinder diameter.
9. **Max Dry Shot Speed**: Enter the maximum speed the die casting machine can develop without metal to inject (measured by the die caster with the speed control valve fully open).

10. **Fast Shot Speed**: Enter the injection speed used to fill the cavity/s. (Confirm the speed is reasonable and is achievable using the die casting machine selected.)
11. **Total Gate Area**: Enter the total gate areas of all parts (Confirm this number is reasonable based on part weight/s.)
12. **Cavity Fill Time**: The time required to fill the die casting cavity/s with molten metal (calculated)
13. **Metal Density**: Enter the density of the die casting alloy used to produce the die casting/s.
14. **% Dry Shot**: Enter a percentage of the max dry shot speed used to actually produce the die casting/s (input adjusted to develop fast shot speed).
15. **Plunger Diameter**: Enter the diameter of the plunger tip used to inject the metal in a hot chamber die casting machine normally mounted vertically in the goose neck assembly.
16. **Plunger Stroke**: Enter the distance the plunger travels in the goose neck to inject metal into the die.
17. **Nozzle Diameter**: Enter the diameter of the nozzle used to feed metal from the goose neck to the sprue bushing.
18. **Goose Neck Length**: Enter the length of the goose neck available for injecting the metal.

ABC Company Hot Chamber Casting Information Input on the Block Sizing Page

NOTE: These steps are specifically for **Hot Chamber** inquiries and block sizing. The input and output values listed on this page will differ from a Cold Chamber inquiries and block sizing. Where appropriate, enter the correct values for ABC Company. Some values are automatically calculated and generated based in the initial inquiry and machine. Values entered on this page automatically calculate/recalculate as more information is entered.

1. Log in to the EZ Block software application. (See Log in steps.)
2. Search for the appropriate inquiry. (See Search steps.)
3. Select **Block Sizing**.
4. **No of Cavities**: Enter same number of cavities as customer.
5. **Part Weight**: Enter the same part weight as customer.
6. **Thru Gate Weight**: This is part weight plus all metal that will flow through the cavity/s during cavity fill (calculated using part weight plus 10%).
7. **Shot Weight**: This is the thru gate weight plus sprue and runners (calculated plus 20%).
8. **Machine Tonnage**: The locking tonnage of the die casting machine used to die cast the part/s (generated from machine selected).
9. **Hydraulic Pressure**: The system pressure developed by the die casting machine (generated from machine selection).
10. **Accumulator Pressure**: The fast shot accumulator pressure used to inject metal into the die (generated from the machine selected).
11. **Cylinder Diameter**: The die casting machine injection cylinder diameter (generated from the machine selected).
12. **Max Dry Shot Speed**: The maximum speed the die casting machine can develop without metal to inject (generated from the machine selected).
13. **Fast Shot speed**: The speed used in the injection of metal into the die cavity/s (calculated) may be adjusted by changing the % of dry shot.
14. **Total Gate Area**: Enter the total or combined area of the inlet gates to fill the die casting cavity/s.
15. **Cavity Fill Time**: The time required to fill the die casting cavity/s with molten metal (calculated).
16. **Metal Density**: Enter the density of the die casting alloy used to produce the die casting/s.
17. **% Dry Shot**: A percentage of the max dry shot speed used to actually produce the die casting/s. (generated from machine selected).
18. **Plunger Diameter**: Enter the diameter of the plunger tip used to inject the metal in a hot chamber die casting machine normally mounted vertically in the goose neck assembly.
19. **Plunger Stroke**: Enter the distance the plunger travels in the goose neck to inject metal into the die.
20. **Nozzle Diameter**: Enter the diameter of the nozzle used to feed metal from the goose neck to the sprue bushing.
21. **Goose Neck Length**: Enter the length of the goose neck available for injecting the metal.

Hot Chamber Results Table

Hot chamber results calculated

- **Nozzle/Plunger Diameter***: The average diameter of the nozzle and plunger diameters.
- **Goose Neck Length***: The total goose neck and nozzle length.
- **Goose Neck Volume***: The nozzle/plunger diameters and the goose neck length.
- **Max P**: The maximum pressure developed by the die casting machine.
- **Max Q**: The maximum flow rate developed by the die casting machine.
- **Flow Rate Q**: The flow rate of the molten metal into the die casting cavity/s.
- **Gate Velocity**: The inlet gate metal velocity.
- **Shot Weight***: The shot weight less sprue.

