

PRODUCING THE NO-BUDGET DIGITAL EFFECTS FILM

A Senior Thesis

By

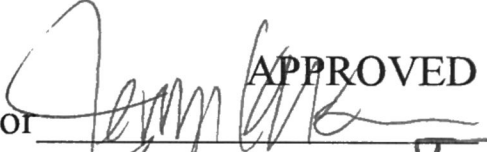
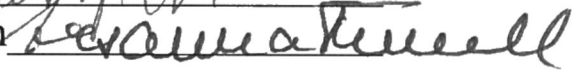
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PRODUCING THE NO-BUDGET DIGITAL EFFECTS FILM. James Atkinson (Terry Larsen), Architecture, Texas A&M University.

In today's cinematic world, elaborate digital special effects are so commonplace that most viewers ignore them. Despite their widespread use, computer-rendered effects cost no less per shot at major studios today than they did ten years ago, during the infancy of computer graphics in film and television. The evolution of low-cost desktop filmmaking tools begs the following question: can a professional-looking effects film be created using desktop technology, almost no money, and a single person fulfilling the roles of writer, director, director of photography, editor, and effects artist? A twelve minute no-budget effects film, *Insomniac*, is currently in production to answer that question, but while much progress has been made, several key shots and scenes have yet to be filmed before a definitive comparison of techniques can be made. Despite a multitude of setbacks, the primary thrust of this project, the film, is still moving full speed ahead under its own power.

Producing the No-Budget Digital Effects Film

Introduction

This paper is intended to accompany the no-budget effects film, *Insomniac*, a work in progress. The real research and effort of this project is to produce such a film against all odds; this paper is but a terse documentation of its creation. It is unfortunate that the scale of the film has prevented its completion as of the writing of this document.

A no-budget digital effects film is defined, for the purposes of this document, to be a film which relies on ordinarily expensive digital special effects such as computer animation and compositing, and image processing, but lacks the funding for these effects to be completed anywhere but on a desktop computer system. I have chosen to define a desktop computer system as a commonly available platform costing under \$10,000 for all computer components, with attached video peripherals costing no more than \$5000. The cost of software is not considered, as software prices are influenced as much by marketing concerns and destination platform as by actual functionality.

The purpose of creating a no-budget digital effects film is to illustrate that it might be possible to achieve professional-looking effects using the radically inexpensive hardware of a desktop system. There currently exists a highly distributed system for the production of effects-based footage in Hollywood: even for a simple commercial, a separate crew exists for the filming of live-action footage, for the management of video once it reaches the effects house, for audio tasks, for modeling computer graphics elements, for animating those elements, for managing the mainframe systems used to render those elements, and finally for outputting the final product back to video tape. For this reason, commercials involving digital effects rarely cost below \$100,000, and can frequently range into the millions, while feature film effects budgets are reaching past the hundred million-dollar mark. The bureaucracy resulting from this distributed system

causes immense delays in the release of new work and adds to the cost of the finished product.

Thus I began *Insomniac*, a twelve-minute 16mm effects extravaganza, in hopes of demonstrating that all of the above tasks can be accomplished for nearly no money by a single person. Even though a great deal of work remains to be done before the film is completed, I have already proven the value of the small-scale approach with the excellent results of some of my live-action elements. As of this date, none of *Insomniac's* effects shots are complete, but by the presentation date of May 1st, at least two of them will be finished, and that will have proven my thesis further. At an average cost of \$10,000 per effects shot at a major studio, just one completed (and professional-looking) shot in my film (which has a total budget of \$4700 including personal hardware investments) will have 'paid' for the entire endeavor.

The Story

Insomniac is the story of a college student named Dave who, during finals week, goes without sleep for four days and overdoses on caffeine pills. This triggers a fugue in which Dave hallucinates that his friends, whom he is visiting at an abandoned airstrip, turn into hideous computer-animated alien monsters which attack him. Dave fights back with an eclectic assortment of weapons while his hapless companions attempt to coax him back into reality.

The story is meant to be slapstick, in anticipation that many of the special effects will not turn out as planned. For a comedy, bad effects will only enhance the humor, whereas they would ruin a more serious drama.

