Ron Beaufort Training, LLC
5900 Core Avenue, #102
Charleston, SC 29406
843-437-1883   www.ronbeaufort.com

Hands-On Technical Workshops
by Ron Beaufort
The Boot Camp Experience

The Original PLC Boot Camp is definitely NOT just "training as usual"

Our intense five-day classes are 100% guaranteed to provide the troubleshooting and problem-solving skills required by maintenance technicians who work with equipment controlled by Allen-Bradley PLCs.

They call this the "Boot Camp" for a reason. This is serious training for students who are highly motivated - are willing to work hard - and who enjoy a challenge.

Here's what makes us so different - and so effective ...

---

(1) we skip the boring lectures - because most students would fall asleep after a few minutes anyway ... instead we assign one hands-on project after another ... nobody ever sleeps through those ...

(2) we never use PowerPoint slide shows ... there's nothing "powerful" about them ... no matter how many fancy frames you use, or how you spin the images, it's just impossible to make a picture of a PLC seem exciting ...

(3) we never use overhead projectors ... these are even worse than PowerPoints ... the drone of that cooling fan will put even the most enthusiastic students to sleep ...

(4) we never assign more than one student to a workstation ... you can't learn to play the piano by watching your neighbor practice ...

(5) we keep our class sizes small ... never more than six students at a time ... but supervisors are always welcome to "sit in" and watch the proceedings ...

(6) we don't waste time teaching outdated subjects - like manual conversions of "binary numbers" ... the Windows Calculator takes care of those operations automatically ...

(7) the instructor maintains a constant two-way dialog with the students to find out what they're thinking ... this helps him correct any misconceptions that they might have ... secret handshake: students don't always know what questions to ask ... the instructor needs to probe and seek out confusion - and then eradicate it ... the instructor can't do that while lecturing from the front of the classroom ...

(8) our "PLC Boot Camp" classes are specifically designed to provide useful skills for plant maintenance technicians ... we continuously stress the interactions between the field inputs, the PLC processor, the field outputs, and the indications on the computer screen ... these are the skills necessary for troubleshooting and maintaining systems controlled by PLCs ...

(9) we love it when the students make mistakes ... we think of them as "opportunities for educational advancement" ... isn't it better to make the mistakes in the safety and privacy of the lab – rather than out on the plant floor? ...

(10) even the instructor makes "mistakes" - and the students are required to recognize and correct them ... usually these are tests - often based on popular misconceptions ... something like: "when it's green on the screen, it's true" ... now there's a trap for the unwary ...

(11) the students spend almost as much time at the whiteboard as the instructor does ... they're constantly drilled in analyzing and discussing the interaction between field inputs, the processor scan, the field outputs, and the indications on the computer screen ...

(12) we don't schedule breaks except for lunch ... if we need a break, we take one ... other than that, we just keep right on working - and learning ...

(13) at the end of each day, the instructor always asks the same question: "Did we cover anything today that was trivial, useless, or not worth our time?" ... the answer from the students is always a resounding "No!" ... it's all good stuff ...

(14) Friday is intended to be a full day of training ... we understand that many of our students need to get to the airport – and we'll work with you as much as possible ... just please make sure that your company's human resources department doesn't save $80 on the ticket by scheduling your flight home for 9:00 o'clock Friday morning ... that's been done before ... the best plan is to stay over Friday night ... we won't run out of useful PLC stuff to talk about at noon on Friday ...

(15) students invariably tell us how "drained" they feel at the end of each day ... this is a lot like mental weightlifting ... no pain – no brain ...

(16) we don't "over teach" the way most instructors do ... you won't hear much along the lines of: "Look out, Johnnie, you're typing in the wrong address there." ... instead we'll let the student go ahead and make the mistake – and then make sure that he learns from it ... "trial and success" – how many times have you heard that one? ... it's the "trial and error" lessons that stick with you ...

(17) our classes are generally a lot noisier than most technical training sessions ... nothing violent - but some students really get caught up in the group discussions ... people down the hall have told us that it sounds more like a Super Bowl party than a technical training class ...

