

*Computed Radiography in Casting
Manufacturing*

Doug Kelly
Carley Foundry

25 YRS. NDT Experience

1. Over 16 yrs. with Hitchcock Ind.
2. 8 yrs. Carley Foundry.
3. Radiography, Flourescent Penetrant.

Level III

A. Honeywell, Boeing, Pratt & Whitney,
Bell Helicopter.

Turntable

1



1st Introduction to C.R.

1. Asked to be part of an evaluation team to review digital radiography. 1999-2000.
2. Evaluated Selenium Plate, Computed Radiography.

Questions/ Concerns

1. Sensitivity – 2-2T was achievable only with magnification.
2. Reference Images.
3. Acceptance as final inspections.
4. Plates and Screens were only available in limited sizes.
5. R.O.I. (Return on investment)

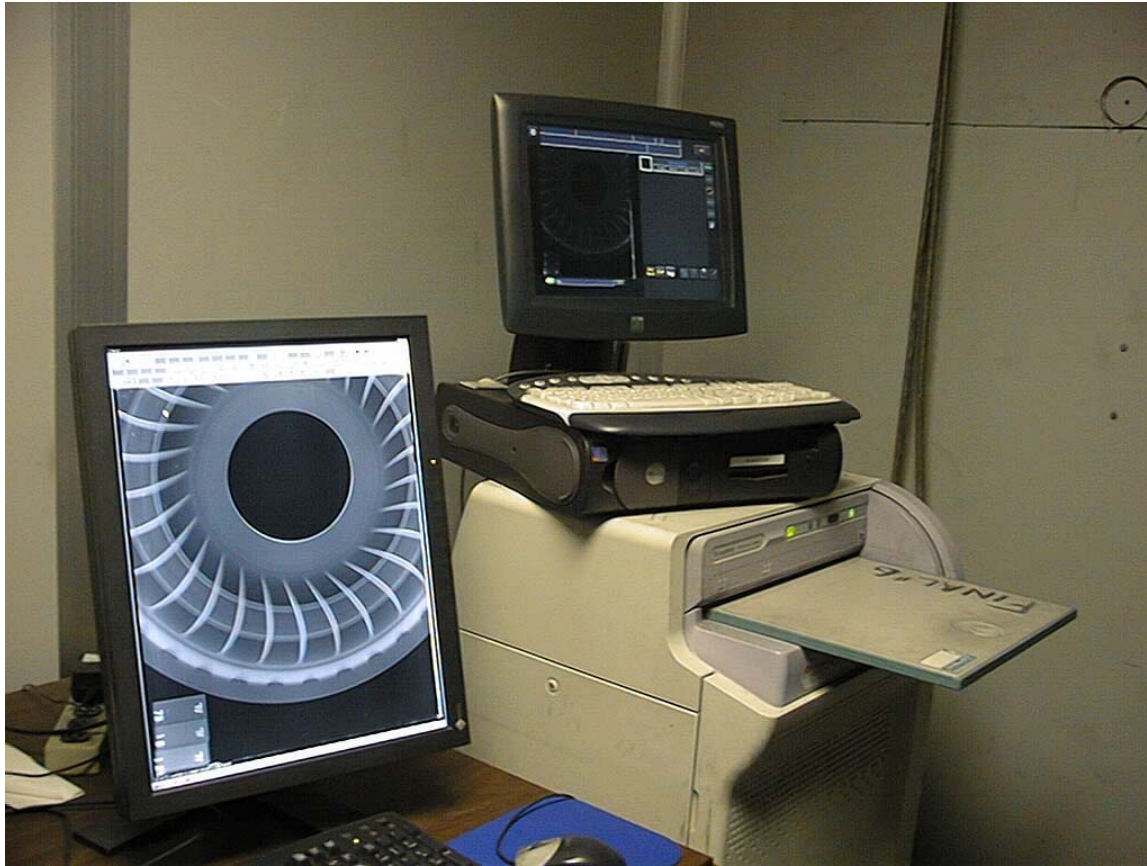
Carley Foundry

1. Has been in existence for over 50 years.
2. We offer Dry sand, Greensand, Investment, Permanent Mold both low and high pressure.
3. We offer Aluminum and Steel Castings.
4. Complete pattern shop with machining capabilities.
5. Latest technology in manufacturing and inspections of castings.
6. Purchased a Selenium Plate for in-process inspections.