Preproduction

Preproduction is the development phase of a film. It begins with an idea for a film, progresses through a script and its revisions, and culminates (for the savvy no-budget effects filmmaker) in a complete set of storyboards. Effective planning in the preproduction stage of a no-budget digital effects film is critical in avoiding uncorrectable mishaps down the road. Mistakes made in the planning stage often will not become evident until postproduction. Examples of latent defects caused by poor preproduction include the following:

Continuity errors: During actual production, the numerous duties of a no-budget director (which include sound engineer, effects supervisor, director of photography, and set designer -- all heavily attenuated due to the limitations of time and concentration) make it nearly impossible to keep track of the actual flow of the shots being filmed, much less the flow of the story as a whole. On a large-scale production, there are numerous compensating factors which can salvage continuity from even the worst development phase, such as filming with a second unit for cutaways, the presence of a crew member dedicated to monitoring continuity, and endless retakes. On small-scale productions, anything one can do to remove decision making from the production stage will contribute towards a better end product. Small procedural decisions on location inevitably overwhelm the big picture, so if one has a pre-prepared plan of action for each shot, the process of filming is reduced to following an instruction guide, filming each shot as specified on paper and checking them off as they are completed. Hence there is little question as to when full coverage has been achieved and the shoot can be completed.

Storyboards -- drawings depicting the camera angle, framing, and action of each shot -- are the most common form of instruction guide prepared during preproduction. Their comic-book style illustration format translates easily into actual shots especially when a director is under pressure. Utilizing storyboards, a filmmaker can spend as much

time as is necessary thinking through the action of a sequence before a single foot of film is shot..

For the no-budget director planning on incorporating digital effects, storyboarding is an absolute necessity. Digital effects, by nature, demand the seamless joining of actions taken during production with actions taken during postproduction. Even though modern desktop computer tools allow for flexible image manipulation, there are still severe limitations on what can be synthesized in a digital environment. Hybrid effects such as those in *Insomniac* demand that live action elements be matched with computer-rendered elements, and there are many ways in which live-action filming decisions can make this task impossible, even for a professional effects studio. The root cause of this conflict between the real and virtual worlds is that information is lost when a three-dimensional scene in the real world is filmed and captured in two dimensions. This information consists of such variables as camera position, focal length, camera orientation, and lens characteristics. Since the relationship between these variables and the resulting image is many-to-one, it is difficult to reconstruct the variables of the live action scene by simply viewing the footage.

In order for a computer-generated element, such as an *Insomniac* monster, to appear as though it belongs in a scene, the perspective of the element must match the perspective of the live action. It is possible to match perspective through trial and error when the camera is static, but when the camera moves, or the other variables such as focal length change over time, the process of matching real and virtual cameras for even a short scene becomes nearly impossible without the use of reference objects in the live-action scene. This process, known as match-moving, requires it's own branch of expertise at the major Hollywood effects studios, as it is becoming increasingly popular for directors to shoot wild footage without reference objects or motion control for use in effects shots. Most of the tornado composites in *Twister* (1996) were accomplished using wild footage shot from moving vehicles which had to be painstakingly match-moved. The requisite manpower for match-moving complex shots is unavailable to the no-budget effects artist,

and since alternate methods, such as motion control, are prohibitively expensive, it is best to adopt a static-camera approach to filming background plates and other live-action elements, unless the shot does not depend on perspective matching (such as a floating CG element) or has a simple camera move (with the camera dollying straight at a constant speed). It is important to remember that match-moving is accomplished by continuous iteration and refinement, which is only practical when using fast graphics hardware found currently on workstations costing \$10,000 or more. Given the speed with which hardware cycles pass, technology suitable for desktop match-moving may become available soon,

Not only can storyboards be used to position elements while shooting; they are also necessary for breaking down multilayer shots into their component images and ensuring that each layer is recorded. A good practice is to list every layer of every shot next to a short description and a small checkbox which can be marked off when the layer is completed. It is often necessary to append information to a storyboard while shooting, such as the description of lighting and camera position for background plates in layers where the successive layers have yet to be shot. In such instances, the first layer to be completed becomes the template for the other layers, since from then on, the other layers of the shot must match its camera angle and lighting. If the shot is a simple composite, such as a close-up of an actor's face looking into a CG monster's face (most of the *Insomniac* composites are designed as close-ups with no visible interaction between layers), then only basic information needs to be recorded, such as approximate camera height and focal length. Yet another advantage of using daylight composites is that matching the lighting is easy: both elements are simply shot in bright sunlight. While it would be nice for the position of the sun to be exactly the same in both elements, matching this detail is usually not necessary unless the shadows of the foreground and background objects are in plain sight (a situation best avoided). With close-ups, the angle of small background shadows is irrelevant to the viewer, believability and continuity will be preserved mostly by the correct coloration of the foreground.

