SLCR

Intended Applications

[Plowman: Small area stripping for repair /NDT inspections. Accessibility to enclosed areas and brackets/recesses. On a/c use and components. Seam removal post PMB.]
[Triplett: 1) Small area stripping during prod. – strip for NDI etc.
2) Repair facilities – stripping masked areas around vents and drains
3) Stripping areas not strippable by flashjet, PMB & chemical.]
[Mickey: Seem to be a problem with what I consider application. With bulk of machine and device use would be very restricted. Seam stripping after PMB. Quick removal of 343 area small area repair or NDI work.]
[Whitney: Coating Removal on F-16/C-130/A-10 Components & airframes (on airframes)]
[Buchi: I do not see us using this laser for aircraft.]
[Fecsik: Workcell only!]
[Morales: none assessed.]
[Staggs: Generic supplement to other strip methods, and eventually scale-up to large area stripping.]
[Ravert: Unit seemed to be suited for flat panel applications only.]
[Truong: Strip appliqué and coatings.]
[King: Needs color recognition software for multiple thicknesses. 2024-Al. Max. working area 6' radius from machine. Best on very flat or slightly rounded. Needs a robot to really be effective.]
[Slife: Work cell for sheet metal repair areas {illegible}]
[Lantis: Small areas on missile components.]
[Howarth: This system seems applicable for stripping small areas that are transportable into a depainting area. It does not seem appropriate for composites. Would be good for auxiliary depainting touch-up.]
[RAF: On aircraft and components. Small area localized area stripping for coating repairs, NDT inspections as required. Internal and external areas including enclosed surfaces (e.g. internal surfaces of brackets, angle sections, etc.) Seam removal post PMB.]

Technical Requirements:

[Plowman: Small footprint, using local power source, ease of operation, damage to substrate avoided. Ease of access to desired areas. Selective paint removal, maneuverability of stripping head, accessibility to enclosed area. Safe to use on a/c and for operators. Surface temps below DA limits.]
[Triplett: Must be capable of removing coatings without damage to substrates – removal rates must be on par with existing methods – hazardous materials (chrome, cad) must be very close to 100% captured.]
[Whitney: Composites / on –airframe / sealants]
[Hoogsteden: How does it remove polysulfide primer & CermanKote?]
[Morales: None assessed.]
[Staggs: Raster speed <u>needs</u> to be increased. This will provide more flexibility in the traverse speed of the effector (currently traverse rate confined & too fast -> zig zag

pattern, too slow -> greater potential for damage from overheating) Laser demonstrated ability to damage composite C-EP).]
[Ravert: Would need to be compatible with electrical requirements worldwide.]
[Truong: Be able to strip coatings & appliqué on both aluminum and composite substrate w/out damaging.]
[King: Mirror beam delivery. CO2 mix gas. Total footprint 6' x 8' plus target dimensions and HEPA filter bag.]
[Slife: Cost is too high for performance. Mirrors reliability. Specialty gas tanks are a major problem.]
[Lantis: Chiller performance may be questionable. Mirrors can get misaligned in the field. May be difficult to reach "tight" areas. Filling of chiller tanks – germicide required? Mirror polishing may be an issue.]
[Howarth: Needs to be able to strip curved areas. Needs to not damage grahite/epoxy/anodize/Alodine. Needs to depaint uniformly, either by automating or operator control.]
[RAF: Small footprint, use of local power supply, ease of operation, no damage to substrate materials, selective paint removal, maneuverability of stripping head, accessibility to enclosed/internal surfaces. Safe to use on aircraft!! Surface temp to be maintained below DA limits (40 degrees Celsius). Safe to operators.]