2nd C.R. Evaluation

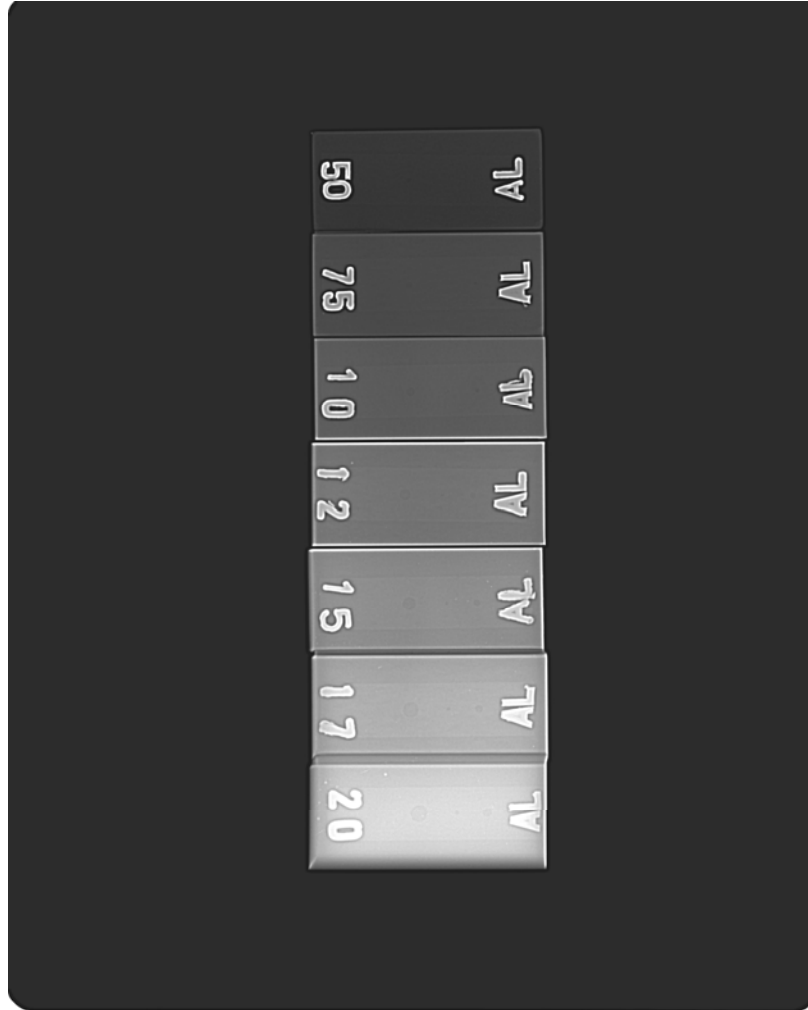
- 1. Looking for alternative radiography inspections. (Real-Time,C.R.)
- 2. Main objective was to reduce film usage and get something versatile.
- 3. Achieve 2-2T Sensitivity.
- 4. Found CR has screens available in 14x17, 8x10, 10x12.
- 5. 1/1 ratio would still produce 2-2T sensitivity.
- 6. Found that latitude was very good.
- 7. Exposure times were a lot less with CR compared to film.
- 8. Software offered many features to be utilized.

Computed Radiography, Fuji Series 4, 100 micron.