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Dependence on Impossible Shots: Simply because something can be realized as a storyboard does not imply that it can be produced on film. While this seems obvious, it is easy to draw and visualize actions which appear straightforward but in fact are physically impossible. Several cases in point occur in *Insomniac's* boards. When Dave emerges from a campus building after completing his last final, the storyboard specifies that the camera slowly dollies back as he shouts a primal victory chant; the camera then dollies back into a close-up at about twice the speed of the pullback. This seemingly simple shot proved to be unfilmable, as there existed no location on campus that would allow either a dolly or a pickup truck to perform the specified move.

Geography is not always the culprit; often space constraints force an alteration in a planned shot and thus a disruption of continuity. For instance, many of the shots taking place in the holding cell at the police station were unfilmable as planned due to the cramped nature of the cell. On a large-scale production, such a set would be reproduced on a sound stage and could be assembled to permit any camera placement, but as a no-budget director I was forced to skip over certain shots which were impeded by immovable objects.

Finally, some shots which seem easily executed on paper turn out to be too dangerous in practice. The most outstanding shot of my original storyboards was a blue-screen composite in which Dave is thrown through the air by one of the CG monsters. The shot required that Dave fly in an arc towards the camera against a blue backdrop. In order to accomplish this, I planned on stringing Dave, wearing a firefighter's harness, from the rafters in the Visualization Lab TV studio using a bungee cord. The shot then required that Dave be bounced in a low arc towards the camera. While this technique might have worked, the administrators of the studio forbade it, citing liability concerns. While liability is usually of little concern for the no-budget filmmaker (who always lacks insurance and

must continually take risks to accomplish anything), the liability of others can be an impediment.

Logical Errors: What makes sense to a writer can be incomprehensible to others. This discrepancy can be particularly acute when the writer of a film is also its director and editor. Since the filmmaker's bias towards his or her own work is usually insurmountable, the only way to catch logical errors before it's too late (i.e. one shows the finished film to friends and family and receives puzzled stares) is to go over the script and storyboards with others, or put the material aside for a long enough period such that much of it is forgotten and then reexamine it. As the latter is not practical under deadlines, sharing the sequence of action with others can help to point out non sequiturs. The most valuable feedback can be obtained from the actor who must perform the action; when the actor visualizes his or herself going through the preplanned motions as if it were actually happening, incongruencies and 'holes' are often revealed. On a no-budget shoot, your actors' opinions on the progression of the shoot are essential, and can make the difference between the director being informed as to a logical error and blithely completing a scene with a hidden logical time-bomb. For example, the *Insomniac* actors playing Dave's friends asked me the meaning of their dialog near the film's end; my difficulty in explaining it convinced me to add clarifying narration in the final scene.

The Big Bite: The credo "don't bite off more than you can chew" must be kept in mind during preproduction. It is all too easy to add material to a script or storyboard, but these additions can result in countless hours of work later. Although it is difficult to gauge how much work will result from preproduction additions, there are a few general guidelines which I discovered, much to my dismay, during *Insomniac's* Herculean production process.

First, the number of scenes must be kept to a bare minimum. While it is tempting to range far and wide, the no-budget writer must keep in mind that every scene requires at least a day of shooting, and sometimes many more. It takes anywhere from a half-hour to an hour to unpack and set up a camera, two lights, simple sound gear, and basic props. Shooting in locations without convenient parking access can multiply the setup time. Thus, in the case of my film, shooting in more than one location in a single day was never practical.

Second, the number of shots should be controlled. This is the most difficult economy no-budget production to manage because there is a direct trade-off between coverage and continuity. The fewer shots one has of a specified action, the greater the chance of a hole appearing in the action while editing. During production of my film, I found that the time a shot took to complete depended more on what the camera was doing than what the action was. For instance, the average time to set up, rehearse, and complete a shot which involved placing the camera in a static position on a tripod, without pans or zooms (once the gear was unpacked), was fifteen minutes. Panning, tilting, zooming, or pulling focus during the shot required more extensive rehearsal and retakes, and resulted in an average shot time of 20 minutes. Moving the camera, either on a truck or a dolly, could result in a shot which took up to an hour to complete, as they contained many variables which had to be managed for the shot to work. As an example, one shot in the jail cell required the camera to dolly up into Dave's face from about eight feet away after he delivered a long line. Due to the low-light nature of the scene, I was forced to shoot at F2.8 and thus had little depth of field to work with. This necessitated that a production assistant 'pull focus' (twist a focus ring during a shot) on the lens's macro ring while the camera rolled forwards. At the same time I had to roll the camera at an even pace to prevent wobbling and keep Dave framed on the video monitor attached to the camera. The shot had to be repeated five times on film and many more in rehearsal before it was correctly executed, and took well over an hour to complete. In a film with 314 planned