User Interface & Operation

[Plowman: Simple 2 button simultaneous trigger action – easy to use. Visibility of area being stripped difficult to see until head has cleared. Access to enclosed areas - severely restricted. Temperature of surface exceeds limits. Size of head and handle arrangement restricts user mobility – 2 handed operation required.]
[Triplett: Current system will need improvements for restricted access areas (equip bays, wheel wells, etc.). Mirror alignment is a major concern – keeping mirrors clean is another.]
[Whitney: Limited to approximately 8' radius. Horizontal and overhead work difficult.]
[Reinmuth: Bulky arm mechanism limits mobility. Mirror mechanism could be fragile or easily damaged; alignment concern.]
[Morales: N/A]
[Staggs: 1 hand operation preferred (2 hand restricts axis of motion). I found the roller-wheels to be useful during the trial run.
[Truong: Engineers will set the operating parameters and operators just aim and strip.]
[King: Handheld on bicycle yoke. Chiller tank could have problems w/ antifreeze. Requires lift assist device – still heavy (about 12 lbs still to support. 3phase/440VAC. Can't see stripped area until head passes over.]
[Slife: Counter-balance is poor.]
[Lantis: Somewhat cumbersome with the beam delivery arm. Can't see what you've stripped. Vacuum hose should be integrated into the working head.]
[Howarth: Relatively easy to operate, although operator can't see what he's stripping. Half-hour warm-up is a pain.]
[RAF: Simple 2 button interlock simultaneous operation provides safety mechanism, is easy to use. Visibility of stripped surface severely limited by surrounding shield making selective stripping without color recognition difficult to achieve. The scanning head

requires two handed use restricting access to some enclosed areas – similarly, size of head, solid laser transfer line booms do not allow full maneuverability or accessibility. Surface temperatures exceeded 40 degrees Celsius. Requirement.]

Safety & Ergonomics:

[Plowman: Flare from ablation process poses fire risk from flammable substance & vapours released from aircraft (e.g. fuel vents, leaks, etc.) Twin beam solid laser light transfer line severely restricts operator freedom of movement. Scanning head difficulties – see above. Very noisy ablation process. Transverse scanning – near impossible due to head restrictions. Surface temperature limitations of 40 degrees Celsius (DA limits) exceeded.]
[Mickey: Hearing protection should be double for the ops. During demo only glasses & ear plugs (single) was required. During safety brief – resp., ear muffs for operator, no {illegible} etc. was require to operate. Normal operator only wore gloves & no ear muffs – only single ear protection. If these items are required they should be in place at all times; "gas cylinder safety".]
[Triplett: Ergonomics – the YAG lasers are more user friendly (lighter & more maneuverable)]
[Whitney: Limited envelope will end up stressing operations.]
[Reinmuth: Arm mechanism needs support. Load – requires hearing as well as eye protection. Can't see the are being stripped until you have finished; could cause damage and not realize it until too late. Tends to fill up filter bags quickly; could be support issue and cost.]
[Morales: 1) This unit's arm is very heavy and if it is mishandled it has the potential to hurt someone. 2) Poor ergonomic design.]
[Staggs: See user interface]
[Ravert: The arm was awkward to use.]
[Berringer: 1) Trigger position needs to be changed. Current positions place too much strain on wrists and forearms. Arms too wide. 2) We discussed robotic arm movements so that it hangs from the ceiling. Would move arm out of operators way. 3) Instead of clear lens, install dark shade lens on end of unit. 4) Build more sturdy/ stable stand to hold material. 5) Can angle of unit be changed from \ to – across? 6) Environmental permitting if venting outside. 7) TCLP filters for Haz/Nonhaz waste.]
[Truong: 1) Need a system for capturing by-products of fluoro polymers. 2) not ergonomic yet.]
[King: Laser glasses; earplugs.]
[Slife: Poor ergo & limited usability.]
[Lantis: More noisy than Nd:YAG. Counterbalance questionable. Two-handed operation is somewhat difficult. Need stronger vacuum? Simplify controls?]
[Howarth: Handheld piece felt heavy and awkward – hands too wide for small person. Strange smell noted when panels stripped – both Al panels and graphite/epoxy. Two-button safety shut-off is a good idea. System was very noisy.]
[RAF: Transfer line booms severely restrict operator freedom of movement and restricts ease of handling the stripping head. System only really usable for vertical stripping motion – transverse scanning action ear on impossible due to head handling restrictions.

