Evaluation of pulse forming techniques using diode lasers feeding fiber amplifiers

Criteria:

1. Ability to change the repetition rate (say from 31 MHz to 750 MHz, 1497 MHz, 3000 MHz)
2. Pulsewidth
3. Timing jitter/phase noise
4. Ghost light, ghost pulses?
5. Level of complexity

Methods:

1. sine wave delivered to diode (we call this “analog” gain switching, what we’ve been using at CEBAF for years)
2. sine wave to a step recovery diode, or the Picosecond Pulse Labs pulse generator (driving the diode with a delta function instead of sine wave, we used to do it this way, and removed the step recovery diode because it didn’t seem necessary)
3. “digital” gain switching using the TTL pulse from the commercial divide-by circuit. This technique seems to depend on what fundamental frequency we apply to the divide-by circuit, e.g., 499 MHz vs 998 MHz, and whether the TTL pulse is 1 ns or 2 ns wide. Also in question, the fidelity of the amplifier we use to boost the level of TTL pulse before it is applied to diode laser
4. analog or digital gain switching at constant rep rate, and using an in-line fiber pulse picker to obtain lower rep rates
5. Operate the diode laser at full rated power, DC. Then use a fiber modulator to pass light at the desired repetition rate