shots, many of which have multiple layers, an hour is far too long to spend on a single one (as of the writing of this document, I have completed approximately 250 shots, although many of them are incomplete without the addition of additional layers).

To complicate matters, special effects add a tremendous time burden to both the shooting and postproduction of a shot. Most of the effects labor for *Insomniac* is resulting from the modeling and animation of the CG monsters, and while the monsters need only to be built once, each additional shot involving them requires days of painstaking animation labor. Even effects which seemed simple on paper are becoming unwieldy as I enter postproduction. For example, the shot where Dave activates an electronic ax with a glowing CG blade was basic in theory. All it involved was the modeling of the ax handle as an occluding object to cover up the composited blade at the points where the handle covered the blade, then animating the CG handle to match the movements of the real prop handle, then rendering the blade with a glow shader in SoftImage and the handle as a completely black object which would be invisible in the final composite. In practice, however, the animation is turning out to be very difficult, as the poor resolution of the VHS image used to roto-scope the animation makes exact positioning of the CG handle impossible.

Summary: The purpose of preproduction is to solve as many problems as possible before shooting begins. A filmmaker has the most time to think during this phase; thus it is imperative to do most of the thinking for the project at this point. Storyboards are the most powerful tool used in developing this thought process. With their proper use, the no-budget effects filmmaker can have some hope of completing his or her project while avoiding continuity errors, impossible shots, and overages which can be lethal to a film's eventual completion.

The storyboarding of *Insomniac* was an arduous process, and at this point I began to realize the enormous scale of what I was undertaking. *Insomniac* is a project that

would require weeks from a full-time effects studio for the postproduction alone, and I am attempting to proceed through every portion of the film on my own in the course of a year while attending school. Considering the amount I have already accomplished, my productivity has outstripped the best effects studio in terms of man-hours; the tradeoff for this is the mishandling of certain shots due to my lack of experience and an utter lack of flexibility during production. due to inadequate funding.

Production

The only way to approach a production as large as *Insomniac* when everyone involved was a full-time student was piecemeal. With my storyboards in hand, I was able to break scenes up and shoot them out of order without fear of losing track of where I was in the project. I could mark off each shot as it was completed until no more remained, and then I would be finished with that scene.

Background Plates: I began production by shooting background plates for scenes which required composites. A background plate is essentially a static shot of the background objects in a multi-layered image. For this film, I designed most of the layered shots so that the objects or creatures which were composited over the background had no interaction with that background. This simplified the photography of the backgrounds immensely. The only considerations which had to be made was for proportions.

When shooting backgrounds, one is taking a picture which has a primary interest that isn't there. The background for a CG monster, for instance, has to be framed as though the monster was in the shot. The easiest way to accomplish this is to have actors or props stand in for the composited elements when one is framing the shot, then leave the frame for the actual filming. For each background plate involving a monster shooting at Dave, for instance, I would have an assistant acting out the part with an imaginary

weapon, and I would focus on the assistant. Especially for close-ups, this step is critical, because backgrounds can and should be out of focus for shots which would be that way with the character actually there. Always focusing on the background will result in a string of pretty, sharp images behind the action, but will impair believability in shots whose depth of field should only include the character. It is also important to remember that every background plate must be slated, as it isn't easy to tell where a plate belongs later without any action in the shot.

All but three of the 45 backgrounds used in *Insomniac* occur outdoors. The plates, like the rest of the outdoor footage, were shot using tungsten balanced Kodak 7268 and a number 85 filter. For many of the outdoor shots, the sunlight was strong enough to mandate the addition of a neutral density filter (for most of the filming, a combination 85 and ND 6 filter was used), which would allow for filming at an f-stop within the range of my lens's iris. The ND 6 filter caused a 2-stop drop in exposure, in addition to the drop caused by the 85 filter (the stock was rated at 100 ASA for tungsten, 64 for outdoors with an 85). Thus I achieved a very workable exposure range using the effective 3-stop decrease caused by the combination of filters.