Flare from ablation process poses fire risk from contact with flammable materials and vapours released from aircraft (e.g. fuel vents, leaks, etc.) very noisy ablation process.]

Field Implementation Potential

[Plowman: Current system only suitable for use on flat surfaces. Access to internal and enclosed structures not possible due to lack of maneuverability of solid booms and size of stripping head. Possible stripping of external skins and removed components only.]
[Triplett: Field applications of current system appears limited to mostly flat open areas.]
[Mickey: Don't see at this time the use of this device.]
[Whitney: Low, not possible for much "on airframe" use, beam transport system questionable / dirt / cleaning alignment]
[Reinmuth: Depot or back-shop, too large a unit to deploy, best for fixed base operations. May have difficult support and supply of CO2 and gasses needed and quality of gas. Could a different interface be made to keep laser at ideal distance and angle from surface?]
[Morales: Scale 1-5 : 2.5]
[Staggs: Large size could hinder deployment]
[Ravert: CO2 availability in deployed locations is potential problem. Would be utilized in shop environment only.]
[Truong: Flight line deployable.]
[King: Four passes to get to primer on test piece 12 sq. in/10 sec per pass. Stripping/substrate damage (on composite) operator dependent – went through primer due to a slow pass.]
[Slife: Low.]
[Lantis: Not for flight duty; CO2 could be cumbersome. Better for "back shop" duty. Questionable "ruggedness".]
[Howarth: Difficult to implement as configured in anything but a depainting room where parts are brought to it. Mirror realignment after moving is prohibitive. For Orbiter, SLCR as configured would have minimal field implementation potential since only a few parts are service off the vehicle.]
[RAF: Current system only really suitable for use on flat surfaces. Access to internal and enclosed structures not possible due to lack of maneuverability of solid booms and size of stripping head. Possible stripping of external skin panels and removed components only.]

Other Comments

[Mickey: Bulky for movement – alignment of mirrors after movement a concern.]
[Whitney: Load! Will limit on floor use. Expensive gas. Not field deployable. Seems to be better for robotic applications.]
[Reinmuth: Looks difficult to do on curved surfaces. Removed coatings quickly but seemed to put a lot of heat into panel; damage concern. Appears that it would be difficult to do anything other than flat surfaces.]
[Hoogsteden: Transport & Shipping]
[Morales: Noisy, quality of strip after several passes is suspect & may require a secondary chemical application.]

[Staggs: With all these lasers, selective stripping would be more feasible if strip rates are adjustable. For a given substrate & coating, we should look into faster strip rates initially & reduce rates as substrate is approached.]
[King: Optics device on a moveable arm but 3' final pip means flat surface accessibility only. Substrate stayed under 125 degrees F on 2024-Al. Mirror alignment critical (12 mirrors) and can misalign.
[Slife: Maybe robot, if speed could be increased 400%.]
[Lantis: Questionable support from SLCR; reference CCAD's problems and ASC/ENVC's work cell lasers stripping project. This area should be investigated."
[Howarth: Slow sweeping seems suboptimal.]

Cleanlaser

Intended Applications

[RAF: On aircraft and components. Small area localized area stripping for coating repairs, NDT inspections as required. Internal and external areas including enclosed surfaces (e.g. internal surfaces of brackets, angle sections, etc.) Seam removal post PMB.]
[Triplett: 1) Small area stripping during prod. – strip for NDI etc. 2) Repair facilities – stripping masked areas around vents and drains. 3) Stripping areas not strippable by flashjet, PMB & chemical.]
[Lantis: Small areas on missile components.]
[Howarth: Small areas to be depainted. This system is more portable and might handle curved shapes. Possibly not acceptable for graphite epoxy substrates.]
[Ravert: On aircraft small area stripping for visual or NDI.]
[Whitney: Same as SLCR]
[Mickey: Stripping paint off A/C parts.]
[Truong: Strip coatings & appliqué.]
[King: 2024 Al.]
[Slife: Small touch-up, maybe for flashjet.]
[Buchi: After the F-16 has been PMB blasted, strips of about one to two inches of paint remains where the seams were taped. This may really work for us.]
[Morales: N/A]
[Staggs: generic supplement to other stripping methods, and eventually scale-up to large area stripping.]
[Fecsik: Selective coating (paint, powder paint, appliqué, RAM) stripping where hardware can't come to a workcell. Composite mold cleaning. Activating composite surfaces prior to coating. Metal surface cleaning prior to bonding.]