(18) all of our students stay continuously and actively involved in the learning process ... the more experienced students don't get bored ... the beginners don't get overwhelmed ...

(19) as long as there aren't any proprietary or trade-secret concerns, we invite our students to bring in a copy of their plant's PLC programs ... the instructor will be glad to point out places where the same concepts being covered in the class are used in the student's own program ...

(20) we have plenty of equipment for everyone - but sometimes students like to bring in their own laptop computers to use in the class ... that's fine with us ...

(21) our classes are more than just "hands-on" ... we make sure that each exercise becomes a "minds-on" experience ...

(22) we concentrate on the "learn by doing" approach that maintenance technicians prefer ... it works a lot better than the old "talking is teaching – listening is learning" method ... other instructors have been getting away with that for a long time ...

(23) all students are not created equal - but we can easily accommodate students at different levels in the same class ... suppose that Experienced Ed is already working on Lesson #4 ... maybe Beginner Bob is still plodding along on Lesson #1 ... that's not a problem in our classes since we only allow one student per workstation ... Ed and Bob are both learning at their optimum levels ... every student makes progress ...

(24) most of our competitors follow the same training method that educators have used for years ... first give a lengthy lecture to "introduce the material" ... then assign a short, hands-on lab session to "reinforce the material" ... so guess where most of the learning actually takes place? ... (a) in the lengthy lecture ... or (b) in the short, hands-on lab session ... do you see a problem with time allotment here? ...

(25) our "PLC Boot Camp" classes start out at a beginner level, but it's extremely common for students with several years of experience to say, "Man, I never knew that!" ... our first morning session is always quite an eye-opener ... we destroy a lot of myths, superstitions, and misconceptions before lunchtime on Monday ...

(26) our customers are always amazed at the scope and the depth of the material which we can teach in just five days ... skipping the lectures saves a lot of time ... when other instructors give their lectures, what level student are they talking to? ... if they're aiming for Experienced Ed's level, what's poor Beginner Bob going to get out of the lecture? ... if they shoot for Beginner Bob's level, then somebody needs to wake up Ed when it's time for the next break ...

(27) our "PLC Boot Camp" classes include actual wiring exercises ... we've found that there's something almost mystical about hooking up a bunch of buttons and lamps and things to the PLC modules ... for many of our beginner students, this is where the "big picture" ideas really start to fall into place ... concepts like the relationships between the I/O addresses and the screws on the modules just never seem to make much sense for some students until they actually connect those wires for themselves ... normally open ... normally closed ... failsafe wiring ... no matter how much you discuss them, they all take on a new significance when it's time to hook up the real-world wires ...

(28) our wiring exercises don't come with a full "cheat sheet" wiring diagram ... there's a separate sheet for each PLC module ... and there's another sheet for the inputs and outputs ... but we don't hand out a sheet that shows them all connected ... sure, we'll coach the students who need help - but making a complete circuit is part of the exercise ... the wiring project takes about thirty or forty minutes - and it's well worth the time and effort ...

(29) years ago people used to ask us: "Why does a technician need PLC skills since the majority of problems are caused by the field devices – and not by the PLC or its program?" ... we don't hear that question too much anymore because experienced maintenance managers realize that all of their field devices are tied together by the PLC's ladder logic ... suppose that the problem with a field output (such as a pump) is being caused by a field input (such as a switch) ... if the technician doesn't have access to the PLC's ladder logic which ties the inputs and the outputs together, then he's going to have a hard time tracking down the problem ...

(30) suppose that Beginner Bob is troubleshooting a problem in the field ... what happens when he tracks the problem as far as the PLC? – if Bob thinks of the PLC as a mysterious "black box", then he'll probably have to call in Experienced Ed for help ... how much lost production time does that cost? ... what if Ed's away on vacation? ...

(31) our "PLC Boot Camp" courses are designed to remove the mystery of PLCs ... we make sure that technicians know how to troubleshoot the system all the way from the inputs in the field – through the logic of the PLC – to the outputs in the field ...

