IPRO 315: Design of a Large-Scale Bridge

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Purpose & Objective

It is the objective of this IPRO, while fostering teamwork and exposure to real world design, construction and marketing tasks, to pursue the design and eventual construction of a steel bridge for the purpose of and under the specifications of the AISC/ASCE and its annual Student Steel Bridge Competition (SSBC).

Expanded:

Teamwork	**Real-World Experience**	**Stakeholder* Interaction**
•Team Member Abilities	•Design •Construction	•Fundraising •Marketing

*Illinois Institute of Technology, IPRO, American Institute of Steel Construction (AISC), American Society of Civil Engineers (ASCE), Sponsors

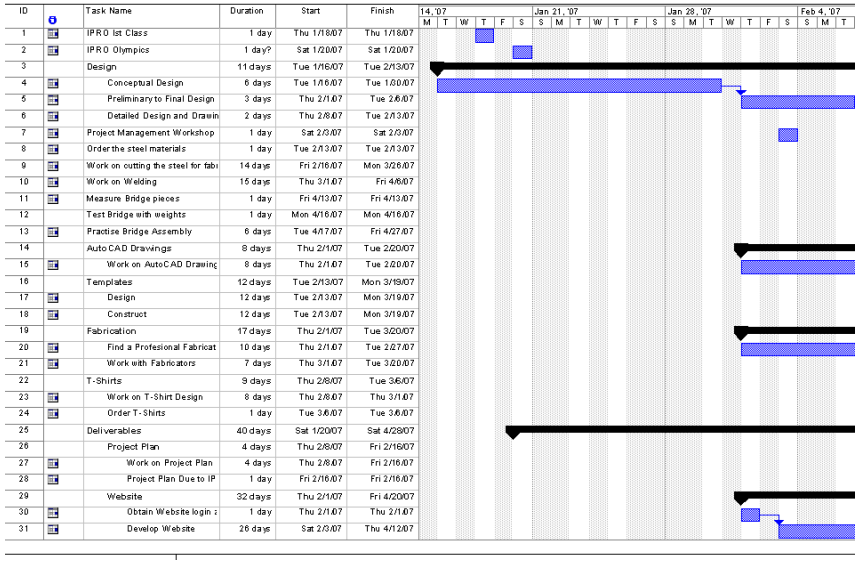
Goals for Achieving Purpose

- Analysis of Previous Work on the Subject
- Division of Tasks Based on Initial Timetable
- Design
- Fundraising
- Fabrication
- Rules
- Construction
- Marketing & Presentation

Analysis of Previous Work on the Subject

Previous Success	Previous Failure
• Light-weight design achieved	• Improper time management • Low-quality fabrication equipment

Division of Tasks Based on Initial Timetable



ID	Task Name	Duration	Start	Finish
1	IPRO 1st Class	1 day	Thu 1/18/07	Thu 1/18/07
2	IPRO Olympics	1 day?	Sat 1/20/07	Sat 1/20/07
3	Design	11 days	Tue 1/16/07	Tue 2/13/07
4	Conceptual Design	6 days	Tue 1/16/07	Tue 1/30/07
5	Preliminary to Final Design	3 days	Thu 2/1/07	Tue 2/6/07
6	Detailed Design and Drawin	2 days	Thu 2/8/07	Tue 2/13/07
7	Project Management Workshop	1 day	Sat 2/3/07	Sat 2/3/07
8	Order the steel materials	1 day	Tue 2/13/07	Tue 2/13/07
9	Work on cutting the steel for fabr	14 days	Fri 2/16/07	Mon 3/26/07
10	Work on Welding	15 days	Thu 3/1/07	Fri 4/6/07
11	Measure Bridge pieces	1 day	Fri 4/13/07	Fri 4/13/07
12	Test Bridge with weights	1 day	Mon 4/16/07	Mon 4/16/07
13	Practise Bridge Assembly	6 days	Tue 4/17/07	Fri 4/27/07
14	AutoCAD Drawings	8 days	Thu 2/1/07	Tue 2/20/07
15	Work on AutoCAD Drawing	8 days	Thu 2/1/07	Tue 2/20/07
16	Templates	12 days	Tue 2/13/07	Mon 3/19/07
17	Design	12 days	Tue 2/13/07	Mon 3/19/07
18	Construct	12 days	Tue 2/13/07	Mon 3/19/07
19	Fabrication	17 days	Thu 2/1/07	Tue 3/20/07
20	Find a Profesional Fabricat	10 days	Thu 2/1/07	Tue 2/27/07
21	Work with Fabricators	7 days	Thu 3/1/07	Tue 3/20/07
22	T-Shirts	9 days	Thu 2/8/07	Tue 3/6/07
23	Work on T-Shirt Design	8 days	Thu 2/8/07	Thu 3/1/07
24	Order T-Shirts	1 day	Tue 3/6/07	Tue 3/6/07
25	Deliverables	40 days	Sat 1/20/07	Sat 4/28/07
26	Project Plan	4 days	Thu 2/8/07	Fri 2/16/07
27	Work on Project Plan	4 days	Thu 2/8/07	Fri 2/16/07
28	Project Plan Due to IP	1 day	Fri 2/16/07	Fri 2/16/07
29	Website	32 days	Thu 2/1/07	Fri 4/20/07
30	Obtain Website login :	1 day	Thu 2/1/07	Thu 2/1/07
31	Develop Website	26 days	Sat 2/3/07	Thu 4/12/07

