

APPL Usage Policies and Procedures

Original text on policies: J. Pandit

Rev. 1 KTL

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The Advanced Propulsion and Power Laboratory (hereafter “APPL” or “Lab”) hosts a number of state-of-the-art facilities, instruments, and capabilities used by researchers to advance science and technology in the propulsion and energy fields. Experiments range in complexity and potential risk from very simple and benign, to very complicated and requiring advanced user experience to mitigate risk. In this document, we frame the standard safety practices of APPL from a management perspective, allowing appropriate and regular control and audit of daily activities in the laboratory.

APPL Faculty/Staff

Co-Director: Dr Wing Ng (wng@vt.edu)

Co-Director: Dr Todd Lowe (kelowe@vt.edu)

Safety Officer: Dr Greg Young (gyoung1199@vt.edu)

Lab Manager: Jason Doby (doby2017@vt.edu)

Machinist: Randall Monk (willrm3@vt.edu)

Gaining Access to the APPL

To gain access to APPL, a VT Faculty Sponsor will need to send the names and PIDs of potential students/faculty/staff to the Lab Manager along with what rig the user will be working on.

Upon receiving a request for access, the Lab Manager will

1. Add the User to the Virginia Tech EHS SMS under the rig they intend to work on.
2. Add the User to the email group, “APPL Users”
3. Contact the User to inform them of the training required. Standard email text for this email is contained in Appendix A.

Upon being contacted by the Manager and before gaining access to the laboratory, the new User must

1. Log into the EHS SMS site to access their [EHS Training Profile](#)
2. Take training (list of classes found below), including quizzes, in a timely manner. Before accessing APPL, all required online training must be completed.
3. Read the safety policies for the area intended for use.
4. Read and understand the Standard Operating Procedures (SOPs) for their rig.
5. Once the required EHS training has been completed, contact your PI and APPL Manager to get swipe access to APPL.
6. Once you have swipe access, you can coordinate with your PI/Research Team to work in the lab.

Required Training

The following thirteen online classes are required to be completed before gaining access to the APPL. These classes can be found in your [EHS Training Profile](#).

- Hearing Conservation
- Electrical Awareness
- Hazcom Right-to-Know
- Laser Safety
- Lockout Tagout Awareness
- PPE Awareness
- Portable Fire Extinguishers
- Compressed Gas Cylinder
- Flammable Liquid Safety
- General Lab Safety
- Hand and Power Tool Safety
- Ladder Safety
- Hazard Assessments

Shared Workspaces

APPL utilizes several specialized test cells and control rooms, some of which are shared among VT Faculty. Teams working at APPL must take this into consideration when planning work of any kind in the lab. Users must ensure that their workspace is safe, kept in order and presentable.

The following responsibilities exist for the Manager regarding all Workspaces:

1. Monthly review of the list of Users assigned to each Workspace to ensure that they are current on EHS training.
 - a. In the event that training responsibilities are not met in a timely manner, User access to the lab is to be revoked

2. Weekly, the Lab Manager or Machinist will conduct a walkthrough inspection of each workspace. Some items that the person conducting the inspection might look for include but are not limited to are:
 - a. Are all obvious safety risks being mitigated?
 - b. Is personal protective equipment stored properly?
 - c. Is the area free of major trip hazards and areas around electrical junction boxes clear to 2'?
 - d. Is the area free of any combustible materials such as paper, cardboard, etc?
 - e. Does the fire extinguisher pass inspection?
 - f. Is the space tidy enough to host outside visitors without notice?
 - g. Are all required documents (SOPs, etc), present and easily accessible?
 - h. Are operating/max pressures & temperatures visible?

The Workspace names, locations and responsible faculty members in the lab are listed in Table 1.

Table 1. Workspaces at APPL.

Workspace	Room number in APPL	Responsible Faculty Member
Combustion Cell	111 (Test Cell) 110 (Control)	Greg Young, Joseph Meadows
Turbine Heat Transfer Cell	112 (Test Cell) 110 (Control)	Wing Ng
Optics/Instrumentation Cell	109 (Test Cell) 107 (Control)	All Faculty
Soft Rotor/Annular Cascade	121 (Test Cell) 120 (Control)	Changmin Son
Heated Free Jet/Hypersonic Wind Tunnel	131 (Test Cell) 130 (Control)	Liselle Joseph, Todd Lowe
Jet Test Cell	132 (Test Cell) 130 (Control)	Wing Ng, Todd Lowe

Rig safety

Rigs are located within Workspaces and are the primary means for conducting experiments or supporting them. The PI for each rig will be responsible for the overall safety of their rig. The PI is also responsible for incorporating safety precautions and procedures into their SOPs and ensuring that those safety precautions are strictly adhered to.

Before any rig can be commissioned, there are three entities that must sign off:

1. VT EHS: To ensure compliance with VT safety procedures.
2. APPL Safety Officer: To ensure rig meets engineering safety recommendations.
3. APPL Lab Manager: To ensure all users have completed the required training and all documentation is uploaded and current in EHS SMS.

Rig safety is the obligation of the Principal Investigator (PI), The PI should assume the following responsibilities.

1. Development and completion of all required documentation as listed below:
 - a. SOP
 - b. Project Risk Assessment
 - c. Hazard Assessment Form
 - d. Hazcom Checklist
 - e. Chemical Inventory
 - f. Safety Data Sheets
2. Uploading of all required documentation into the [VT EHS Safety Management System](#).
3. Training all personnel involved with working on a rig for which the PI is responsible.