In addition to simple plates for close-ups, there were a number of more complex plates. Several called for the presence of fire and smoke to enhance the believability of an exploding or burning foreground object. In these cases, a small controlled gasoline fire was created off screen so that flames and smoke would enter the frame. The resulting viscous, black smoke was very effective in enhancing the violence of what would occur in the foreground. Several plates required Dave's presence: for example, the background for a shot of a CG monster's hand grasping Dave's shirt collar was accomplished by having an assistant's hand reach in from out of frame and hold the shirt at the exact angle of the monster's hand. Since the monster's arm would overlay the human one, positioning of the human arm was critical. Further processing of the background is necessary before it will be usable for the composite, in that a separate layer must be derived consisting of the

portion of Dave's shirt under the creature's fingers. Such cut-and-paste layer derivation is possible using Elastic Reality, which allows for the easy creation of mattes based on animated shapes.

Two moving plates, yet to be filmed, will require steady, straight driving of a truck for the duration of the shot. For all of the moving camera shots in *Insomniac*'s longest scene (on the crumbling tarmac of an old airstrip), rolling the camera with a wheeled dolly proved impossible due to the rough paving. The flat tarmac provided an excellent surface for trucks, however, and the unlimited driving space provided for some very pleasing shots from the backs of moving flatbeds.

Acting shots: It is important not to underestimate the difficulty of straightforward acting shots when adding them alongside effects shots. The primary difficulty for the no-budget director in this ordinarily simple category is the collection of actors who will not only work for free, but work all at the same time. Long runs of dialog can be shot quickly if the cast and crew are kept together long enough to get into a 'groove' where the actors know their lines well and the director has a good feel for the scene, but this was never possible on *Insomniac*. Scheduling constraints for all involved resulted in no shoot ever lasting longer than five hours.

Compounding matters was the fragmented nature of the scenes in the film. In addition to changing camera setups during the course of a scene, most of *Insomniac*'s scenes require large movements from one area of a scene to another. For example, in 'film space' (the fictional geography which is understood through the film's editing), Dave runs into a storage shed after being chased from his starting point on the tarmac by the CG monsters. The shed involved was actually 50 yards away from the starting point, necessitating that all of the gear be moved to a new location halfway through the shoot. Fortunately for continuity, the wide, flat nature of the runway and surrounding land provided the ability to shoot a misplaced event at a low angle with only blue sky in the

background. When Dave's friends discuss his situation outside the shed, they are standing in the wrong spot according to the action, but by shooting them against blue sky, they can be placed anywhere in film space.

Acting shots require extensive rehearsal, second only to acting shots before a blue screen. At this point the director must not only inform the actor of what their movements are, but place the dialog in it's proper context for the actor, or else the wrong delivery is inevitable. A director's acting skills (if any) are challenged at this point, and many frustrating moments arose when I was unable to properly articulate a line of dialog in a way that illustrated what I wanted. Dave, as the principle actor, required the most coaching not only because of his prominence in the film, but because he had no acting experience whatsoever. Thus, another compromise for no-budget effects filmmaking is brought to light: it's much more important that actors have time to waste than it is for them to have acting skills. My production phase began in October of 1996 and is still in progress, and the patience required to keep working for this long would have proved too much to bear for most experienced actors, given that at the college level, student actors work primarily in theater, and no production lasts longer than a semester. Experienced actor's reluctance to participate for extended periods was illustrated by my difficulty coordinating the film's only seasoned players, who acted the parts of Dave's friends. As members of our university's improvisational comedy troupe, they were occupied not only by constant rehearsals, but parts in school theater productions as well.

Blue Screen Photography: The purpose of a blue-screen composite is to enable an object or character to be isolated for the purpose of placing it on a separately shot background. The process requires a large surface painted with a special high-chrominance blue; for *Insomniac* I utilized Roscoe Ultimatte Super-Blue, an expensive brand with a blue chrominance exceeding commonly available household paints. Another option is the use

of blue cloth (preferably Ultimatte blue), which can be hung behind the element to be composited.