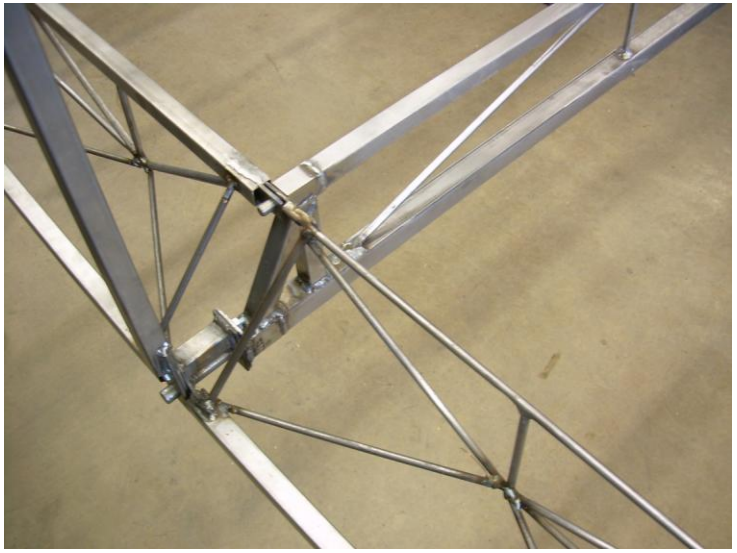
Design Phases

Key Stage	Concerns
Analysis of Previous Projects	IIT Previous Success/Failure Previous Competition Numbers
Statement of Problem Focus	
Analysis of Rules	
Initial Design Solution	Members Joints
Computer Load Modeling	Members Joints
Actual Loading	Top Chord Failure
Actual Construction Testing	Joint Revision
Rule Review	

Problem Focus & Rules

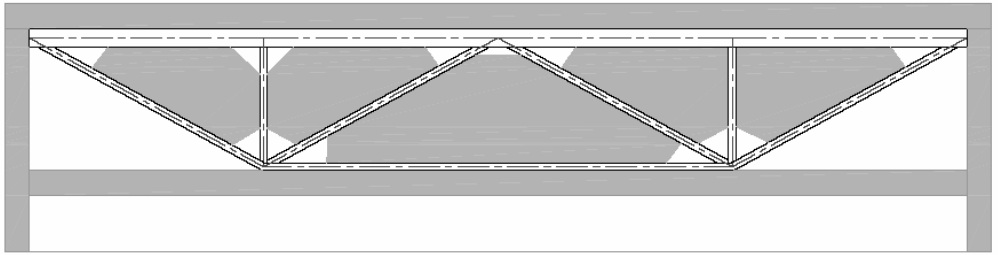
Team Focus	Rule Restrictions
• Lightness –Member Size –Number of Members	• Member Size: –6”x6”x42”
•Stiffness	•Limited Joining Methods
•Construction Speed	•Assembly Limitations
•Economy	•Temporary Piers
•Aesthetic	
•Avoidance of Penalties	•Penalty Regulations