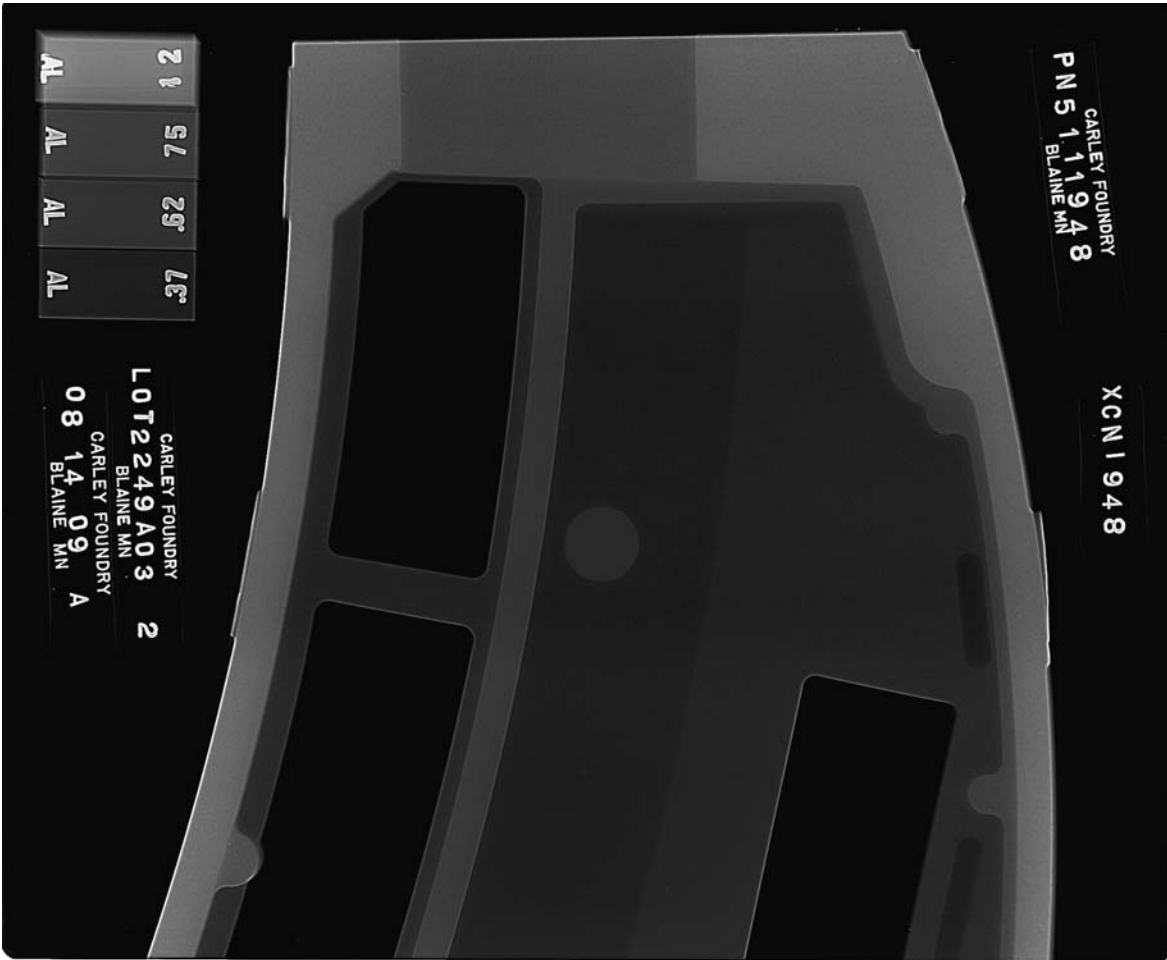
Latitude

1



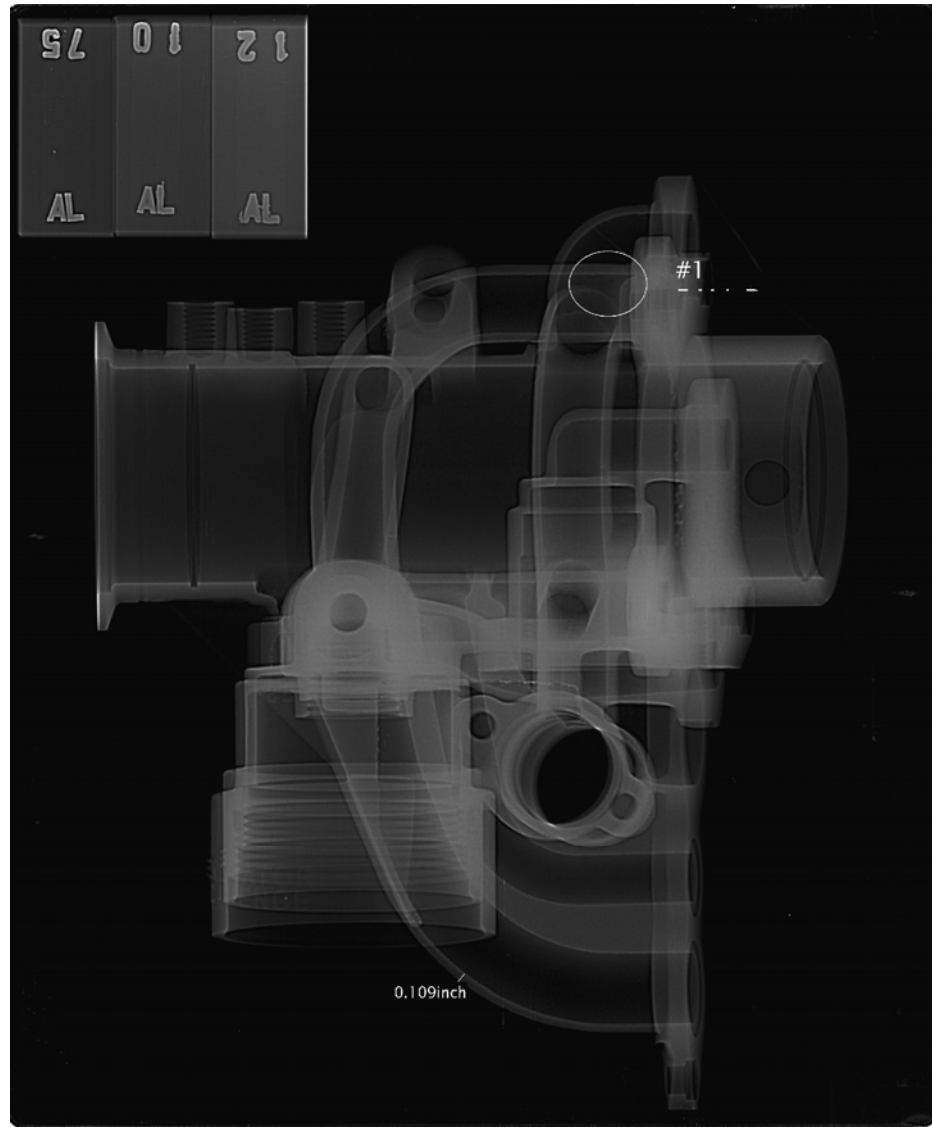
Latitude + Exposure

2



Annotation/Measure

2

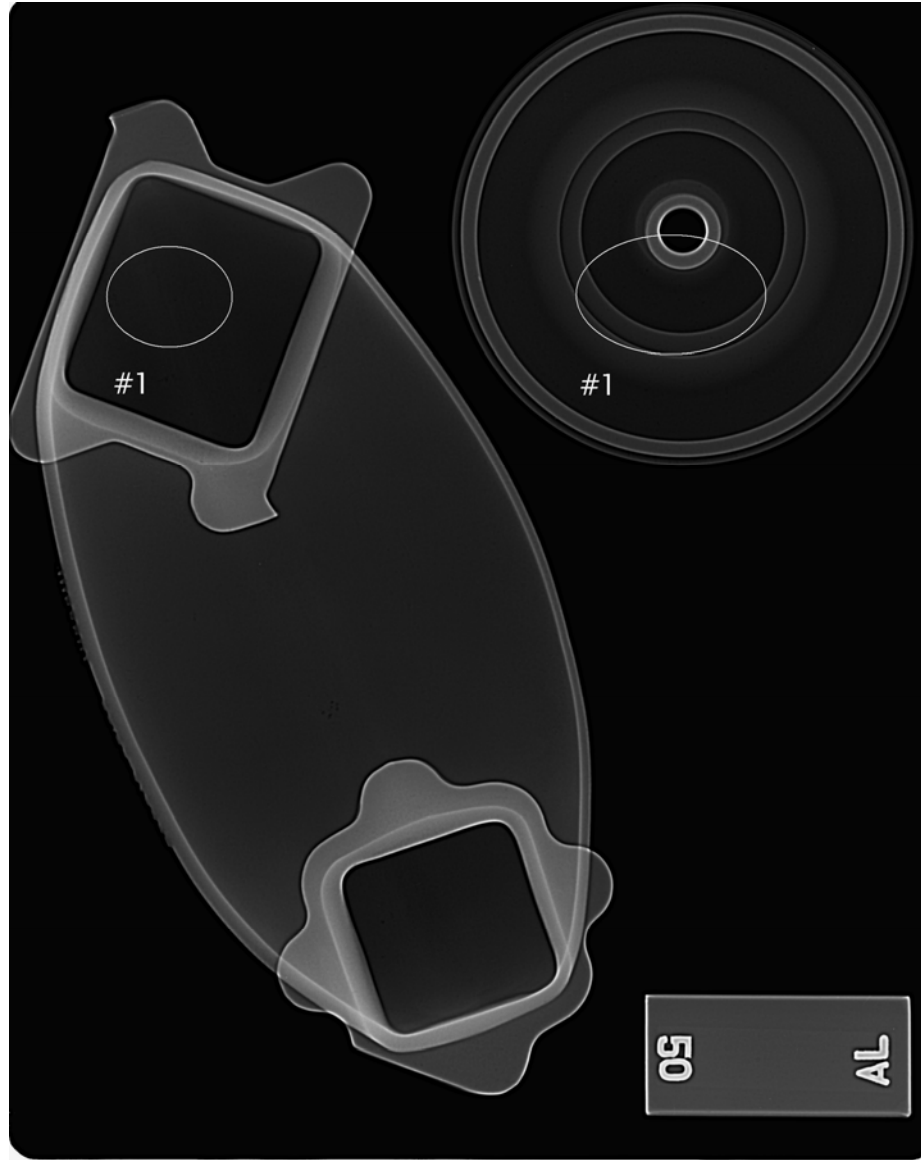


Developing System checks and Procedure.

1. Using the PS 21206.6 as guideline. (Boeing)
2. Monitor Degrading (resolution, brightness, contrast)
3. Screens & cassettes degrading
4. Finding known defects to use as daily checks.
5. Preventative maintenance.
6. Technique menu's to eliminate operator variables.
7. Exposure charts for CR.