For *Insomniac* I had the option of either filming my elements in the Visualization Lab's television studio, which had a hanging blue cloth, or building my own screen which I could set up outdoors. Since the lighting on the bluescreen element must match the background plate at least in color and intensity (direction matching is a bonus but not always practical), and all but five of the required blue screen shots were for outdoor composites, I opted to build my own screen and use natural sunlight for the lighting. In the bluescreen extraction software I am utilizing, the light intensity on the screen must be the same as that on the subject, else the software is unable to determine where the foreground ends and the background begins (this usually results in hair and other fine edge detail being lost in the composite. Ensuring this balance in a studio with artificial lighting is difficult, but in sunlight the process is automatic, since sunlight is uniform.

Since there are five indoor blue screen composites (a morph from a drill into a pistol, a morph from a plunger into the electronic ax, the mirror shot (described below), and two shots in the jail cell) I filmed these in the television studio under controlled lighting. I quickly learned that the more information I possessed from the shooting of the background plates, the better. For instance, I had recorded the camera's height and focal length for each plate, but had neglected to record information about the position and wattage of lights, guessing that I could reconstruct the lighting layout from my video tap footage shot along with the plates. The small, blurry, black and white video signal turned out to be insufficient for gauging the lighting, and I was forced to guess on these shots where the lights should be placed.

My homemade outdoor screen initially consisted of a 12' x 6' linoleum sheet painted with the Roscoe blue, attached to a frame made of PVC pipe. I chose PVC pipe because of its light weight and ability to be assembled with inexpensive connectors into a variety of frame configurations. Problems arose, however, when the screen was erected

and a mild breeze caught the screen. The frame proved to be too weak to support the screen in even the slightest wind, and the PVC frame had to be scrapped. As of the writing of this paper, I am constructing a new, sturdier frame.

The Mirror Shot: The most complicated composite in *Insomniac* occurs inside the shed in which Dave hides after being pursued by the monsters. The shed interior was provided by a large garage populated by tools, dust, and miscellaneous clutter. Immediately after Dave finds a drill which morphs into a prop gun, he sees something out of the corner of his eye, spins to point the gun at it, and sees that it is only his reflection in a standing oblong mirror. He waves at his reflection, and to his surprise the reflection Dave waves back, then tosses the real Dave his gun out of the mirror, giving Dave some extra firepower.

This effect, which has been filmed in its entirety (three layers) but has not yet been assembled, is achieved by replacing the actual mirror image of Dave with an artificial one. It would have been simple to start the shot with an artificial Dave inserted over the mirror, but I felt that a more impressive shot would have the camera pan from Dave to the mirror before the reflection took on a life of its own. The key to doing this is inserting the new mirror Dave over the mirror frame after the camera has stopped. Right after the camera stops panning, Dave waves his arm in front of the mirror; as his arm moves across the mirror, a matte line follows the back of his arm and the new image of Dave appears. Such animated mattes can be best created in Elastic Reality. The movement of the arm should disguise the fact that a new image exists in the mirror, and once it is past, the new Dave image begins to speak.

The new mirror Dave consisted of a blue screen shot filmed at the distance from Dave to the mirror plus the distance from the mirror to the camera. Positioning the camera in the television studio to capture this element was difficult, since the angle of the mirror with respect to the ground was not recorded, and without this information it was possible only to guess what angle to shoot Dave from based on the video tap footage.

This element will be composited over a background plate of what stood behind the real Dave on the set, and then the combination of these two will fit inside the expanding matte following the real Dave's arm. In order to make the gun cross from these layers to the layer containing the real Dave when it is thrown, the gun will be extracted as a separate layer from the blue once it leaves the mirror Dave's hand. This last layer will be composited on top.

Planning a shot like this takes time, and executing it is a long, drawn out affair. The mirror shot, like its companion blue-screen shots which require careful positioning and timing, is but one of the reasons *Insomniac's* completion is several months away.

The Human Factor: A recent setback which occurred during the production of *Insomniac* serves to illustrate the indifference and carelessness which impedes the no-budget filmmaker. Since I chose to shoot Kodak 7268 for all my outdoor scenes, in order to reduce grain and give me a low ASA for bright sunlight, I require a number 85 filter on my lens at all times to compensate for the color difference between indoor light generated by tungsten bulbs and natural sunlight. 7268 is color-balanced for indoor use with tungsten lighting, and without the filter, anything shot with sunlight will have a pale, bluish cast, which necessitates color correction to achieve proper skin tones. While shooting the first 800 feet of 7268, I used a combination 85 and neutral density 6 filter (a filter which lessens the amount of light reaching the lens without altering its color) which I borrowed from a friend. During the period when I was filming indoor scenes (including the real jail cell, the mock jail cell, the classroom, and my apartment), I had returned the filter to my friend, and it was subsequently sold without my knowledge. When the time came to resume outdoor filming -- this time against my homemade blue screen -- I asked for the filter back and was informed that it was gone. Since shooting blue screen footage without the filter would entail color correction, which would then alter the color of the blue backing and possibly ruin the matting process, all shooting would have to wait for the