Block Sizing Results for Hot Chamber

The selection of the area and subsequent block number should be determined by the number of cavities, die casting part configuration/s and die casting die configuration.

Note: Use the largest calculated area from either ABC Company or Customer.

- ABC Company: Vacuum is based on calculation results area
- ABC Company: Vent is based on calculation results area

- Customer: Vacuum is based on calculation results area
- Customer: Vent is based on calculation results area

Instructional Objectives – Module 5

- **Terminal Objective 1 -** The mechanical engineer will know how to access the web-based EZ Block Sizer software via a computer. (Cognitive / Remembering)
    - o **Enabling Objective**: Using a computer, the mechanical engineer will demonstrate how to open a web browser and enter the EZ Block Sizer software URL into the browser address field on the first attempt (Cognitive / Applying)
    - o **Enabling Objective**: Using a computer, the mechanical engineer will demonstrate how to enter the user name and password to log in to the EZ Block Sizer software on the first attempt. (Cognitive / Applying)

- **Terminal Objective 2 -** The mechanical engineer will navigate to the various pages in the EZ Block Sizer software. (Cognitive/Applying)
    - o **Enabling Objective**: Using a computer, the mechanical engineer will locate (identify) the Home, Inquiries, Block Sizing, and Machine Database pages in the EZ Block Sizer software on the first attempt. (Cognitive / Applying)

- **Terminal Objective 3** - The mechanical engineer will identify the pertinent information entered on the customer form to create and save a new Cold or Hot Chamber inquiry and block sizing in the EZ Block Sizer software. (Cognitive / Remembering)
    - o **Enabling Objective**: Given a customer information form, the mechanical engineer will identify and enter the customer information into the appropriate corresponding fields in the EZ Block Sizer software Inquiry page and save the inquiry on the first attempt. (Cognitive / Applying)
    - o **Enabling Objective**: Given a customer information form, the mechanical engineer will identify and enter the customer information into the

appropriate corresponding fields (Cold or Hot Chamber) in the EZ Block Sizer software Block Sizing page on the first attempt. (FYI - Information entered on this page is automatically saved and recalculated.) (Cognitive / Applying)

- **Terminal Objective 4 -** The mechanical engineer will analyze (compare) the vent and vacuum block size input/output information for Cold or Hot Chamber inquiries and block sizing. (Cognitive / Analyzing)
  - o **Enabling Objective**: The mechanical engineer will conclude if the variances between the ABC Company pre-set (generated and/or calculated) parameters and the customer information are correct and within the 15% variance allowed by ABC Company. (Cognitive / Evaluating)

- **Terminal Objective 5 -** The mechanical engineer will produce and send the inquiry and block sizing to the customer. (Cognitive / Applying)
  - o **Enabling Objective**: The mechanical engineer with demonstrate sending the inquiry and block sizing information to the customer via an email on the first attempt**.** (Cognitive / Applying)

Enabling Objectives Matrix & Supporting Content – Module 6

Title of the unit/module: Create Inquiry and Block Sizing Procedures

Brief description of target audience: The mechanical engineers at ABC Company.

Terminal Objective: The mechanical engineer will identify the pertinent information entered on the customer form to create and save a new Cold or Hot Chamber inquiry and block sizing in the EZ Block Sizer software.

List Pre-Instructional Strategy: Overview

Enabling Objective	Level on Bloom's Taxonomy	Learner Activity (What would learners do to master this objective?)	Delivery Method (Group presentation/lecture, self-paced, or small group)
Given a customer information form, the mechanical engineer will identify and enter the customer information into the appropriate corresponding fields in the EZ Block Sizer software Inquiry page and save the inquiry on the first attempt.	Applying (Application)	After listening to a lecture, the learner will demonstrate (via practice activities with the software) by choosing and entering the pertinent information from the customer information form into the correct input fields on the Inquiry page.	Group lecture then individual activity
Given a customer information form, the mechanical engineer will identify and enter the customer information into the appropriate corresponding fields for Cold or Hot Chamber sizing in the EZ Block Sizer software Block Sizing page on the first attempt. (FYI - Information entered on this page is automatically saved and recalculated.)	Applying (Application)	After listening to a lecture, the learner will demonstrate (via practice activities with the software) by choosing and entering the pertinent information from the customer information form into the correct input fields on the Block Sizing page.	Group lecture then individual activity

SUPPORTING CONTENT

Pertinent Information from the Customer Information Form Entered into the EZ Block Sizer Application

The "**X**" indicates if the information from the Customer Information Form is entered into the EZ Block Sizer application.