8. Pattern Pro Demo

Daily Test



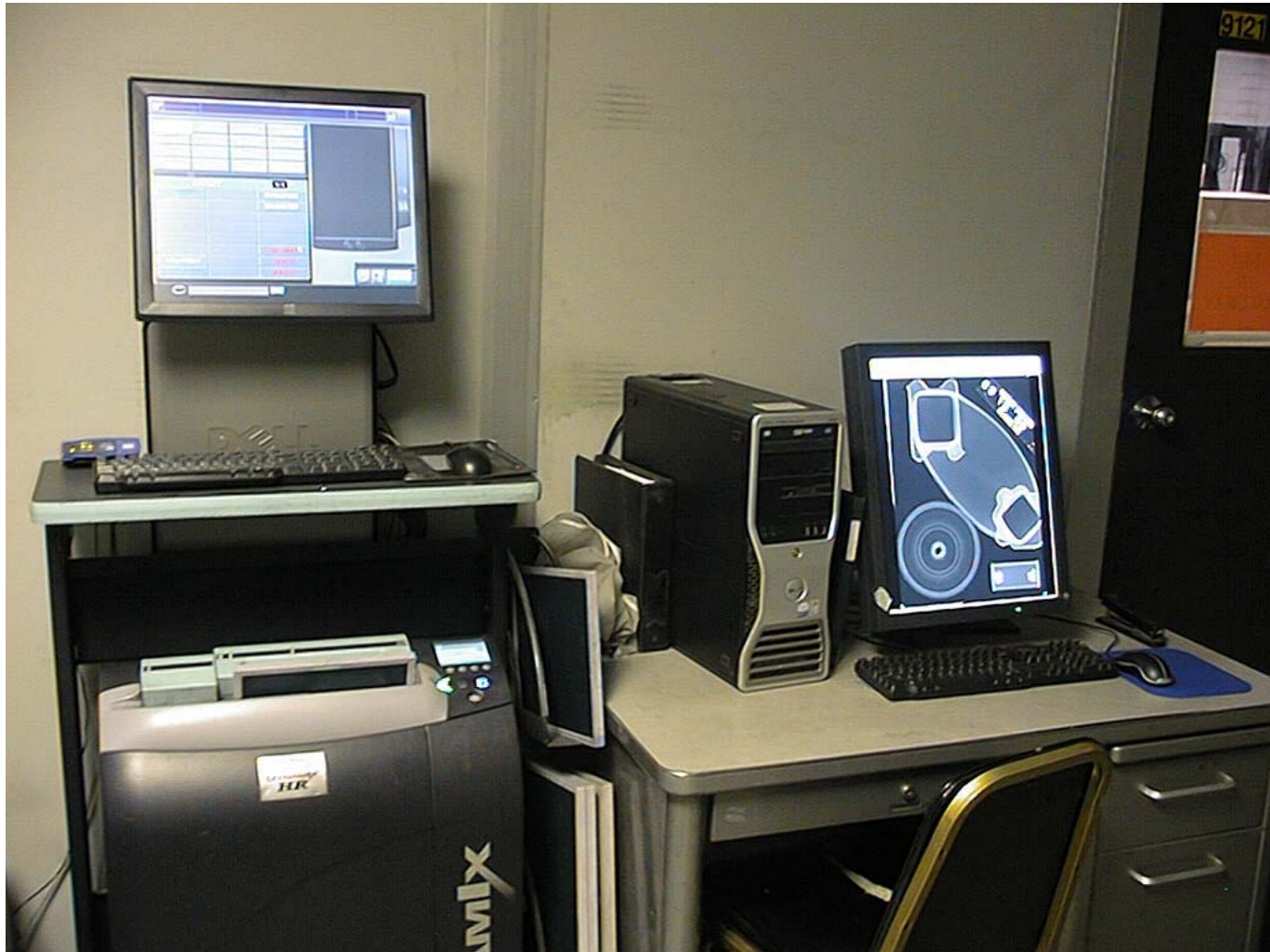
Pattern Pro

- 1. Monitor Brightness
- 2. Contrast & Resolution
- 3. Flat Field

- [Run Demo](#)

Fuji HR 50 micron

3



Advantages to CR

1. Screens & Plates were available in sizes common to film.
Techniques would be easy to convert.
2. Closest to film. (screen, cassette)
3. Versatility – Not limited to one area or machine.
4. 2-2T Sensitivity with very good latitude and 1/1 ratio.
5. Exposure time's were dramatically less.
6. Cassettes and screens are very durable and replaceable.
7. Software is very user friendly.
8. Technical support is very good.
9. Eliminates film cost and solutions (environmental)
10. Reduces storage for film. (DVD vs. Film)

Life of screens & cassettes

- Final 14 x17 screen – 1500 exposures
- Final 14 x 17 cassette – 8000 exposures
- After screens become worn then they are used for in process or foundry control.
- We have had screens last up to 7000 exposures also.

Customers that have approved C.R.

- 1 – Mid Continent – 24 parts
- 2 – G.E. Medical – 9 parts
- 3 – Textron Lycoming – 97 parts
- 4 – Harley Davidson – 18 parts

All in process parts that previously used film techniques.