(32) we don't conduct "sales pitch" training ... you know - the ones where the text book turns out to be the manufacturer's product catalog ... most of those courses merely compare the specifications and capabilities of Model-X with Model-Y ... information like that doesn't help a technician troubleshoot a pump that won't run ...

(33) our courses don't include trivial topics such as the type of Motorola or Zenith chip used inside the PLC processor ... that type of information is absolutely worthless to a plant maintenance technician ...

(34) our "PLC Boot Camp" classes include a detailed understanding of the processor's scan cycle ... the students are repeatedly drilled to perform a step by step analysis of how the field inputs are sampled, how the ladder rungs are executed, and how the field outputs are controlled ... we've found that the vast majority of students – even those with years of experience – come into our classes with serious misconceptions about these critical ideas ... once we've worked past these misunderstandings, things which once seemed so baffling and confusing suddenly become crystal clear ... for many of our students, removing the mystery of what goes on "under the hood" is the all-important key to fully understanding PLCs after years of frustration ... and we cover this critical lesson before lunchtime on Monday morning ...

(35) many other instructors use the statement: "the scan is too fast – it's too unpredictable – it's too random - you can't understand it" ... this is their fallback excuse whenever the screen display just doesn't make sense ... this argument is hogwash ... we teach our students how to understand, analyze, monitor, and test the scan sequence every step of the way ... we go far beyond what the computer screen normally shows ...

(36) many students are amazed with how much talking they do in our classes ... the instructor doesn't just talk "at" the students ... instead he keeps them engaged in a two-way discussion ... this is the best way to find out what misunderstandings and misconceptions they have in their heads ... all of these need to be corrected before the class is over ...

(37) many misconceptions about PLCs have been handed down over the years from one technician to another ... for example: "an XIC examines a switch to see if it's closed" ... that analogy is close enough to work in many cases – but it doesn't work in all ... but years ago someone made up that erroneous "rule" and it's been passed along ever since ... no wonder some people have such a hard time learning about PLCs ... some of the "facts" that they're being told are incorrect ... we clear up a lot of misconceptions in our classes – many of them before lunch on Monday ...

(38) our "PLC Boot Camp" classes develop problem-solving skills ... this is a big one ... many of our new customers are plant maintenance managers who supervise large crews of technicians ... one of their most common requests is: "Can you please teach my technicians how to THINK?" ... along the same lines: "I've already sent my guys to other PLC training classes – but when they get back, they still can't do the job." ... in most cases we find that their technicians already DO know how to think ... the problem is that the training they've received from our competitors has only given them information about how a PLC-controlled system is "supposed to work" ... no one has ever shown them how to proceed when the system DOESN'T work ... in other words, their previous training has never exposed these guys to any realistic PLC problems ... our classes are focused entirely on problems ... one problem after another ...

(39) we force our students to use a systematic approach to solving problems ... occasionally they get a little frustrated when we insist that they go through all of the steps involved ... most of the time they'd rather just scroll up and down through the ladder program using the "hunt and peck" method ... we won't allow that ... instead we force our students to learn and to use the tools that are available to them ... things like the software's Find All, Cross Reference, and other search features ... even the hardcore "seat of the pants" students eventually buy into the idea ... when the plant's program has hundreds or even thousands of rungs, their favorite scrolling method wastes time and money ... knowing how to systematically track down the problem from one component to another is a critical job skill for every maintenance technician ...

(40) how well can a student learn problem-solving skills in a training session that never has any problems? ... most of our competitors do everything possible to prevent problems and mistakes from ever happening in their classes ... so where does a maintenance technician go to learn problem-solving skills? ... send them to us ... we'll show them one realistic problem after another – and make sure that they learn a systematic approach to solving those problems ...

(41) our "PLC Boot Camp" classes develop self-confidence ... we're convinced that improving each student's self-confidence is immensely important throughout the training process ... no matter how much knowledge the student possesses, it's all practically worthless without the self-confidence required to make use of it on the job ...