Customer Information Form	Inquiry Page	Hot Chamber Block Sizing Page	Cold Chamber Block Sizing Page
Date (auto-generated)			
Customer	X		
E-mail			
Phone			
Part Identification			
System requested (Vacuum or Venting)			
Material (Aluminum, Magnesium, Zinc) Note alloy used	X		
Chamber: (Hot or Cold)	X		
Machine Tonnage		X	X
Manufacture	X		
Machine shot cylinder dia.		X	X
Hydraulic system pressure (psi.)		X	X
Fast shot accumulator pressure (psi.)		X	X
Cold Chamber (Dia. And Length)			X
Hot Chamber (Plunger dia. and Plunger stroke)		X	
Goose neck length		X	
Nozzle dia.		X	
Nozzle length			
Dry shot speed (This is critical to design)		X	X
No. of cavities		X	X
Shot weight (w/o biscuit)		X	X
Through gate weight (include part weights and overflows vacuum)		X	X
Part weight 's (w/o)		X	X
Slow shot speed (IPS. If known)			
Fast shot speed (IPS. If known)		X	X
Cavity fill time (ms. If known)		X	X
Total gate area (in^2.)		X	X
Gate thickness (in.)			

References

Bruner, J. Constructivism. Retrieved from
http://www.instructionaldesign.org/theories/constructivist/

Keesee, G. Andragogy Adult Learning Theory, April 10, 2017. Retrieved from
http://teachinglearningresources.pbworks.com/w/page/30310516/Andragogy--AdultLearningTheory

Keller, J.M. ARCS Motivational Theory. Retrieved from
http://www.nwlink.com/~donclark/hrd/learning/id/arcs_model.html>

Keller, J.M., & Suzuki, K. (1988). Use of the ARCS motivation model in courseware design. In
D. H. Jonassen (ED.) *Instructional designs for microcomputer courseware*. Hillsdale, NJ:
Lawrence Erlbaum.

Straker. D. Expectancy Theory. Retrieved from
http://changingminds.org/explanations/theories/expectancy.htm

Survey sent to SME to help create the learner analysis. Returned answers are in blue.

To help me create the most appropriate and engaging learning experience for the learners, please take a couple minutes and fill out this survey. Please email your responses back to me as soon as possible.

Thank you very much for your time.

1. What are their titles of the primary learners attending the training? Mechanical Engineers (2)

2. Are there secondary learners that needs to attend the training? (Meaning they need to know about the software – but will not be actively using the software after the training.) Yes. A sales person and a manager.

3. General Characteristics of the learners
   Age range:
   < 20
   20 to 30
   31 – 40
   41 -50
   60 +

4. How many men and/or women will be taking the training? (Please include the age range associated with each learner). 4 @ 41-50

5. Education Level: High School, Post-secondary, Masters, etc.

6. Work history experience and years with current company? You can use general statements here to define the learners. All are relatively new to the company. < 2 years.

7. Are the learners familiar with using computers? (No, somewhat familiar, familiar, very familiar) Yes - familiar

8. Are learners familiar with using software? (No, somewhat familiar, familiar, very familiar) Yes - familiar

9. Do you know what types of software the users have used in the past? MSOffice suite, web based applications, and some specialized engineering apps.

10. Are the learners familiar with the die casting manufacturing process? Yes - familiar

11. (No, somewhat familiar, familiar, very familiar) Yes - familiar

12. Are the learners familiar with the terminology used in the die casting, fluid mechanics and the manufacturing process? (No, somewhat familiar, familiar, very familiar) Yes - familiar

13. Do the learners have any known concerns about the new process and software training? Please explain. The process has been outsourced up until now. Bringing the process/software in house new to them.

14. Do the learners have any specific goals for attending the training? Please explain. They want to learn how to use the software as well as understand how it derives the results that it does (understand the underlying equations).

15. Do the learners have any perceived misconceptions toward the subject of training? There seems to be some concern about their ability to understand the calculations that are the heart of the application.

16. Do the learners believe there is a benefit to taking the training? Yes. Being able to operate independently as well as cost savings in the long run.

17. Do the learners believe they will be able to apply the knowledge gained from the training immediately after the training (or next day)? They are aware that some level of experience is needed to utilize the software and that it may take some time to fully understand the process.