The Manager has the following responsibilities related to rigs:

1. Ensure all Users are up to date on required training classes.
2. Regular consultation with PIs to determine if SOPs and other required documents uploaded into EHS SMS are for the current configuration of the rig.
3. Perform weekly walkthroughs of all areas at APPL to ensure that APPL and EHS safety protocols are being adhered to.

Table 2. Rigs at APPL.

Rig name	Workspace	Responsible Faculty Member
Annular Cascade	Room 121/120	Changmin Son
Cascade Tunnel	Room 112/110	Wing Ng
Counterflow Rig	Room 111/110	Greg Young
Heated Free Jet	Room 131/130	Todd Lowe
High Pressure Natural Gas Combustor	Room 111/110	Joseph Meadows
High Speed Wind Tunnel	Room 132/130	Todd Lowe
Hypersonic Wind Tunnel	Room 131/130	Liselle Joseph
M250 Rig	Room 132/130	Wing Ng/Todd Lowe
Shock Tube	Room 112/110	Wing Ng
Soft Disc Rotating Duct	Room 121/120	Changmin Son
Solid Fuel Ramjet	Room 111/110	Greg Young

Annual Safety Audit

In order to ensure highest standards for safety, the Directors and the Manager will consult EHS regularly and obtain annual audits of the safety practices of the laboratory. The findings of these audits will lead to actions for mitigation of deficiencies that are to be overseen by the Manager until remedied. In the event that deficiencies are not addressed by the responsible faculty

member promptly, the Directors and Manager may take action to cease activities in the Workspace or Rig until the deficiencies are remedied.

Routine Oversight Inspections

There will be an internal inspection of every Workspace and Rig on a regular basis by either the Lab Manager or Machinist. This inspection will review the submitted documentation to ensure that the uploaded documents are for the current rig configuration. If any new hazards are identified, or rig procedures changed, the Manager may request an updated form for review and approval. Review of the area may also lead to identification of deficiencies in the safety practices in the area. After each review, faculty members responsible for Workspaces and Rigs will be notified of these deficiencies. In the event that severe deficiencies are not addressed by the responsible faculty member promptly, the Directors and Manager may take action to cease activities in the Workspace or Rig until the deficiencies are remedied. **In addition to regular, monthly inspections, the Manager will conduct random inspections at will.**

Annual Safety Meetings

There will be a semiannual all-hands meeting at APPL, once at the beginning of the Spring Semester and again at the beginning of the Fall Semester to brief all users on universal safety policies, laboratory etiquette and to foster a positive, professional laboratory culture. Attendance at this meeting is expected unless you have other academic commitments.

Reserving Lab Space and Compressor Usage

Since the majority of lab space at APPL is shared, you must email the Lab Manager to reserve lab space and compressor usage. The criteria needed in an email is below.

To schedule facility/compressor usage, email Jason Doby (doby2017@vt.edu) with the following information:

1. Name of rig and your name.
2. Day(s) and Times (the more exact times the better for others to plan if possible)
3. State purpose of test, whether paying for test, or just working on rig, commissioning, or misc. (i.e. Helps give everyone a view of a "priority" test rather than just working on a rig, etc.)
4. What room/cell you want?
5. Will you be using the compressor (Helps other teams know if they can or cannot test or work on rig)

6. If a rig makes a loud noise or if there is any doubt, has the PI issued an APPL noise ordinance SOP warning been sent out by PI (Faculty Leader) and if that has been done (Y or N)? Your PI knows what to do and has instructions.

7. If there's a conflict or test of rig that has priority over other testing, it is the responsibility of the PI to negotiate with the conflicting party's PI in order to reach a compromise.

All the above criteria will be entered within the APPL calendar information sections/tabs for each new entry.

Requesting Machine Shop Services

At some point during your tenure at APPL, you will likely need machine shop services. We are fortunate to have an in-house, full time machinist Randall Monk (willrm3@vt.edu). In order to streamline and document machine shop requests, please use the process below. Email Jason Doby (doby2017@vt.edu) if you need assistance with this process.

1. Follow the link below to the Mechanical Engineering Help Center: [me-trouble.mojohelpdesk.com](https://trouble.mojohelpdesk.com)
2. In the upper right corner, click the menu icon and then click “Log in to check your tickets”. Under the sign-in fields, click “Log in with your VT Account” and use your PID to login.
3. In the upper left corner click the red button that says “New Ticket”. The “new ticket” button exists on the main link in step 1 above but you will need to login in order to attach your drawings.
4. Click “APPL Machine Shop Service Request”
5. Complete all fields on the next screen. In the lower right corner “Description” field, click the attachment link to attach a 2D drawing of work to be completed. All fields with a yellow exclamation mark are required.
6. At the bottom of this screen, check the “Acknowledgment” box to agree to the item directly above in the “Notice” field.
7. Click “create”.
8. Your ticket has been submitted to the APPL Machine Shop and you should receive an email.

Reporting Usage & Testing Campaigns

In most instances, PIs must pay for testing and compressor usage at APPL. The PI is responsible for ensuring that the lab usage is reported using the Google Form below. Teams should complete this Google Form at the end of each testing campaign or in whatever interval is most practical for your testing situation. Contact Jason Doby if you have any questions about using this form.

[APPL Usage Report](#)

Receiving Packages at APPL

Most of the time, the Lab Manager or Machinist will receive packages that you have ordered. The Lab Manager will notify you of a received package and it will normally be located in the Optics Room. If you happen to accept a package, please place the packing slip on the Lab Manager's desk to be forwarded to either the AOE or ME admin personnel.

Workspace Appearance & Organization

It is the responsibility of the teams to keep their workspaces in order to include but not limited to sweeping, trash disposal and organization. During weekly inspections by the Lab Manger, PIs will be notified of workspaces that are in need of attention.