Design Modeling & Solution



Fabrication Phases

Template Design
& Manufacturing



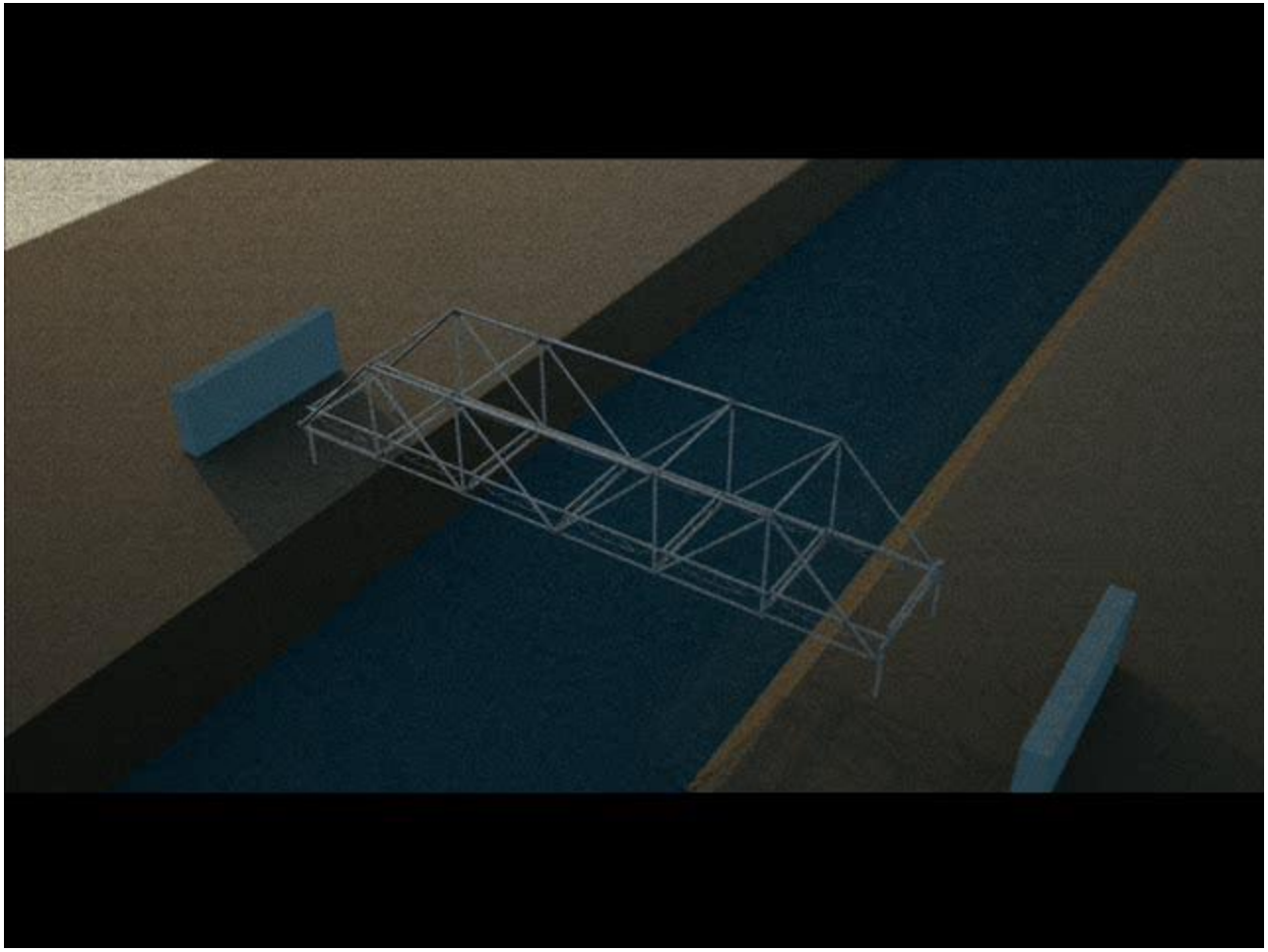
Fabrication of Members

Welding of Members

Construction Phases

Key Stage	Concerns
Theoretical Construction	
Rule Review	Assembly Definition
Modified Theoretical Construction	
Selection of Construction Team	Combination of Speed, Reach, and Knowledge of Process
Test Construction	Joining Difficulties
Load Testing	Failure Point
Design Revision	Introduction of Cross-Bracing
Practice & Innovation	Tools

Theoretical Construction



Load Testing

Actual Construction

Fundraising

Marketing & Presentation

Stakeholder	Presentation Medium
Illinois Institute of Technology/IPRO	Representative Exhibit
AISC/ASCE	Project Overview Sponsor Recognition Rule Varification
Sponsors	Sponsor Branding
General Public	Web Site

Results, Conclusions & Obstacles Faced