Technical Requirements:

[Triplett: Must be capable of removing coatings without damage to substrates – removal rates must be on par with existing methods – hazardous materials (chrome, cad) must be very close to 100% captured.]
[RAF: Small footprint, use of local power supply, ease of operation, no damage to substrate materials, selective paint removal, maneuverability of stripping head, accessibility to enclosed/internal surfaces. Safe to use on aircraft!! Surface temp to be maintained below DA limits (40 degrees Celsius). Safe to operators.]
[Hoogsteden: How does it remove polysulfide primer & CermanKote?]
[Lantis: Adjustable features are nice. Deionized water cooling system is good.]
[Howarth: Uniform coating removal possibly by one vertical and one horizontal pass. Remove coating without burning substrate possibly by constant motion.]
[Ravert: Needs to be worldwide deployable. Vacuum requirements need to be increased.]
[Whitney: Same as SLCR]
[Mickey: Safeware needs to be developed to prevent burn through.]

[Truong: Efficient strip rate. Easy to use and flight line deployable. Work on composite substrate w/ out damage.]
[Buchi: Need to have chromic acid anodize test results. I would like to have a panel at the lab to look at, after you have done the testing.]
[Staggs: Demonstrated ability to damage composite (C-Ep). Recommend 90 degree turns for most even strip. Angle of approach clearly affected focus, but this could be learned easily w/ proper training.]
[Morales: N/A]
[Fecsik: Complete removal of paint with no damage of substrate. Feedback system.]

User Interface & Operation

[Triplett: Very easy to use – will strip in confined areas. An added shut off if wheels are not running could help avoid damage to substrates.]
[Lantis: Fairly easy; "wheeled" end effector was a nice touch! (but this would only work well on flat surfaces. Very small & compact – good! Operator had to hold end effector at the proper angle – difficult to focus. Unit seemed to "skip" – maybe this was due to operator inexperience. Integrated dust collection system is nice, but duel lines (vacuum & fiber optic cable) is a little cumbersome.]
[Howarth: Five minute warm-up is convenient. Small enough to handle easily. Focus angle important to keep focused. Adjustable raster speed.]
[Whitney: Easy to use but operation can often expose substrates.]
[Mickey: Vacuum hose could be made smaller to allow for easier ops. Waist belt system to support hose to prevent fatigue.]
[Truong: Easy to use.]
[King: Rastered, back & Forth motion over target, goes through primer too easily – operator training. Fiber optic delivery gives good flexibility. Dustbuster sized gun should give good access.]
[Slife: Limited use due to size of hand unit.]
[Reinmuth: Appears to be more capable of doing curved surfaces, more control. Vacuum and fiber optic hoses are limiting movement, swivel joint or support would help. Cut was like a knife, so user had to keep the tool moving to prevent damage, if beam could be widened to cover more area may be good.]
[Morales: N/A]
[Staggs: Easy to use. Small footprint let's user visually monitor strip progress. Slow strip rate allows better selective strip capability (vs. other lasers)]
[Fecsik: Must be very mobile. Fiber optic cable is the key.]
[RAF: Single trigger operation and smaller trigger head allows single handed operation. Visibility of surface being stripped by laser not possible until after laser removed from over area – due to enclosure of flare by shield. Fibre optic transfer lines allow operator greater freedom of movement although weight of lines is unsupported. Prolonged operation may cause operator problems. Size of the head may cause restrictions to enclosed surfaces and contact angles only allows 45 degrees perpendicular (?) stripping. If user pulls back from the surface laser beam becomes diffuse and stripping is ineffective. System currently only allows single axis movement.]