filter. As sole property master for the entire production, situations arise like this arise at least once a week, and are compounded by the fact that the no-budget director must order most of the items in his or her repertoire through the mail, unless he or she lives in a cinema-savvy metropolitan area. So when a crisis arises and new equipment must be bought, the solution is always two to three days away, and always expensive. The delay is further exasperated by incompetence, ignorance, and indifference on the part of mail-order retailers accustomed to large orders from upscale productions. After scouring my catalogs for the filter I needed, I located one from a Tennessee film supply house. Not only did they ship me the wrong filter, they charged a price which belonged neither to the correct nor the incorrect order and refused to take responsibility. Thus my already tenuous shooting schedule was delayed yet again.

Big budgets command respect from all involved in a large feature production. Not only does this apply to vendors selling production equipment and supplies, but also to actors and crew (which in my case were often the same individual). Naturally, in the no-budget realm it is difficult to convince people to subvert their schedules in order to assist in a film. Without being paid, cast and crew can come and go as they please, and coordinating a shoot often results in waiting for all involved to be free at the same time. This process is comparable to a least common multiple problem: students typically have cyclical schedules based on the intermittency of tests and projects, with a series of 'busy' days usually followed by a string of 'free' days. The shoot can occur on the next day that everyone is free, but only if the weather permits and if all the equipment is working. This rarely happens. What at first appeared to be a short project stretched into a year-long affair in large part because of scheduling problems.

Financial Woes: Inadequate funding is a fact of life for the no-budget effects filmmaker. Thus most of the decisions which resulted in production delays resulted from lack of money.

Case in point: Transferring images from film to video is expensive. Transferring them to high-quality video, such as Betacam SP, is exorbitant. Since video transfers are done by the hour, and the sum total of *Insomniac*'s footage would not exceed one hour, I can only afford to transfer to Beta SP video once. This means that I cannot order the transfer until every last film element is shot. This is the largest single snag in *Insomniac*'s production. Not only am I unable to know if certain shots turned out correctly (I was able to transfer the first 30 minutes of film shot for *Insomniac* to low-quality VHS to verify some of the shots), but I cannot begin any effective editing or image processing until the shooting ceases.

Another example is my reliance on mail-order supplies. In addition to the filter example above, the start of production was delayed three weeks while waiting for a \$700 video tap, bought with personal funds, to be shipped from a film supply house in New York. It was crucial to have a video tap for this picture, since many camera moves and positions made it impossible for the viewfinder to be used. In addition, I wanted to be able to record what the camera was viewing as it happened for instant feedback, so that complex shots could be verified for correct framing and action.

Postproduction

Insomniac's postproduction began when I received my first video transfer on VHS tape. Since Beta SP, not VHS, is my final video format, the usefulness of the VHS video is limited for postproduction purposes. The tasks waiting at the end of production, and the receipt of the beta tapes, are video and sound editing, computer modeling and animation, scoring, and image processing. Each of these tasks has already begun to a certain degree.

Video and Sound Editing: All video and sound editing will be accomplished on *Insomniac* using the same tools broken in on a film I made last year, *Vector*, although I purchased a new computer system expressly for *Insomniac*'s enhanced effects demands. The system is designed around a Pentium-Pro based PC with a Turtle Beach Multisound Monterey for digital sound recording, and wave and MIDI playback; a DPS Perception Personal Video Recorder system for component video digitization and playback; a dedicated high-speed fast SCSI-2 AV drive which can store up to 15 minutes of compressed video, 4 gigabytes of IDE hard disk space, and a tape backup drive.

The Perception card is a truly unique desktop video tool, in that it can record and play back video at near broadcast quality (4.5:1 compression) yet is extremely affordable (\$2500) by video product standards. Systems with similar functionality (albeit superior features, speed, and usability) can cost \$25,000 or more. Currently, DPS also markets a lossless D1 capture system for the PC, which can be used to achieve truly professional-looking video results. These types of products are helping digital effects migrate away from large studios and mainframe computers to the more populist desktop level.

