

# IPRO 346

## SUMMER 2010



ILLINOIS INSTITUTE OF TECHNOLOGY

# Statement of Problem

Condensate from commercial HVAC systems is currently drained as if it were waste water, This condensate can be recycled and be put to use depending on the output amount and chemical cleanliness.



# PROJECT GOALS

Measure the amount of condensate produced by commercial HVAC systems.

Testing the condensate for bacteria and chemicals.

Developing feasible outdoor uses for the condensate based on the cleanliness and quantification.

Conduct market and business analysis for the potential uses of the condensate.

# Team Members

- **Abhishek Chandnani**

- [achandna@iit.edu](mailto:achandna@iit.edu)
- Mechanical Engineering
- Skills and Attributes
  - good organizational skills
  - interpersonal skills and networking capabilities
  - hands-on work experience in job environment
  - MS Word, MS Excel, MS PowerPoint, C++, AutoCAD, MATLAB

- **Jinwoo Lee**

- [jlee185@iit.edu](mailto:jlee185@iit.edu)
- Skills and Attributes
  - computer - AutoCAD, 3dsmax, sketchup, Photoshop, illustrator.
  - language - Korean.

- **Christopher Najarian**

- [cnajari1@iit.edu](mailto:cnajari1@iit.edu)
- Electrical Engineering
- Skills and Attributes
  - Math skills, creative thinking, working in teams

- **Michael Regacho**

- [mregacho@iit.edu](mailto:mregacho@iit.edu)
- Mechanical Engineering
- Skills and Attributes
  - AutoCAD and ProEngineer
  - paperwork and good organizational skills.
  - excel, word, picking up new skills quickly, hands-on work

- **Aanchal Taneja**

- [ataneja6@iit.edu](mailto:ataneja6@iit.edu)
- Electrical and Computer Engineering
- Skills and Attributes
  - Team worker
  - Hard Working
  - Inquisitive and Explorative
  - Communicative
  - Coherent with the subject material as well as some of its real life implications

- **Angad Singh**

- [asingh63@iit.edu](mailto:asingh63@iit.edu)
- Mechanical Engineering
- Skills and Attributes
  - Analytical and Problem Solving Skills
  - Multi tasking
  - Hands on Experience with the underfill, Surface Mounting, assembly and testing procedures.
  - MS word, MS Excel and MS PowerPoint
  - Worked in a Professional environment for 8 months. (RIM)

- **Sami Somo**

- [ssomo@iit.edu](mailto:ssomo@iit.edu)
- BME
- Skills and Attributes
  - MS Word, Excel, PowerPoint, MATLAB

- **Michael Spytek**

- [mspytek@iit.edu](mailto:mspytek@iit.edu)
- Mechanical Engineering
- Skills and Attributes
  - Using MS word and Excel.
  - Basic operation of manual milling machines
  - Fabrication of test equipment
  - Basic wood and metal working skills
  - Business operations, including dealing with suppliers and customers
  - Automotive repair

- **Philip Tam**

- [ptam2@iit.edu](mailto:ptam2@iit.edu)
- Chemistry
- Skills and Attributes
  - MS Word, Excel

- **Zachary Waas**

- [zwaas@iit.edu](mailto:zwaas@iit.edu)
- Mechanical Engineering
- Skills and Attributes
  - MS word , excel, PowerPoint
  - group work , hands on metal and wood work
  - AutoCAD and SolidWorks
  - Creating dimensional drawings and 3-D renderings of various components

# TEAM ORGANIZATION

## Testing

Philip Tam (Group Leader)  
Sami Somo  
Abhishek Chandnani  
Aanchal Taneja

## Research

Abhishek Chandnani (Group Leader)  
Michael Regacho  
Angad Singh  
Jinwoo Lee

### **IPRO 346**

**Team Leader: Zachary Waas**  
**Minute Taker: Aanchal Taneja**  
**Agenda Maker: Mike Spytek**  
**Time Keeper: Angad Singh**  
**iGroups Moderator: Zachary Waas**

## Survey

Sami Somo (Group Leader)  
Zachary Waas  
Michael Spytek  
Christopher Najarian  
Jinwoo Lee

## Collection & Quantification

Michael Spytek (Group Leader)  
Angad Singh  
Zachary Waas  
Aanchal Taneja

# PROGRESS TOWARD GOALS

- Visited Pentair for better understanding of their expectations for this IPRO.
- Set up pumps at multiple locations to quantify the condensate produced on a daily basis.
- Take samples at multiple locations to test the condensate's chemical cleanliness.
- Conduct surveys to determine public's view and opinion about the concept of condensate harvesting and recycling.

# PROGRESS TOWARD GOALS

Visited Pentair in Delavan, Wisconsin to get a better understanding of they operate. They gave us a tour of the manufacturing plant and informed us of their expectations for this IPRO.



(Visit to Pentair)



(Touring MTCC HVAC Systems)

# PROGRESS TOWARD GOALS

Rigged the flowtec pumps from Pentair with counters in order to determine the amount of condensate produced on a daily basis.





# PROGRESS TOWARD GOALS

Set up multiple test sites which include MTCC, Spyco Industries Inc, and locations in India for measuring the amount of condensate.



(Spyco Industries)

(MTCC)



# PROGRESS TOWARD GOALS



# FUTURE PROGRESS

Samples from multiple sites will be tested for chemicals and bacteria levels.

This will be done to determine the usability of condensate.



# POTENTIAL CONDENSATE USES

- Pre-cooling intake air using recycled condensate (improving efficiency)
- Landscape irrigation
- Cleaning purposes (Laundry, On- site power washers, Window washing, etc.)
- Hydro-electric power
- Decorative fountains
- Cooling equipment (Computer servers, Machinery, etc.)

# MAJOR OBSTACLES ENCOUNTERED

- Understanding how HVAC systems operate and learning how temperature and humidity affect condensate production.
- Figuring out a way to collect and quantify the amount of condensate produced.
- Collecting samples and conducting tests to determine the chemicals and bacteria contained.

# ANTICIPATED CHALLENGES

- Limited amounts of data due to a short summer schedule.
- Lack of interest in the market place about the idea of condensate harvesting, this will cause problems when trying to pitch a recycling product or method.
- Uses of condensate are limited due to weather conditions and seasons.
- Working with laws and codes that also limit the recycling and uses of condensate.



**QUESTIONS/COMMENTS....?**