Safety and Ergonomics

[Triplett: Better visibility of stripped surface would be helpful.]
[Lantis: Very quiet! Two hold down buttons are a little cumbersome – is this safety really needed?]
[Howarth: Less bulky and unmanageable than other models. Hoses over should make weight problem. Less muscle involvement than SLCR. Lower noise level.]
[Ravert: One handed operation made using the gun easy.]
[Whitney: Seemed OK & easy to hold.]
[Mickey: Same as page (1) [see SLCR] if you have requirements then they should be in place and attended to.]
[Truong: 1) without wheels, if beam is 2-3" off the surface, will integrate dust collection system be effective in collecting by-products? 2) Adapt a more user-friendly vacuum hose to relieve fatigue to the operators, adapt another handle for holding.]
[King: Glasses, ear plugs. Angel of operation makes movement of gun difficult. Requires much body motion to go south of perpendicular.]
[Slife: Marginal]
[Reinmuth: Slower removal rate but this appears to be good to have better control, limits damage. Gun type nozzle is easier to use and keep at correct angle and distance much more quiet operation, seems like hearing protection would not be needed.]
[Morales: Safety – Good; Ergo – Good.]
[Staggs: 1-handed operation is an option (although second hand was helpful for steady motion & would lessen fatigue) (ability to use 1 or 2 hands is advantageous.)]
[Fecsik: Protect user. Protect bystanders. Curtains, like welding, makes sense.]
[RAF: Interlock to prevent accidental firing of head by operator (?). Wt of transfer lines may cause operator problems with prolonged use. In addition, the rigidity of the lines causes some restrictions. Possible use of belt clips (as for air liens) and inclusions of a Universal Joint at stripping head connection would reduce problems and improve maneuverability of systems. May also promote freedom of movement to allow stripping in all direction. Flare produced very high temps and risk of fire from contact with flammable substances and vapours released from aircraft (fuel vents, leaks, etc.). Stripping head does not allow access to enclosed surfaces. Quiet ablation process.]

Field Implementation Potential

[Triplett: Appears to be the best choice for implementation near term. It has the portability and small head size needed.]
[Lantis: Should be very good because of its compactness.]
[Howarth: Portable unit, maneuverability and uniform removal make this potentially implementable for much wider variety than other lasers. Small footprint will limit process to stripping small areas.]
[Ravert: Very good potential]
[Whitney: Limited to flat surfaces w/ no surface anomalies. Explosion (fuel vapor) hazard needs to be addressed.]]
[Mickey: Use on limited basis for small parts.]
[Truong: Portable, flight line deployable. Great potential.]

[King: Very slow strip rate 10 sq. in / min. Small footprint. 4' x 5 ' plus target and HEPA filter area.]
[Slife: NDI?]
[Reinmuth: Appears to be the better choice for portable applications. If ruggedized it looks like this unit could be deployable.]
[Morales: Scale 1-5: 3.5. Scale can increase if the gun nozzle is one of many nozzle accessories to accommodate various applications.]
[Staggs: Highly portable. So very good deployment potential.]
[Fecsik: Yes – Raytheon field services.]
[RAF: Similar to SLCR but also allows for some internal flat structure stripping due to greater flexibility of transfer lines. Enclosed surfaces still not capable of being stripped due to size of head and contact angle.]