(42) a key component of basic military training used to be the "Obstacle Course" ... the same old ropes and walls are still there today, but now the sign out front says "Confidence Course" ... we go along with the military's opinion that the best way to build self-confidence is to overcome obstacles ... our "PLC Boot Camp" courses specialize in presenting obstacles for the student to overcome ... sure, we'll coach when necessary – but the only way to build self-confidence is to climb up the rope and over the wall yourself ...

(43) our floor plan arranges the workstations around the perimeter of the room – with the students facing outward ... the instructor can easily circulate and take care of anyone who needs extra help ... he can also assign extra projects to anyone who finishes early ...

(44) our projects aren't simple "canned" lab exercises - so the instructor constantly circulates around the room and continuously monitors each student's progress ...

(45) the same floor plan also helps when one student comes up with something really interesting ... all of the other students can quickly gather around the lucky workstation and take part in the discussion ... something like: "Why won't Johnnie's motor run?" ... our lab computers are networked so it would be easy to broadcast Johnnie's screen to all of the other students' stations ... even so, it's critical that the students all come over and gather around - because we're teaching how the PLC "fits in" to the whole industrial system ... sometimes the problem with Johnnie's system can't be spotted by looking at the computer screen display alone ...

(46) our classes teach the students to consider the entire system while troubleshooting ... everything including the I/O power supply, the field inputs, the input module, the LEDs on the input module, the input's status on the screen display, the ladder logic program, the output's status on the screen display, the LEDs on the output module, the output module, the field output, and of course all of the wiring between these components ... we continually stress the fact that the PLC program is only one part of a complete system ... a technician needs to understand a lot more than just what shows up on the computer screen ... our classes constantly drill the students to look at the "big picture" - as well as the "details" - while troubleshooting ...

(47) the projects that we assign are carefully designed to present realistic problems to the students ... these are the same types of problems that will be encountered back at the plant ... once the student recognizes the problem, then the instructor coaches the student through a systematic approach to a solution ... so ... see a problem - solve the problem ... see a problem - solve the problem ... that's bound to be more useful in the long run than listening to a lecture ...

(48) sometimes we're asked if it's ok to bring in a recorder and tape the class ... that's fine - but you're pretty much wasting your time ... remember there aren't going to be any lectures ... the recorder might catch what we were saying – but you won't be able to tell what we were looking at ... or what we were pointing to ... so how about a video recorder? ... we don't mind – but that's been tried too ... we move around a lot in these classes ... good luck keeping us in focus ...

(49) our "PLC Boot Camp" classes are not intended to teach "programming" ... the boss would get very upset if his maintenance technicians came back to the plant after learning nothing but programming skills ... so we concentrate on real-world skills that are more useful to technicians ...

(50) on the other hand, our students do write a few programming exercises in the "PLC Boot Camp" class ... but the objective is always to drive home the interactions of the field inputs, the PLC processor, the field outputs, and the indications on the computer screen ...

(51) some people misinterpret our "boot camp" style as meaning just "basic training" – but in fact, our courses go far beyond the basics ... actually, the "boot camp" name refers to the total immersion in the material, the constant hands-on drilling, and the self-confidence that our students develop from our learn-by-doing approach ...

(52) we treat a lot of the course material on a "need to know" basis ... for example: when the first problem which requires the use of floating point memory pops up, then the instructor will discuss floating point memory - but not before ... this approach is highly effective because the information is transferred at the precise moment when the students are intently focused on a need for it ... when the solution is presented this way, the students make a firm mental connection between the problem and the solution ... these are the types of lessons which stick best in the human mind ...

(53) simple techniques allow us to pack more useful knowledge into our five-day classes than most colleges are able to cover in a full semester ... our college-educated students frequently make that particular comparison ... they're always amazed at how much they're able to learn, and understand, and remember – all while thoroughly enjoying their time in our classes ...

(54) our five-day classes cover everything from beginner-level all the way through analog signals ... students leave the class with enough knowledge to return to the plant and go right to work - plus a solid foundation that they can keep building on for the rest of their careers ...