Utilizing the Turtle Beach sound card, source audio such as dialog can be digitized and edited losslessly. Because I used a digital audio tape (DAT) recorder for source audio on *Insomniac*, my initial results from sound editing are almost noise-free. The MIDI features of this low-cost (\$350) sound card are impressive, and already have yielded impressive results for my initial score.

Almost all video and audio editing is being performed in Adobe Premiere, a multi-featured software package which is capable of interfacing with the Perception card and processing its proprietary video file format. As my system is nonlinear, clips of video can be imported into a construction window, cut and pasted, trimmed, and deleted via simple menu-based commands. Audio editing and mixing is similarly easy, with features such as a graphical 'rubber-band' tool for setting levels on each audio track, sound filters, and a convenient playback interface.

All video and audio, once edited, is compiled into windows Audio Video Interleaved (AVI) format and can then be stored off-line on a tape backup device. Due to limited disk space, each scene must be edited separately then moved to backup storage in this fashion.

Computer Modeling and Animation: Because of the high cost of computer animation and modeling software, and the unique hardware demands of this type of graphics, I chose to perform these tasks on a Silicon Graphics O2 workstation in the Computer Science department at A&M. The software package being used for both modeling and animation is SoftImage 3D.

I have already begun modeling the CG monsters but will likely not finish before mid-summer. There are several reasons why this portion of the film is stalled. First, since I have no prior experience with SoftImage, I must learn the software as I work, which is a slow and clumsy process. If I had time for a proper learning period in which I could methodically complete each of the tutorials included with the documentation, my 3D tasks would proceed much more smoothly, but this is not the case. Second, my disk space on the Silicon Graphics system is limited to 15 megabytes, making it impossible to accomplish anything substantial. Before I can proceed at full speed in this area, I must upgrade my home system with an OpenGL accelerator card to enable it to run this type of application, at an additional personal cost of at least \$1000. At this time the funds for this do not exist.

The only 3D effects chore which has been completed as of the writing of this document is the modeling of the electronic ax based on the actual prop.

Scoring: Utilizing a newly acquired MIDI controller keyboard, the Turtle Beach sound card synthesizer, and a sequencer called Turtle Tools written by Turtle Beach, I have been able to write a nearly-finished title theme for *Insomniac*. More thorough musical scoring

must wait for the very end of preproduction, when the flow of the action is definite and matching incidental music can be written.

Image Processing: Image processing includes color correction, image warping, digital painting, and compositing. Color correction is being accomplished as video is digitized from the source tapes into the computer. Gain settings for brightness, contrast, and RGB values can be set on the fly to cancel out bad colorization of the source video. All image warping will be accomplished in Elastic Reality, which allows the user to define shapes over portions of an image then deform those shapes along with the associated image portion. ER will also be used for the two morph sequences, already filmed. Digital painting and compositing, including bluescreen extraction, will be accomplished using Adobe Photoshop and Premiere, respectively.

Conclusions

It is difficult to draw conclusions at this stage in *Insomniac's* production, largely because my only feedback from the production process consists of 30 minutes of VHS tape (which, it must be kept in mind, represents a tremendous amount of filming work for a single person with a crew of two at most). I can, however, conclude several things about the process to date.

First, storyboarding is essential. Without the 400+ drawings I created for *Insomniac's* 314 shots, managing shoots would have been impossible. Using storyboards as an instruction book while filming ensures that what a director shoots is both optimal and complete..

Second, 16mm film looks good. Despite the fact that I ruined several shots by relying on the video tap for focusing, many of the shots processed thus far look very professional, and would be well suited for commercial production. If I were to begin a

commercial after *Insomniac* is completed with the knowledge that my video tap is unreliable, I would be able to shoot perfect live-action and background plates at a fraction of the cost of a complete professional film unit. It is also important to note that had the funds for immediate video transfer been available, I would have known immediately of the focusing problem and taken measures to correct it. Even with the cost of repeated video transfers, I would still be operating at a total cost much less than the average film unit.

Third, and most importantly, producing a project such as this requires full-time commitment. That isn't to say it can't be done; to the contrary, I have made steady progress since last fall, and the end is in sight. The rigorous nature of covering every role in a film from beginning to end (other than that of actor), though, demands complete devotion from both the filmmaker and the actors. Unfortunately, this is not possible when all involved must attend to schooling and jobs.