Other Comments:

[Berringer: Handheld laser is back weighted. Must be slung over shoulder. Could vent come out front like SLCR to equal weight counterbalance. Fiber Optic Cable – trip hazard – lay in floor.
Squeeze grip the handle – make smaller if possible. No emergency stop on handle. Take into account heat from unit. Move green button to side and make concurrent pressure depressed @ same time (if possible).]
[Triplett: Need to look @ stripping sealed butt joints – does it remove paint without damage to sealant?]
[Howarth: Masking edges of raster sweep might make edge burning less likely. Closest to what I was picturing for PLCRS concept.]
[Whitney: Strip edge overheating due to return sweep raster delay (tape {illegible}. Knife like cutting.]
[Mickey: May want to put this gun in the booth.]
[King: Difficult to regulate ablation depth; raster slice is too small so manual speed regulation is difficult. Easy to lift one guide wheel making removal non-uniform. No notice to users.]
[Reinmuth: Small and compact, good portable.]
[Morales: Quiet. Good results. Addition – Maybe make the nozzle rotatable on a single axis – like a paint gun nozzle for better X & paint removal]
[Staggs: All 4 lasers can damage composite, so all 4 lasers need an auto-shut-off system to prevent dwell over a given area.]
[Fecsik: Quantel & Cleanlaser are the only two players for Raytheon's needs.]
[RAF: When operated outside optimum stripping range, ablation process is lost and thermal effect of laser results in very high heating of paint film and subsequent scorching/burning removal of paint!!]

Quantel

Intended Applications

[Triplett: 1) Small area stripping during prod. – strip for NDI etc. 2) Repair facilities – stripping masked areas around vents and drains 3) Stripping areas not strippable by flashjet, PMB & chemical.]
[RAF: On aircraft and components. Small area localized area stripping for coating repairs, NDT inspections as required. Internal and external areas including enclosed surfaces (e.g. internal surfaces of brackets, angle sections, etc.) Seam removal post PMB.]
[Whitney: same as SLCR]
[Mickey: Paint Removal of a/c parts.]
[Fescik: same comments as Cleanlaser for me.]
[Lantis: Small areas on missiles.]
[Buchi: We are thinking of using this laser for removing sealant.]
[Ravert: Bits & Pieces stripping (i.e. age parts, brackets)]
[Morales: N/A]
[Slife: Small areas]
[Truong: Strip hard to get areas]
[Staggs: Generic supplement to other strip methods, and eventual scale-up to large scale area stripping.]
[Howarth: Very small areas, secondary touch-up depainting. May not be acceptable on composites. Would be good for seams/corners, etc. if it doesn't degrade substrate.]
[King: Blast booth glovebox sized parts – nothing big.]

Technical Requirements:

[Triplett: Must be capable of removing coatings without damage to substrates – removal rates must be on par with existing methods – hazardous materials (chrome, cad) must be very close to 100% captured.]
[RAF: Small footprint, use of local power supply, ease of operation, no damage to substrate materials, selective paint removal, maneuverability of stripping head, accessibility to enclosed/internal surfaces. Safe to use on aircraft!! Surface temp to be maintained below DA limits (40 degrees Celsius). Safe to operators.]
[Whitney: same as SLCR]
[Mickey: Smart software needs to be added to prevent burn through.]
[Fescik: same as Cleanlaser]
[Lantis: Scale-up potential with parallel construction is a nice feature.]
[Ravert: Power Requirements must be worldwide compatible. Chiller & laser unit is too large.]
[Morales: N/A]
[Slife: Stand off control]
[Truong: Stripping w/out damaging the substrate. Ozone Control.]
[Staggs: Demonstrated ability to damage composite. Small beam was good for access to complex geometries, but even stripping unlikely (ability to adjust footprint size is need).]

[Howarth: Quick coating removal with good control of strip path using support system. Chiller/box needs to be limited in size. Needs complete or near complete capture of chips/dust, etc.]
[King: Footprint 20' x 20' (chiller, booth, power supply). 70degree F chiller water supply?]

