Reconstruction of Wooden Common Press

Team P16510

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Agenda

1. Review Problem Statement
2. Key Customer Requirements
3. Systems Level Design Goals
4. Printing on a Printing Press
5. Functional Decomposition
6. Field Trip to Mackenzie Heritage Printery
7. Updated Benchmarking
8. Morphological Chart
9. Feasibility Analysis
10. Current Modeling
11. Common Failures
12. Materials List
13. Next Steps
The Cary Graphic Arts collection maintains a collection on the history of printing, including a full pressroom with 18 historic presses. Few original wooden common presses still exist; in order to better present the history of printing, the Cary Collection is seeking to have a reconstruction of a wooden press made. The goals of this project are to design a wooden press based upon historical research, to build a press in accordance with this design, and to publish a paper documenting the design and construction processes. The final press must be consistent with original common presses and maintain historical accuracy. This press will function as an original press and be used for instruction at the Cary Collection.
Key Customer Requirements

● Historical Accuracy
  ○ Design
  ○ Material
  ○ Construction (Detailing)

● Full Scale Model

● Fully Functioning

● Assembly and Disassembly Guide

● **Assembly or Disassembly in < 2 Hours**

● Thorough Design Documentation

● Construction Manual

● Published Work
Printing on a Press

https://www.youtube.com/watch?v=Hdw6k5iMt_8
Functional Decomposition

Print Document

- Apply ink to paper
  - Make impression
    - Apply pressure
      - Apply ink to type
        - Set type
  - Withstand torque
    - Position page
      - Hold paper
        - Insert paper
    - Move bed
      - Protect margin
Field Trip: Mackenzie Heritage Printery
Stop the Presses: We’re Headline News!

American Printing History Association
To Encourage the Study of Printing History

FROM THE ANNUAL MEETING OF THE
AMERICAN PRINTING HISTORY ASSOCIATION
AT THE UNIVERSITY OF IOWA, OCTOBER 17, 2016

An Uncommon Reconstruction

Illustrations from Mechanick Exercises of English (left) and Bluee (right) style presses.

This is the first in a series of blog posts that will continue throughout the year.

Beginning in late January and continuing through the middle of December, a group of four students at the Rochester Institute of Technology will be designing and building a wooden common printing press to be installed in the Cary Graphic Arts Collection there. The team consists of myself, Seth Gottlieb, Ferris Nicolas and Randall Paulhamus, all Mechanical Engineering majors, and Veronica Hobbard, an Industrial and Systems Engineering major.

http://www.niagarafallreview.ca/2016/02/20/students-studying-centuries-old-printing-press

http://printinghistory.org/uncommon-reconstruction/
Updated Benchmarking

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Hose Type</th>
<th>Spindle Length</th>
<th>Spindle Pitch</th>
<th>Plate-to-bed Distance</th>
<th>Height of Cheeks</th>
<th>Printable Area</th>
<th>Hose Footprint</th>
<th>Torque to Turn Rosette</th>
<th>Girt Attachment</th>
<th>Check Material</th>
<th>Bed Material</th>
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<tbody>
<tr>
<td>Significance</td>
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<td>Isaiah Thomas Press</td>
<td>Printed Massachusetts Spy</td>
<td>English</td>
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<td>Stephen Daye Press</td>
<td>Printed first American book</td>
<td>English</td>
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<td>Plantin Mortius Museum Presses</td>
<td>Oldest press in the world</td>
<td>Modified Bible</td>
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<td>James Franklin Press</td>
<td>Relative of Benjamin Franklin</td>
<td>English</td>
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<td>Benjamin Franklin Press</td>
<td>Founding father Printed money</td>
<td>English</td>
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<td>Destroyed in Great Fire of 1911 in Bangor, Maine</td>
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<td>Fawceter Press</td>
<td>English press in Australia</td>
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<td>Roy Press</td>
<td>Mackenzie Printery</td>
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Added more data since PDR, gathered from reviewing plans in “The Common Press” and the visit to the Mackenzie Printery
Morphological Chart

Constraints

- Historical accuracy: Possible solutions must be present on presses found in research material.
Example: Choice of Cramp Irons
Q: How much would it weigh to fill the entire printable area?

Assumptions:
- Linotype alloy: 4% Sn, 12% Sb, 84% Pb; $\gamma_{\text{max}} = 0.30 \text{ lbs/in}^3$
- Max printable area is twice the area of the platen: 295 in$^2$
  - Harris and Sisson, 1978
  - Trip to Mackenzie Printery and Newspaper Museum
- Type High = 0.918" $\approx$ 1.0"

Analysis:
\[ V_{\text{form}} = A_{\text{form}} \times \text{(Type High)} = (590 \text{ in}^2)(1 \text{ in}) = 590 \text{ in}^3 \]

\[ W_{\text{form,max}} = \gamma_{\text{max}} \times V_{\text{form}} = (0.30 \text{ lbs/in}^3)(590 \text{ in}^3) = 177 \text{ lbs} \]

Comments:
- The form would be at most 177 lbs, not including the chase; the girts must accommodate at most this load plus the bed of the press
Feasibility Analysis

Q: What design is considered aesthetically pleasing? Can we assess before woodworking and manufacturing?

Approach: Research common wood design of the era, create prototype, collect response from customer and random sample.

Analysis: Construct prototype - 3D printing or Foam
Feasibility

After we model everything...

- Where can we put the bar? The winter? The rounce?
- Where are the stresses concentrated?
- What impact does relocating components have on the structure?
- Likelihood of a female? Adjust the press to accommodate both genders?
- What dimensions do we need to tweak?
- Can we raise it up?
Current Modeling

- Created from measurements gathered and reference material found
- Will be used for
  - 3D print and test fit designs
  - Stress analysis
Common failures

- **Girts Attachment**
  - Original: Held by nails or screws
  - Proposed: Clamps
  - Test tensile strength of leather

- **Bar Catch**
  - Original: Stationary
  - Proposed: Adjustable
  - Strong evidence in European Style Press

- **Impression on the Platen**
  - Quality of print
  - Metal Clad on Roy Press

https://www.peabody.harvard.edu/node/2014
http://www.ticknor.org/pastevents.shtml
Materials List

- Wood
  - Elm
  - Beech
  - Oak
  - Honduras Mahogany
- Metal
  - Iron (Steel)
    - Cast
    - Forged
- Leather
- Cord
  - Raffia
  - Wool
  - Linen
Next Steps...

- Further into sub-system design
- Subject matter experts for:
  - Wood
  - Leather
  - Cast Iron
  - 3D Printing
- Solidify common materials used
- Build test rig
- Field trip #2
  - March 19th to Newport Historical Society
  - March 21st to Exeter Historical Society
  - March 22 to Vermont Historical Society