User Interface & Operation

[Triplett: Difficult to hold steady – overlaps are not consistent which increases the possibility of burning composite structure.]
[RAF: Single handed operation of gun without shield allows visibility of surface being stripped. Focusing mechanism using light square easy to use and safety interlock prevents operation when system is outside optimum focal range. Pistol grip arrangement with suspended fibre optic cable limits maneuverability in glove box environment although spot laser operation is possible. More scope for use on enclosed surfaces due to focal distance being outside of stripping head.]
[Whitney: Very easy to use & seemed the most forgiving.]
[Fescik: same as Cleanlaser]
[Lantis: No integral dust collection system is a drawback. Companion chiller makes system large and cumbersome.]
[Ravert: Warm up seemed excessive.]
[Morales: N/A]
[Slife: Open beam would allow operator to perform designs (play with it too much)]
[Truong: Need a rotating table inside the glovebox for easier stripping. Need to strip faster.]
[Staggs: Glovebox design: Need gloves for vacuum seal; perhaps need to hang from above and feed cables through other opening.]
[Reinmuth: Can have long cables so the unit can be positioned away from the part, helps with versatility. Very narrow beam so the area stripped per pass was small, OK for small areas.]
[Howarth: Gun is hard to control vertical direction. Horizontal sweeps are difficult, but not as difficult as vertical. Trigger mechanism is intuitive to operate. Cable out the bottom of gun is awkward.]
[King: Manual- stripping quality operator dependent. Target area much smaller than the end of the gun ~ ¼ " square. Very small strip areas; slow rate; hand rastered.]

Safety & Ergonomics

[Triplett: Need gloves in glovebox. Fiber optic cables coming in from the top would improve ergonomics.]
[RAF: Transfer line and weight of stripping head may cause problems with prolonged use. Rigidity of transfer lines also a potential problem. Localized stripping controlled by operator determines temp of surface during stripping, operation required to be within a defined focal range otherwise safety cut-off applies. More accessibility and maneuverability available from this system. However, as with Cleanlaser, incorporation of supports for transfer line (1 head) and a universal joint would promote much greater freedom of movement and reduce strain on operator. Very quiet system although persistent/constant ablation noise could result in ringing in ears. Use of glovebox should

be modified to include gauntlets and seal UV light escape routes (Note: rubber selected for gauntlets requires to be UV resistant).]
[Whitney: Easy to point in an unsafe manner.]
[Mickey: Gloves need to be installed in glovebox; have legs adjustable for height req. to be more ergonomically friendly; have chain longer to allow for gun to hang; {illegible} be used with less pressure on the workers wrist.]
[Fescik: same as Cleanlaser]
[Lantis: 50 cm radius safety shut-off is a nice feature. Side to side action is more cumbersome. Wo9rkedn is somewhat cumbersome and heavy.]
[Ravert: Incorporate gloves into box, head size seemed a little large.]
[Morales: Safety – questionable. Some type of industrial glove should be used inside the box. Weight of the {illegible} will be a problem in a confined area (any area for that matter).]
[Truong: Unit is too big & cumbersome. Need adjustments for height(s) of glovebox. Need an extra handle on the laser head. Fiber optic cables should come from the top for easier handling.]
[Staggs: Ergo – see above]
[Reinmuth: Weight at gun would be issue, fatigue of operator, left to right worked best. Good visibility of what is being stripped. Relatively quiet, hearing protection may not be require.]
[Howarth: Heavy, awkward gun would promote wrist fatigue after prolonged use. Glovebox is cumbersome to use. Quiet operation. Collection devise would eliminate need for glovebox.]
[King: OD > 7 windows on box. Range-on switch to preclude non-target firing.]

Field Implementation Potential

[Triplett: Specific applications are possible but I cannot think of a glove box application at the OEM level.]
[RAF: Glove box limits use to off a/c use only. However, similar system for external use could be applied similar to Cleanlaser 2000 plus more enclosed surfaces due to ability to target beam beyond laser head.]
[Whitney: This could be tried out today.]
[Mickey: Cleaning of small parts for booth.]
[Fescik: same as Cleanlaser]
[Lantis: Companion chiller makes system more cumbersome.]
[Ravert: Very good potential. Concept already exists in many shops. Could replace two or more machines per workcenter.]
[Morales: Scale 1-5: 3.5]
[Slife: NDI, speed not fast enough for use for PMB supplement.]
[Truong: The current system is too big. Too cumbersome for flight line deployable.]
[Staggs: Chiller box reduces mobility.]
[Reinmuth: Good for getting into difficult areas, gun like beam. System and chiller are rather large, limits portability.]
[Howarth: Small strip width limits implementation potential to tiny areas and touch-up after primary depainting operations. However, for small, tight areas, the Quantel might be better than conventional methods.]

[King: Fiber optic delivery for better flexibility in box. Footprint too big for usefulness of application. Glovebox needs gloves and better seals.]

Other Comments:

[Berringer: What H2O Pressure is required for the chiller?
Build gloves in - movable glove box –side to side. Device to hold parts instead of leaning against cement block. Height adjustment legs. Bungee from roof? Trigger finger – 2 hand devices – squeeze pad grip
Configure inside so its proper distance away from panel. Smaller glovebox will need less airflow.]
[RAF: External system supplied by UK RAF requires evaluation alongside other lasers in programme. Scorching effect similar to Cleanlaser!!]
[Whitney: This was the one that I would choose to use at this time.]
[Fescik: Quantel & Cleanlaser are the only two players for Raytheon's needs for portable lasers.]
[Lantis: Concern for dust accumulation in the shroud. Should be faster.]
[Morales: Not to noisy. Good quality strip.]
[Truong: Unit footprint is too big for portable.]
[Reinmuth: Glovebox was useful for parts that could be removed, as long as they fit in the box. Raster capability would be useful, possibly have switch for fixed beam or raster.]
[Howarth: Smallest stripped area of all the lasers presented. May be too small to be practical for all but the most detailed parts.]
[King: Short wavelength. Very slow.]

Laserline

Intended Applications
[RAF: On aircraft and components. Small area localized area stripping for coating repairs, NDT inspections as required. Internal and external areas including enclosed surfaces (e.g. internal surfaces of brackets, angle sections, etc.) Seam removal post PMB.]
[Fecsik: None – needs lots of work by AFRL]
[Mickey: Need more information on system to determine application.]
[Whitney: Same as SLCR.]
[Morales: N/A]
[Staggs: Generic supplement to other strip methods, and eventually scale-up to large area stripping.]
[King: 2024 Al]

Technical Requirements
[RAF: Small footprint, use of local power supply, ease of operation, no damage to substrate materials, selective paint removal, maneuverability of stripping head, accessibility to enclosed/internal surfaces. Safe to use on aircraft!! Surface temp to be maintained below DA limits (40 degrees Celsius). Safe to operators.]
[Whitney: Same as SLCR.]
[Morales: N/A]
[Slife: Most potential, but not there yet.]
[Staggs: (more development needed) Excessively fast strip rate needs to be controlled.]

User Interface & Operation
[King: So far still; operation for production under development. Probably best used for a CNC table where diode stays still. Not a good candidate for fiber optic (?) due to dispersive effect of the fiber.]

Safety & Ergonomics
[Mickey: All safety concerns as noted on page (1) [see SLCR comments]]
[Whitney: N/A]
[Morales: N/A]
[Staggs: (to be developed)]
[King: 225 degrees F part temp on back side; temperature front side needed burns paint rather than ablates. Leaves soot on part.]

Field Implementation Potential
[Whitney: N/A]
[Morales: N/A]
[Staggs: we'll know more later]
[King: First pass to primer second pass to metal.]

Other Comments

[Triplett: I think this unit has potential with more work. The programmability of the strip area is a nice feature.]
[Mickey: Cleanliness of system may be a good choice in future.]
[Whitney: CW has the greatest potential for damage.]
[Morales: Did not view this product.]
[Staggs: very anxious to see how this performs once it's portable.]
[King: Fast strip rate; 2 sq. in/4 sec. Put diode laser in a hand gun.]